Drought Impacts and Solutions for Water Supply Management
The fourth in a series of Western Governors’ Drought Forum workshops

December 8-9, 2014
Las Vegas, Nevada

Under the leadership of Western Governors’ Association Chairman, Governor Brian Sandoval of Nevada, industry leaders, state experts and stakeholders are sharing best practices for drought management through the Western Governors’ Drought Forum. A key element of the Forum is an ongoing series of sector-specific workshops to identify drought impacts, solutions, success stories and case studies.

Workshop Take-Aways

For the fourth Forum workshop, Drought Impacts and Solutions for Water Supply Management, findings fell into the following categories:

Policy

No silver bullet: While there is no one-size-fits–all cure for drought, there are tools emerging to assist water managers in minimizing its impacts. A legal framework to facilitate rapid and effective water transfers helps get water to areas that need it most. Future investments in data and monitoring and infrastructure improvements would help track and accurately respond to drought.

Culture

Collaboration and communication: The best solutions for drought are the ones born from partnership and collaboration. The Colorado River Basin is a dynamic system, where water management in one state has profound impacts downstream and upstream. In such an interconnected system, communication and collaboration are essential to safeguarding future water supplies. Colorado River Basin states realized this with the signing of the System Conservation Agreement as a means to conserve water and sustain flows.

Workshop Notes and Highlights

WGA hosted the fourth workshop of the Drought Forum meeting series, focusing on drought impacts and solutions for water supply management, on Dec. 8-9, 2014 in Las Vegas, Nevada. Governor Brian Sandoval of Nevada, Chairman of WGA, delivered introductory remarks.
Governor Sandoval emphasized the fact that drought is a regional issue for the West, referring back to the drought of 2012 when 17 of the 19 Western states experienced some degree of drought. The regional nature of drought makes a traditional “triage-style” disaster response difficult but imperative. It is also critical to understand states and communities experience the economic and social impacts of drought in unique ways.

Governor Sandoval commended the “impressive commitment” of water professionals to providing available water to people within the state and in the local communities. “Water professionals recognize the importance of properly responding to record-setting drought, because it will set an example at a national and international level.”

A summary of key findings from the workshop follows. For more information, visit westgov.org/drought-forum or email WGA Policy Advisor Carlee Brown at cbrown@westgov.org

The Science of Drought

Findings and Observations

- “Our job is to make sure that people understand that it will take more than just a little rainfall to lessen the drought. It will take 150% of normal precipitation for two years combined, with an average third year, to bring reservoir and groundwater storage levels back to normal.” – Roger Pulwarty, Director, National Integrated Drought Information System, NOAA

- “Warmer conditions can exacerbate drought, but they do not create drought. Precipitation deficits that we have seen over the last three years are larger than anything predicted by global warming. The main driver of the drought conditions that we are seeing is natural variability.” – Roger Pulwarty, Director, National Integrated Drought Information System, NOAA

- “Drought evolution is really complex; it has multiple drivers and develops at multiple timescales. Short time-scale precipitation amounts are indicative of root-zone soil moisture rangeland conditions. Hydrologic drought is far deeper and has more profound impacts than vegetative drought, meaning that it receives more emphasis in water management decisions.” - Justin Huntington, Associate Research Professor, Desert Research Institute

- “When looking at something like the Drought Monitor or Drought Risk Atlas, the reality is there are not many points of real observation on the ground. It is uncomfortable to think that this important information used across the country for decision making is the result of a model informed by relatively few on-the-ground observations.” – Douglas P. Boyle, Nevada State Climatologist, University of Nevada
Possible Solutions

- “We desperately need more real, on-the-ground observations of climate variables to understand and address the level of uncertainty in decision-making tools like the Drought Monitor and Drought Risk Atlas.” – Douglas P. Boyle, Nevada State Climatologist, University of Nevada

- “Understanding atmospheric rivers is essential to understanding drought and precipitation on the West Coast. Since the 1950s, between 40-70% of drought breaks on the West Coast were due to atmospheric rivers.” – Justin Huntington, Associate Research Professor, Desert Research Institute

- “The way that data is produced and recorded at the local level is irreplaceable. Satellite monitoring data simply doesn’t measure up to it. Unless we are serious about increasing the amount of local monitoring, we cannot anticipate long-term precipitation deficits. In the West, the sparseness of data on important drought metrics like soil moisture is a huge problem that needs to be addressed.” – Roger Pulwarty, Director, National Integrated Drought Information System, NOAA

- “Communities can’t get assistance when there is a drought due to limitations under the Stafford Act. That is a tool we can look at using for drought, not just other disasters.” – Douglas P. Boyle, Nevada State Climatologist, University of Nevada

Keynote Speaker: Michael L. Connor, Deputy Secretary, Department of Interior

Findings and Observations

- “Educating the public on drought and its implications is crucial. We need to be constantly vigilant in the investments that we make and the means by which we progress through drought.”

