THE CALIFORNIA *Journal of*
Politics & Policy

Charting New Waters: Why Has Integrated Management Succeeded in Some States But Not Others?

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Climate change has come to dominate the attention of the water sector in the West. Tree rings and other paleoclimatic data present a picture of the climate of western North America frequented by droughts and punctuated by catastrophic floods. Numerous droughts, greater than any witnessed by European settlers, plagued the Colorado River basin between 750 and 1500.

At the other end of the spectrum, recent studies in the Central Valley of California show a regular incidence of "biblical" floods that filled the Central Valley every 200 years. The region is no stranger to climatic extremes, but all of the models of climate change predict with a great degree of confidence that those extremes will become even greater and more frequent because of greenhouse gas pollution. A growing body of research and reports, such as the 2009 National Climate Assessment and a 2011 report to Congress from the Bureau of Reclamation, point to significant threats to water resources from climate change.

A landmark paper in *Science*, entitled, "Stationarity is Dead," lays out the idea that the past is no longer a sufficient predictor of the future, and we need to adjust the way we plan for our water resources in the future. That presents a tremendous challenge. The West's dams, levees, and other infrastructure, once the envy of the water world, were all built on past assumptions.

Laws and policies on water rights, species recovery plans, and clean water permits are calibrated to data collected over the last century, for the most part. Land-use decisions are dependent on that data and history as well. The realization that the future will not conform to the past is now leading to a transformation in the water industry and a whole new way of thinking and working.

In 2009, federal agencies began working with stakeholders to develop a National Action Plan that provides an overview of the challenges a changing climate presents for the management of the nation's freshwater resources and describes actions that federal agencies will take to help freshwater resource managers ensure adequate water supplies and protect water quality and public health. In 2013, federal agencies released their first Climate Change Adaptation Plans to plan for and address the impacts of climate change on their programs and operations. As part of a new partnership among the National Oceanic and Atmospheric Administration and universities throughout the nation, the Western Water Assessment was established at the University of Colorado, Boulder to evaluate and address societal vulnerabilities related to climate change and water resources and provide advice and direction to local decision-makers about how best to prepare.

Federal agencies are not alone in their efforts to confront the challenges of a more volatile and uncertain climate. Over the past several years, the Western Governors' Association (WGA)

has issued several reports describing vulnerability of states to a changing climate and served as a clearinghouse to share advice and best practices among them.

The front lines of water management remain at the local level—municipalities, counties, and utilities, as well as businesses and individuals. Numerous communities throughout the West such as Seattle, Boulder, and the state of California, have been identified as models of adaptive planning for the rest of the world. Colorado and other states have modified drought mitigation and response plans to consider the impact of climate change. Oklahoma has an exceptional state water plan that gives careful consideration to a changing climate.

The idea that natural ecosystems provide society with a diverse stream of benefits has been around for a long time. However, it was not until 2006 that the idea of "ecosystem services" was formalized with the publication of the United Nations Millennium Ecosystem Assessment. Today there is fairly broad recognition of this concept and numerous efforts to incorporate the value of those natural assets into decision making of all sorts, from environmental regulation to public and private investment.

As with climate change, the authors of the 1998 report paid little attention to this issue compared to the attention it receives today. The concept of ecosystem services is closely linked to the notion that water infrastructure need not be limited only to constructed and heavily engineered systems. The idea of natural or green infrastructure is to use natural assets such as forests, riparian areas, and wetlands, or mimic those natural systems through the use of bioswales, green roofs, and constructed wetlands, to achieve water management goals and objectives.

In the West, ecosystem services and green infrastructure have been especially evident in the areas of forest planning, floodplain management, and urban design, although there are many other examples. This approach of large-scale watershed protection and management is actually much more common in the western US where cities such as San Francisco, Portland, and Boise have relied on forested landscapes, mostly on federal lands, to maintain water quality and avoid the expense of building new infrastructure.

Water remained a top priority of the USFS under both the Bush and Obama administrations and has been embraced by land management agencies such as the Bureau of Land Management. In 2012 the USFS adopted a new planning rule that for the first time directs staff to consider ecosystem services as well as multiple uses when making management decisions for public lands. It remains to be seen how the agency will implement this new rule, but at least one new program, Forests-to-Faucets, illustrates how the agency is partnering with the water industry to improve freshwater conditions in the West.

Forests-to-Faucets brings together municipal utilities within each USFS region to cooperate on forest management and pool resources to meet mutual objectives. Denver Water's 1.3 million customers receive most of their water from snowpack and streams that originate on National Forests. In 1996 and 2002, Denver Water experienced two severe fires in watersheds that supply the Front Range.

In August of 2010, Denver Water formalized a partnership with the US Forest Service to reduce wildfire risk, restore areas recovering from past wildfires, and minimize erosion in watersheds critical for Denver Water's water supplies and infrastructure. Each agency is contributing up to $16.5 million over a five-year period with an average cost of $27 to each Denver Water household.

