Groundwater Management: A Policy Perspective

Sharon B. Megdal, Ph.D., Presenting Author
smegdal@email.arizona.edu
Andrea K Gerlak and Robert G. Varady, Coauthors

Groundwater Protection: Reflecting Progress & Responding to the Future
Groundwater Protection Council Annual Forum
St. Louis, Missouri
September 23, 2013
Outline

• Some background on the Water Resources Research Center (WRRC) at the University of Arizona

• International efforts related to groundwater governance and management and transboundary groundwater assessment
  – Stimulated interest in performing a national survey of groundwater governance

• Methodology utilized and results from an initial nation-wide survey conducted on groundwater governance
  – Dr. Robert Varady and Dr. Andrea Gerlak, University of Arizona Collaborators

• Interest in soliciting feedback and suggestions regarding additional research.
WRRC Mission

The University of Arizona Water Resources Research Center (WRRC) promotes understanding of critical state and regional water management and policy issues through applied research, community outreach and public education.

The WRRC is committed to:

- assisting communities in water management and policy;
- educating teachers, students and the public about water; and
- encouraging scientific research on state and regional water issues.

Web site: wrrc.arizona.edu
Some WRRC Projects and Programs

- Publications – Arizona Water Resource, Arroyo, Map, other
- Annual Conference
- Brown Bag Seminars
- Part of university-wide water programs
- Projects include
  - Groundwater governance
  - Transboundary aquifer assessment
  - Comparative policy analysis of growing, semi-arid, water-scarce regions
  - Water Education for Teachers
  - Rainwater harvesting
  - Water for nature
  - Watershed and community-based work
  - Relationship between surface water and groundwater in the Upper Santa Cruz region
- Teach graduate Water Policy course each Spring
Desalination, the removal of salts from water, is a growing concern in many parts of the world. It is not the "silver bullet" solution to water scarcity, but it can provide a valuable resource in areas where fresh water is limited.

Border Water So

What Makes Management of Border Water a Challenge?

The U.S.-Mexico border is not only a physical barrier but also an area where different environmental regulations and policies come into play. The management of water resources and the control of contaminants in the border area is a complex challenge.

The Need for Desalination

While desalination is a promising solution, it is not without its challenges. The cost of desalination plants is high, and the energy required to operate them can be significant. Moreover, the brine produced as a byproduct of the process can be challenging to manage.

Contaminants of Emerging Concern in Water

Contaminants of Emerging Concern Raise Many Questions

When the news reports on traces of birth control hormones or painkillers found in water, we do not know what to think. Is there any danger? How will these contaminants affect human and wildlife health? Should we be concerned? What should we do? Many water contaminants are the subject of regulations that protect water quality, but many more fall into the category of substances for which we do not have the knowledge to answer these basic questions. These include substances that have been called emerging contaminants or contaminants of emerging concern (CECs).

What are CECs?

The United States Geological Survey (USGS) provides a useful definition of CECs: "any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and/or human health effects."

In some cases, release of emerging chemical or microbial contaminants to the environment has likely occurred for a long time, but they were not recognized until new detection methods were developed. In other cases, synthesis of new chemicals or changes in use and disposal of existing chemicals creates new sources of emerging contaminants. In other words, CECs are any substances that we are beginning to suspect could cause harm. They may be new substances, or they may have been around for a long time but only recently become a concern in the environment. We may just be beginning to understand their effects on the environment or human health, or we may only now have the ability to detect them in the environment. Basically, they are substances we know very little about for all kinds of purposes, which
Arizona’s Experience a Model for Groundwater Governance

I have been traveling internationally much of the time since my sabbatical began at the end of February. I spent just over one month in Israel as a Lady Davis Visiting Professor at the Hebrew University of Jerusalem, during which time I traveled to Marseilles, France for the World Water Forum. In April, I spent some time in Montevideo, Uruguay attending the first regional consultation of the Global Groundwater Governance Project (see groundwatergovernance.org and the Quest View in the Winter 2012 issue of this newsletter). The project is designed to bring attention to the importance of groundwater for many regions of the world and to identify best practices or frameworks for good groundwater governance. Most recently I visited Australia, home to the famous Murray-Darling Basin and the object of much interest by water professionals. While I learned a lot during all of these trips, what these experiences have driven home is that, although we have a lot of opportunity to improve groundwater management in Arizona, we have accomplished a lot, and some aspects of our framework can be a model for other groundwater-dependent regions.

Why do I say this? Because I learned that Australians are very interested in our approach to banking Colorado River water and aquifer recharge. I spoke to this topic when addressing researchers at CSIRO, Australia’s national science research organization, and staff members at the Murray-Darling Basin Authority. While in Adelaide, I met CSIRO aquifer recharge expert Peter Dillon, who is responsible for writing the thematic paper on aquifer recharge for the Groundwater Governance Project. After some one-on-one discussions and review of documents, he is featuring Arizona’s approach to managing groundwater storage in his paper.

While at the World Water Forum, I spoke about water banking as a means of connecting surface water and groundwater use, even though Arizona’s law considers them separately. Listening to others speak about how, in the context of large basins dominated by river systems, groundwater use and aquifer health are often times overlooked, I sat there thinking, “that’s not the case in Arizona.” We have given much attention to groundwater use, particularly in the Active Management Areas, and careful consideration of both the strengths and the weaknesses of our management approach can inform other efforts, such as the Groundwater Governance Project.

Along with UA colleagues Ben Varady, Andrea Gerkens, and others, I have been the primary point of working with the policy team for the Groundwater Governance Project. One important and challenging task for the project was to offer a working definition of groundwater governance. Existing definitions of the process differ from ours, so we have had the opportunity to review the application of responsible availability, transparency, cost-coordinating administrative act and among different jurisdictions and to be guided by government to conduct its business. In Arizona, our framework offers a new approach to groundwater use: how to meet the regulations necessary for good decision-making on groundwater use.

I do not wish to suggest that without careful consideration, a process to address. In Arizona groundwater unless we are in an area Management Area, while 80 percent of the state’s land area falls in an AMAs, it is wholely dependent on a list of issues and tools available to the water managers face. 1. Millions of acre feet of water are used by aquifers in a management plan for the Groundwater Governance Project. Researchers have the option to work with the policy team to identify best practices or frameworks for groundwater governance. Most recently I visited Australia, home to the famous Murray-Darling Basin and the object of much interest by water professionals. While I learned a lot during all of these trips, what these experiences have driven home is that, although we have a lot of opportunity to improve groundwater management in Arizona, we have accomplished a lot, and some aspects of our framework can be a model for other groundwater-dependent regions.

Copyright © 2012 Envirotech Publications; Reproduction without permission strictly prohibited.
Water Management Issues and Challenges and the search for solutions

- Growth and the need for additional supplies (competition)
- Drought/climate variability
- Water – Energy Nexus
- Water quantity assessments
- Water Quality
- Use of recycled water for potable and other water needs
- Access to and utilization of renewable supplies
- Transboundary water issues
- The surface water/groundwater interface
- Riparian areas and other environmental considerations
- Water rights settlements
- Conservation Programs
- Recovery of Stored Water
- Groundwater replenishment
- Water cost/pricing
- Water Planning

Uncertainty!
International projects related to groundwater

- GEF (Global Environmental Facility) funded Transboundary Waters Assessment Program (TWAP)
  Five waters: Oceans, large marine ecosystems, lakes, rivers and groundwater
  Medium size project – part of the expert panel working on gw
  Full size project underway. Groundwater effort being led by UNESCO IHP.

- => GEF funded Groundwater Governance Project (www.groundwatergovernance.org)

- Federally authorized US-MX Transboundary Aquifer Assessment Program (TAAP)

- Comparative policy analysis
  Israel – Israel Water Management Program
  Jordan – grey water project
  Australia – water banking paper
Groundwater Governance
Thematic Papers

1. Trends in groundwater pollution
2. Conjunctive use & management
3. Urban-rural co-management
4. Management of recharge/discharge
5. **Groundwater policy and governance**
6. Legal frameworks for groundwater governance
7. Trends in local groundwater management
8. Social adoption of technology
9. Macro-economic trends
10. Governance of subsurface space
11. Political economy of groundwater governance
12. Water and climate change
Working Definition of Governance

From Thematic Paper No. 5 (Varady et al.)

The process through which groundwater is managed through the application of responsibility, participation, information availability, transparency, custom and the rule of law. It is the art of coordinating administrative actions and decision making between and among different jurisdictional levels—one of which may be global.

Sometimes difficult to distinguish what is meant by governance versus management.
Governance vs. Management

• In practice, groundwater governance is the complex and overarching framework that determines the management of groundwater resources and the use of the aquifers.

• The local, regional, or national governance framework establishes who participates in formulating strategies and is responsible for their execution and how the different actors (governmental, public sector, nongovernmental, private sector, and civil society) interact.
Management vs. Policy

• Water management is *what we do.*
  – E.g., the actors operate wells, treat water for use/reuse, store water through managed aquifer recharge, conserve water, etcetera

• The *decisions* the actors make regarding what to do, all in the context of the governance framework, can be considered the *water policies* of a region.
  – For example, laws can authorize water banking, but actual decisions on the water banking done in a region can vary, depending on circumstances.
Basic Water Governance Principles

• Sustainability
• Transparency
• Participation
• Accountability/responsibility
• Integration with water policy
Motivation for the study:
Groundwater governance in the U.S. is highly decentralized; we can’t paint the picture with a single brushstroke.
The U.S. Groundwater Governance Survey Project

• Overall objectives
  – To inventory current trends in U.S. groundwater governance – define the state of practice
  – Provide information in support of policy strategies and technical use in understanding and improving groundwater governance and water governance generally.

• Phase I (mostly descriptive): Initial Survey
  – Survey a single, knowledgeable point of contact in each state and the District of Columbia to obtain information on the state of the groundwater governance. Survey conducted November 2012 to February 2013.
  – Selective results to be summarized here
  – Funded internally by the University of Arizona Water Resources Research Center
General Findings

- Diversity in terms of the users of groundwater subject to state groundwater regulations.
- Diverse tools and strategies to manage groundwater use and quantity.
- Groundwater governance priorities vary by state.
- The role of the courts in groundwater issues in the states varies.
- Significant variance exists in recognizing the connection between surface and groundwater and in considering the water needs of groundwater dependent ecosystems.
- Survey respondents report differences in terms of agency capacity to carry out policies and responsibilities, and the public accessibility of groundwater information.
Selected Results

Figure 1 Percentage of Human Demands Met by Groundwater
Figure 4: States Applying Groundwater Regulations to Key User Groups
Figure 5: States Adopting Groundwater Governance Priorities
Groundwater monitoring
States also report that groundwater use is metered or monitored across a diverse set of sectors, including municipal, industrial, and agricultural. For 42% of respondents, all water sectors are metered or monitored.

Figure 8: States In Which Key Water Sectors Are Metered or Monitored
Figure 10: States Employing Particular Groundwater Management Strategies
Plans for Phase II (more analytical)

- Get behind the state-level single brushstroke
  - Example, Arizona has different groundwater governance frameworks in different parts of the state. It is hard to obtain this detailed information in a 15-minute study

- Survey multiple parties from different water sectors in each state so to gather perspectives on the performance of the groundwater governance framework

- Perform selected in-depth case study analyses, and examine the laws/regulations more fully.
  - Opportunity to analyze and compare cases across countries at this point

- Get information on what is working and what is not and also look at what level of government is involved.

Funding and potential partners being sought for this phase.
Interested in receiving feedback and suggestions

Groundwater Governance in the U.S.
Summary of Initial Survey Results

Andrea K. Gerlak¹, Sharon B. Medgal²,
Robert G. Varady¹, and Hunter Richards²
The University of Arizona

May 2013

Groundwater Governance in the U.S.
Appendix B: Qualitative Survey Responses
WRRC CONFERENCE 2014
CLOSING THE GAP BETWEEN WATER SUPPLY AND DEMAND
TUESDAY, APRIL 8, 2014
THE UNIVERSITY OF ARIZONA
TUCSON, AZ

Keep up with WRRC news and events through subscription to the Weekly Wave e-newsletter

WRRC.ARIZONA.EDU/SUBSCRIBE

Upcoming Events

- Aug. 9
- Sept. 10
- Sept. 12
- Sept. 20
- Oct. 10
- Nov. 13

For more information visit:
WRRC.ARIZONA.EDU
Thank you!

“When the well’s dry, we know the worth of water.”

Benjamin Franklin

Acknowledgments:
Hunter Richards, Research Assistant and Survey Report coauthor
Funding was provided by the Technology and Research Initiative Fund through the University of Arizona Water Sustainability Program and Water Resources Research Center
Assistance in identifying survey respondents was provided by the members of the National Institutes for Water Resources

Initial Survey Report is posted on wrrc.arizona.edu/groundwater