- “Federal water managers recognize the importance of state primacy in water resource management, and are working on ways that we can effectively collaborate with state water managers rather than impinge on their primacy.”

- “The Bureau of Reclamation was originally intended to support states and develop water infrastructure. Today, the mission isn’t to reclaim the West as much as it is to sustain the West. The West is still extremely fragile and sensitive to water scarcity. How we operate and manage reservoirs is crucial to dealing with drought.”

- “Water will be a major part of the President’s agenda for the last two years of his term. We are looking for improved innovation and new ways to finance infrastructure. Permitting is critical to the development of any new infrastructure, and needs to be done faster and more comprehensively to facilitate an agile response to drought.”

Possible Solutions

- “Access to funding for water projects will be an issue in the future. The Bureau of Reclamation is a critical partner. We need to help federal agencies continue to get funding and support the projects that are essential to the West. Demonstrating the value of water projects to a diverse group of stakeholders is essential to acquiring much-
needed funding and political support.” – Taylor Hawes, Colorado River Program Director, The Nature Conservancy

• “We need to prioritize water infrastructure investments. Not just in creating new infrastructure projects, but also in repairing and modernizing aging ones. Continued investment in federal programs like State Revolving Funds, the NRCS’s Environmental Quality Incentives Program, and the Bureau of Reclamation’s WaterSmart program will ensure conservation of our water resources.” – Dep. Sec. Mike Connor, Department of Interior

Drought Impacts and Strategies for Water Supply Management

Findings and Observations

• “‘Buy-and-dry’ (of water rights on agricultural land) is an unfortunate response to infrastructure not reacting quickly enough to water scarcity. Agriculture is seen as sacrificial, as farmers can afford to allow some water to go to municipal uses, while municipalities struggle to build dams and infrastructure capable of handling drought and scarcity.” – Pat Tyrrell, State Engineer, Wyoming Office of the State Engineer

• “There is a common misconception in the water supply industry that conservation hurts utilities’ financing. In reality, demand-side conservation allows you to delay major capital investments up to a decade. Eliminating overuse from your system helps to harden rates and revenues while adding predictability.” – Paul Matthews, Chief Financial Officer, Tualatin Valley Water District, Beaverton, Oregon

• “We always talk about customers not understanding the value of water, but the results of a recent survey suggest otherwise. We surveyed our customers and the results indicate that customers think their average water bill is $80-90; in reality it is $27. This demonstrates a large over-estimation of the cost of water.” – Paul Matthews, Chief Financial Officer, Tualatin Valley Water District, Beaverton, Oregon

• “During drought it can be difficult to communicate the importance of conservation to new residents in the state who come from wetter areas. We need to be better at conveying the fact that if you are living in the arid West, you will see drought in your lifetime.” – Pat Tyrrell, State Engineer, Wyoming Office of the State Engineer

• “The environmental community works to develop solutions for the environment, but that needs to be done in tandem with developing solutions for local communities. We need to engage in a new approach to environmental conservation and work through collaborative agreements.” – Taylor Hawes, Colorado River Program Director, The Nature Conservancy

Possible Solutions

• “Urban water planners have historically made decisions on well-defined outer boundaries and built infrastructure concerned only with protecting our specific service area. That has to change; we need to think in a larger context. There are very few solutions that can be found in the Colorado River Basin in the absence of finding solutions in the California Bay-Delta. Urbanites need to realize that we are citizens of a
basin, highly impacted by upstream conditions.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

- “Power generation capacity is closely tied to lake elevation; as lake elevation goes down, so does power generation capacity. Investments from the Bureau of Reclamation in recent years on new technology and turbines allow us to generate more power at lower lake levels. This is essential for maintaining energy markets, as hydropower is almost half the cost of the next cheapest source of energy generation in the area.” – Jayne Harkins, Executive Director, Colorado River Commission of Nevada

