

WATER RESOURCES
Groundwater/PCAST National Workshop**August 16, 2024**
Special Report #2622

On July 22, members of the President's Council on Science and Technology (PCAST) hosted a workshop on Safeguarding America's Groundwater Security: Addressing Challenges and Risks. The workshop convened government agencies, key groundwater users, and community stakeholders to share insights and identify scientific and policy opportunities for enhancing groundwater management.

Governor Stephen Roe Lewis, Gila River Indian Community, provided the keynote address, providing a perspective of water management from a tribal sovereign nation. He emphasized the importance of a holistic approach to all water supplies, whether the source is surface water or groundwater: "What we do with one source of supply impacts other sources of supply." He said that data-driven innovation has become their mantra, and they have prioritized financial and technical assistance for infrastructure to use every drop of water. They have learned they cannot manage their water resources in isolation, that they must develop and sustain partnerships, which requires hard work and compromise. He said we need to act now to develop solutions for the challenges we face for all of our water supplies, but especially groundwater.

The PCAST Groundwater Working Group was established in early January 2024. Group Co-Leads are: Inez Fund, ScD, Professor of Atmospheric Science, University of California – Berkeley; Joe Kiani, MSEE, Chairman and CEO, Masimo; Steve Pacala, PhD, Professor Emeritus, Department of Ecology and Evolutionary Biology, Princeton University; joined by members Laura Green, Professor of Physics at Florida State University and Chief Scientist of the National High Magnetic Field Laboratory; and lastly, Catherine Woteki, PhD, Professor of Food Science and Human Nutrition at Iowa State University and Visiting Distinguished Institute Professor in the Biocomplexity Institute at the University of Virginia. <https://www.whitehouse.gov/pcast/members/>

During the workshop, the Working Group acknowledged that the federal government has very little jurisdiction over groundwater, which mostly falls under state and local jurisdictions, but that the need for some kind of policy is becoming apparent as patterns of use render some aquifers a non-renewable resource. Groundwater pumping is greater than recharge in many places around the country, and aquifers face additional challenges from climate, geology, and subsidence. Water quality for potable drinking supplies is paramount but has fallen short, particularly with concerns about emerging contaminants. Any policy must address the multi-dimensional needs, including domestic, municipal, tribal, grazing, agriculture, industry and others. They noted that groundwater management issues are local and heterogeneous.

The Working Group has made some initial tentative recommendations that will be revised prior to the PCAST report to the White House in November 2024. They talked about developing a central repository for transparent and available information, with an inventory of the quantity and quality of the groundwater storage, withdrawal, and recharge data at spatial and temporal scales that are useful for water managers and users. They noted the importance of enhancing the collection and synthesis of measurements of groundwater, especially in regions with limited access to potable water. Enhancing modeling and other software tools would support water management decisions and sustainable groundwater planning. Tracking groundwater movement and safeguarding clean drinking water could include a research program focused on chemical signatures of groundwater, to advance water monitoring, and recycling and recharge in different aquifers. The federal government could also develop policies and incentives (such as competitive grants) to encourage planning and sustainable management. They could add groundwater stewardship to federal agencies with responsibility for surface waters on public lands, noting that "the federal government does have jurisdiction there."

PCAST shared some of what they thought they had learned from the public comments: (1) currently available science and technology could drastically reduce uncertainties about the Nation's groundwater; (2) currently available technologies could increase supply in many locations as well as reduce demand at low cost; (3) groundwater science and technology continue to develop rapidly, implying that additional investments would provide new capability; and (4) water managers in some locations have taken effective action. PCAST highlighted the Local Enhanced Management Areas (LEMAs) created by the Groundwater Management Districts in Kansas, as well as local efforts in California under the Sustainable Groundwater Management Act to address concerns in a comprehensive way.

Most of the workshop consisted of lengthy breakout sessions with smaller groups, with discussions focused on: (1) incentives to effectively promote sustainable groundwater use and recharge; (2) mechanisms for water partnerships and collaborations that are effective for groundwater governance; and (3) engagement with communities.

Several discussions emphasized the role of the federal government in assisting States, Tribes, and communities with: (1) the timely collection and appropriate availability of data; (2) filling data gaps; (3) the need for a holistic context to understand data before it can be integrated; and (4) the need for national modeling efforts and standards. One participant said that modeling was in a “heroic age” as we move from disparate partial models to a consolidated picture with an appropriate granularity that becomes useful. Another suggested that good groundwater models are so affordable at \$10M-\$15M that they should be everywhere, but another noted that such a cost can still be out of reach for many communities. Water managers have commented that “all models are wrong, but sometimes they are useful,” and there is room for improving model reliability. Additionally, while models can provide interesting information, monitoring is more useful and diagnostic.

The federal government also has a role in supporting and expanding water monitoring networks on public and private lands (with voluntary incentives). Participants noted that some incentives work early on but cannot be sustained indefinitely. Additionally, data provided by government agencies is not always trusted by those who need data for thoughtful decision-making. Co-designing water data collection can reduce those uncertainties. Data collection objectives should be designed around the decisions they support. There are increasing concerns about data anonymity and private data ownership (appropriately compensating owners for the cost to monitor and report). There is a need for real-time, automated monitoring. Some data gaps are currently filled using proxy data sources: remote sensing, crop yield, power use, and demographic data. Data collection funding is needed for equipment and researchers.

There are legal frameworks such as interstate compacts and water rights where States take the lead. One participant recommended that, rather than focusing on a national effort to limit water use, to instead create new water for States to maximize use in ways that ensure our economic, social, and environmental success. Another discussed legacy issues related to property rights, and recommended a redistribution of rights.

There was some discussion of developing a common vision of groundwater as our national policy, with stewardship ideals for water management, without interfering in state jurisdiction and governance. Supporting water data and community engagement is an easier space to engage in a national policy. The federal government can set the tone and help facilitate those conversations around governance. One participant pointed out the connection between food security and water use, and noted that often the disadvantaged communities are also the agricultural communities that experience water scarcity. Another participant emphasized the importance of preventing biodiversity collapse. One noted that concepts of water certainty and water assurance for the future can change over time. A difficult challenge across the Nation is assessing the value of water use and uses.