In a more recent example of a watershed collaboration to improve water quality, Colorado Springs Utilities and the Forest Service initiated a five-year partnership to help restore the areas burned by the devastating Waldo Canyon Fire in 2012—the largest, most expensive and destruc-

tive fire in Colorado history. Colorado Springs Utilities will invest approximately $6 million to support watershed health, and the Forest Service will complete on-the-ground project work that complements the utilities' investments. Other partnerships like these are emerging throughout the West.

Urban Design

Cities are comprised primarily of what water managers call "impervious" surfaces, hardened surfaces such as roads, rooftops, and parking lots where rainfall is unable to soak into the ground. Rather than recharge local groundwater, rainfall on urban landscapes runs rapidly off impervious surfaces into storm drains and then into local streams, causing unnaturally high peak flows and flooding. This urban storm water picks up pollutants such as heavy metal, fertilizer, pesticide, and oil and grease from lawns, driveways, and roads as it makes its way to the nearest storm drain.

In the mid 1990s, the idea that cities could better mimic the hydrology of natural landscapes and improve water quality through the use of bioswales, rain gardens, or green roofs began to take hold and the idea of green infrastructure was born. Sometimes described as "low impact development" (LID), the concept has spread widely in the last decade. Large and small cities from Portland to Los Angeles have turned to green infrastructure to address water pollution, flooding, and additional challenges around water scarcity and endangered species, and to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. An important secondary goal of this effort is stormwater capture and storage in groundwater aquifers to augment water supplies.

The notion of water markets sparks a more or less perpetual debate. Many see water markets as the ticket to a more rational and efficient allocation of water in the West. Most economists believe that more open markets would allow water to flow smoothly and efficiently to the uses with the greatest societal worth.

Freer markets would create incentives for less wasteful water use by making the economic value of the water a greater factor in decisions by users. A rancher who has the option to sell a portion of his water right is more likely to increase his irrigation efficiency. However, many resist turning over a critical and public resource like water to a free market.

Although an appropriative water rights system creates property rights to use water, it does not facilitate free and open transfer of those rights. Every western state subjects water rights transfers to considerable oversight to protect other water rights holders, the environment, and local economies. Because markets tend to shift water from agricultural uses to growing cities, the debate over specific water transfers, and water markets generally, can implicate the very culture of the West, and the conflict between the old and new West.

The sale of water rights by a rancher to a distant city may yield profits for him, but may bring bad economic news for his neighbors, local communities, and businesses. No water means no irrigation. No irrigation means no crops. No crops means no sales of fertilizer, seeds, and tractor parts. If enough ranchers sell their water, the economic scales can tip, and the local economy can crash. The acquisition of Owens Valley water rights by Los Angeles, perhaps the most famous water transaction in the West, destroyed an entire community.

We have not resolved this debate in the last 15 years, although we certainly have water markets. In 1998, the commission report recognized the challenge "to facilitate transfers on the one hand, recognizing the benefits they may produce, and to scrutinize transfers on the other hand,

understanding their potential costs to society." At the same time, it did not provide a clear path for resolving these conflicting policy goals, and not much has changed since then.

In 2011, the Western Governors' Association (WGA) recognized the same tension in announcing its official policy on water transfers: "Western Governors believe states should identify and promote innovative ways to allow water transfers from agricultural to other uses (including urban, energy, and environmental) while avoiding or mitigating damages to agricultural economies and communities." Easier said than done, to be sure. In the past 15 years western states have not developed any significant legal changes that address this tension, and many water transfers still stir conflict.

Despite the static legal landscape, water markets play an important role in water allocation in western states, particularly in regions experiencing the most acute shortages or during times of drought. Market participants are finding and using new tools to transfer water while protecting local communities. The modern administrative system of appropriative rights allows for water rights transfers only after jumping through a set of regulatory hoops. In every state, a party must obtain approval of the relevant state agency (or water court in Colorado) if they wish to change the beneficial use of their water right, the place of withdrawal, the place of use, or the location of return flows.

Despite the lack of major policy reforms, water markets are in fact playing an important role in reallocating water in the West. The degree, location, and timing of market activity tend to show that where circumstances put true pressure on water supplies, markets function to reallocate water use. A look at the last 15 years shows that while markets are not booming, they are perking along quite nicely.

Current Status

In 2012, the WGA published a report that provides a good, up-to-date review of the current status and importance of water markets in the West. Over the last 25 years, western water markets have remained active, and water transactions have become commonplace in several western states. The volume of water traded annually has varied from a low of just over 500,000 acre-feet (AF) (in 1988), to highs above 2.5 million AF (a peak reached in 1991, 1994, 2000, and 2005). Volumes of water traded over that period have predictably been higher in more arid and populous states (California leads the way, with 13.3 million AF traded over this period, almost five million AF ahead of second place Arizona).

Regionwide, the primary buyers for water rights have been municipalities seeking new supply. Purchasers seeking water for energy extraction, agriculture production, and environmental uses have driven some of the demand on the market, although the overall numbers miss several insights. For example, water markets play a vital role for states that face the most critical water shortages. As part of a survey conducted for the WSWC report, New Mexico reported that water transfers are the only remaining method available to obtain new supplies.