- “The years of competition and litigation over water need to come to an end. The West cannot survive if we continue to fight for winners and losers in water conflicts. Water resource management has to be strategic, built upon partnership and rational thought.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

- “Fear of political retaliation is impeding the implementation of many innovative solutions in water management. We need to reach out to the sectors that often provide political push-back and educate and involve them in the decision making process. If you can make all of these different interests feel like they are a part of the solution, it becomes a less politically-risky endeavor.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

Working with Communities and Water Users

Findings and Observations

- “The premise of the Western Water Project is that water for agriculture is a good thing. Keeping water in agriculture means keeping water in the stream for trout. Agricultural producers are stewards of the land; they realize that their values are inextricably linked with the environment. Threats to agricultural viability are a threat to the environmental value of streams.” – Russ Schnitzer, Agricultural Policy, Parula LLC, for Trout Unlimited

- “Utilities need to have more awareness of the conditions in the watersheds that supply them. Many western forests are in bad shape, and with drought comes catastrophic wildfire, threatening the reliability of water supply to utilities. A little bit of proactive forest management can go a long way towards wildfire risk reduction. To address this, Denver Water partnered with the US Forest Service to create a forest restoration program for the purpose of water supply protection.” – Jim Lochhead, CEO/Manager, Denver Water

- “It is great to utilize technology to increase efficiency in agricultural operations, but what you do with that conserved water matters. If you use the water saved to simply increase acreage, then you are not helping the basin as a whole. Increased efficiency can actually mean increased consumption.” – Russ Schnitzer, Agricultural Policy, Parula LLC, for Trout Unlimited

Possible Solutions
• “As a regulatory agency, we need to make stakeholders – especially agriculture - a part of the solution as early as possible. Getting communities to buy into drought planning and management is essential, and requires early communication and active participation by stakeholders.” – Jason King, State Engineer, Nevada Division of Water Resources

• “The purpose of groundwater in Nevada has traditionally been to act as a savings account. With limited surface water availability we have historically issued supplemental groundwater rights during drought, but as groundwater resources become increasingly stressed we are starting to look at having to curtail those supplemental rights.” – Jason King, State Engineer, Nevada Division of Water Resources

• “Water agencies need to work hard to educate their customers about the value of water. Education needs to occur on a continual basis, even during wet periods. Utilities also need to interact with and educate the business community so that when political support is needed, you have the right allies.” – Jim Lochhead, CEO/Manager, Denver Water

• “We need to address drought as the disaster that it is. This means implementing restrictions, augmenting supplies, and planning ahead on a multiple-year basis. From a financial perspective you need to anticipate losing revenue, cutting expenses and charging drought fees to customers.” – Jim Lochhead, CEO/Manager, Denver Water

• “In conversations about water agriculture generally feels backed into a corner, but in reality it is a similar position that Denver Water feels backed into as well. Water agreements are not an all-give, no-take sort of thing. We are all at the table, having a conversation, and we need to work out a mutually beneficial final stance.” – Russ Schnitzer, Agricultural Policy, Parula LLC, for Trout Unlimited

Technology and Innovative Approaches

Findings and Observations

• “Groundwater replenishment agreements with agricultural producers provide them with a secure revenue stream to improve water efficiency in their system during times of drought, while allowing the Central Arizona Groundwater Replenishment District to retain reliable groundwater supplies in other areas. It makes fallowing less economically damaging to producers.” – Dennis Rule, Manager, Central Arizona Groundwater Replenishment District

• “The Central Arizona Groundwater Replenishment District collects revenue from members and puts that money towards purchasing water to replenish aquifers across Arizona. We depend on a diverse revenue stream to make sure that we are meeting replenishment obligations. If we fail to meet those obligations the Arizona economy will take a large hit, as we provide an assured water supply required for our community’s growth.” – Dennis Rule, Manager, Central Arizona Groundwater Replenishment District

• “The Water, Infrastructure and Supply Efficiency (WISE) project is a great example of collaboration between two municipalities to best utilize existing infrastructure. Aurora built a massive infrastructure program in 2010 to shore up water supplies, but for much of the year it is underused. South Metro Denver, