



# Finding the Ways that Work: Groundwater Management in the Western U.S.

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**W**hether it is used as a primary water source or as a buffer for variable surface water supplies, groundwater provides water security to support economic development worldwide.

However, groundwater is a difficult resource to manage and presents challenges that are distinct from those related to surface water management.

The Robert B. Daugherty Water for Food Global Institute and the Environmental Defense Fund have partnered in an attempt to address the challenge of understanding and translating best practices for groundwater management. Their pending collaborative report, *The Future of Groundwater in California – Lessons in Sustainable Management from Across the West*, seeks to provide guidance to groundwater managers in California and beyond by drawing on the diverse experience of water management programs from across the western U.S.

Going beyond the typical technical guidance, the report attempts to get at the “story behind the story” by drawing upon varied experiences of groundwater management to try to understand what works and what doesn’t. The report uses nine case studies from six states to present key lessons learned. Case studies are from Arizona, California, Colorado, Nebraska, Oregon, and Texas, and represent a wide range of hydrology, climates, legal structures, and water uses.

The report begins by breaking down the issues that drive groundwater policies:

- Surface water and groundwater interactions
- Long-term aquifer depletion
- Water quality
- Other concerns

Interactions between surface water and groundwater are significant

drivers of groundwater policy across the western U.S. while, in general, long-term aquifer depletion and water quality concerns have been less likely to produce binding groundwater policy changes.

Many types of water management tools are available to water managers, ranging from strict regulations to voluntary efforts. Water managers can seek to change behavior of water users by using tools that are not intended to provide financial incentives, also sometimes referred to as “command and control” approaches. Alternatively, incentive-based tools seek to change behavior through providing direct financial incentives. Managing agencies can also take action to manage water resources on behalf of water users in the district. These actions can be categorized as agency supply augmentation and protection tools. Lastly, many water managers rely heavily on voluntary tools such as education and outreach efforts. All of these tools are present in varying degrees across the nine case studies featured in the report.

The report distills the key elements of effective groundwater management into five themes:

- The importance of building trust
- The need for data
- Using a portfolio of approaches
- Assuring performance
- Access to adequate funding

## **BUILDING TRUST**

Perhaps the most important element of groundwater management is building trust. It is vital that the people who are impacted by groundwater management policies understand and trust management goals for a program to be effective. In many of the case studies, trust building began by having broad community involvement from an early stage.

Data can also be a powerful tool to visualize current groundwater

conditions and show potential future impacts to groundwater resources. A community member who is skeptical of new groundwater use policies may be convinced otherwise if shown that their presently unaffected groundwater well could be impacted by groundwater quality degradation or lowering groundwater levels in the future. Use of data can give credibility to water managers and give the community a sense of ownership in the management program.

Other approaches to build trust with the community include involving key stakeholder groups in the planning process and providing beneficial resources to the community, such as recreation services or agricultural cost-share programs.

#### THE NEED FOR DATA

Data are critical for groundwater management decision making, whether that's having an accurate record of groundwater levels or having flow meter data to track water use.

However, data collection is time consuming, costly, and often controversial. It is therefore important for water managers to carefully consider how much data is "enough" data to avoid unnecessary costs and jeopardizing community trust.

#### USING A PORTFOLIO OF APPROACHES

Across the case studies, water managers relied on a multitude of management tools and strategies. While there can be a tendency to want to choose one tool as a panacea (water metering for example), groundwater management as highlighted in the case studies typically begins with a permitting framework, a tracking system, educational component, and funding source. Once this initial framework is established, it becomes easier to add additional tools that are appropriate for local conditions.

#### ASSURING PERFORMANCE

Effective groundwater management requires a system of monitoring and enforcement to ensure that water users are complying with management policies. Without monitoring to detect noncompliance and subsequent enforcement of the policy, there will always be an incentive for water users to ignore management requirements. However, monitoring and enforcement is often unpopular, incurring significant social, financial, and political costs.

#### FUNDING

All of the case studies illustrated the need for adequate funding to meet groundwater management goals. Regardless of what approaches are used, groundwater management requires long-term financial resources to support education and outreach, infrastructure improvements, data collection and modeling, and monitoring and enforcement programs. Water managers rely on a wide range of funding mechanisms to support their programs including taxes, bonds, state and federal grants, and user fees.

#### CONCLUSION

While new groundwater managers have their work cut out for them, there's no need to reinvent the wheel! Experience from groundwater management programs across the western U.S. provides valuable insight into aspects of groundwater management than can make or break a program. Building community trust, knowing what data are most important, using multiple approaches, assuring performance through monitoring and enforcement, and having adequate funding are critical - but not often obvious - components of groundwater management.

For a more in-depth look at the case studies and lessons learned, look for the release of the report, *The Future of Groundwater in California: Lessons in Sustainable Management from Across the West*, by the end of the year.

To learn more about the work that the Robert B. Daugherty Water for Food Global Institute does, visit [waterforfood.nebraska.edu](http://waterforfood.nebraska.edu).

#### EDITOR'S NOTE

This article is a summary of the presentation given by Ms. Gibson at the 2017 Groundwater Foundation National Conference.

#### ABOUT THE AUTHOR

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