Two major water transfers in southern California illustrate the progress in developing water markets and the continuing controversy about their effects on rural irrigation districts. San Diego, Los Angeles, and three large irrigation districts in southern California all rely on water diverted from the Colorado River. All told, California has used approximately 5.2 million AFY of Colorado River water. This water supply is not so much stretched thin as it is stretched past the breaking point.

California is under a mandate to reduce its use of Colorado River water from 5.2 to 4.4 million AFY by 2015 and then 2025 to comply with the Colorado River Compact. All the while, urban demand in southern California has continued to grow. For decades, fingers have pointed at the large irrigation districts (Coachella Valley Water District, Palo Verde Irrigation District, and the Imperial Irrigation District [IID]) that use comparatively large amounts of water per acre, in part because of the area's salty soils, and in part because of outdated irrigation practices and infrastructure.

These exigencies have driven the parties to pull off two of the largest water transactions in history, both of which allow farmers to fallow their least productive fields, freeing up water for urban growth and allowing farmers to focus on their most valuable crops. Palo Verde's deal includes funding for local economic stimulus, while IID's includes devoting some conserved water to the restoration of the Salton Sea. Yet, both transactions have been bitterly criticized as condemning local communities to the same fate as the Owens River Valley.

These two transactions exemplify the status of water markets today. Where demand pressure is great enough and the infrastructure allows it, we can implement impressively complicated water transfers. In the coming years, water markets can be improved through collecting and disseminating better data about transactions, establishing clearer rules about water conservation and water rights forfeiture, and expediting review for similar, recurring transactions.

Environmental Water Transfers

One market innovation that has taken hold in the last 15 years is that of water rights transactions designed to restore streams and other aquatic ecosystems. These water transfers, called environmental flow transactions, became legally feasible in the late 1980s and now make up a meaningful portion of the overall water market in some states. They have played an important role in the protection and restoration of key spawning tributaries for trout and salmon in the Columbia basin, wildlife refuges in California's Central Valley, and other aquatic ecosystems in the West. Transaction costs for these types of transfers remain unfortunately high, however, and their future depends on more sustainable and increased funding.

In several states, agencies and a variety of NGOs including several "water trusts," have developed innovative transactions whereby willing sellers or donors can devote some or all of their water rights to enhancing aquatic ecosystems. These include permanent transfers of water rights, fixed-term leases, irrigation efficiency projects where a portion of the conserved water is left in stream, short-term water transfers, irrigation forbearance agreements, and the use of water banks to allocate water for stream flow. These transactions have played a critical role, particularly where long-term funding is available.

In California, environmental transactions made up 20 percent of the volume of water traded between 2003 and 2011. Most of these transactions were funded as part of the Central Valley Project Improvement Act's Water Acquisition Program or CalFed's Environmental Water Account. These project-funded transfers tend to be annual purchases of water allocated between stream-flows and wildlife refuges. The volume of transactions is largely driven by amply funded mitigation programs for large projects.

The Columbia Basin has been the true nursery for environmental water transactions. As part of its compliance with the Endangered Species Act, the Bonneville Power Administration is required to provide funding to restore flow in priority tributaries. The resulting Columbia Basin Water Transaction Program (CBWTP) has disbursed an average of approximately $5 million a

year for environmental water transactions in Columbia Basin states since 2002. A growing community of NGOs has used CBWTP grants to leverage additional funding from state and federal agencies and private donors.

Through fiscal year 2011, the CBWTP has supported 53 permanent water rights transfers and well over 200 leases, irrigation forbearance agreements, and other temporary transactions. Over the life of these transactions, the transfers represent a commitment of 5.8 million acre-feet of water. Although the last 15 years have seen enormous progress in environmental water transactions, this progress has not spread across the West.

Water energy nexus—energy production from solar to hydraulic fracturing requires significant quantities of water. As population increases newcomers need domestic water as well as water to generate power. The agricultural use of drip irrigation and micro sprinklers has reduced evapotranspiration and produced large water savings. Because agriculture constitutes around 80–90 percent of the total water demand in the West, efficiency frees up water for other uses.

One area likely to garner more attention in the near future is the need to treat nontraditional water pollutants. Known as contaminants of emerging concern (CECs), these pollutants include pharmaceuticals, agricultural antibiotics, and some pesticides that have been linked to cancers and endocrine disruption. Traditional wastewater and water treatment plants are not designed to remove CECs so research is now focused on new approaches. Recognizing the need to address CECs, the new cutting edge Silicon Valley Advanced Water Purification Center will use UV disinfection and oxidation through hydrogen peroxide.

References

Hanak, Ellen, and Elizabeth Stryjewski. 2012. “California’s Water Market by the Numbers: Update 2012.”

Hanak, Ellen, Jay Lund, Ariel Dinar, Brian Gray, Richard Howitt, Jeffrey Mount, Peter Moyle, and Barton “Buzz” Thompson. 2009. “California Water Myths,” p. 11.

California Resources Agency. 2000. “California’s Colorado River Water Use Plan” (draft). Colorado River Board of California, May. Department of the Interior, Record of Decision: Colorado.

River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead.” 2007. Bureau of Reclamation.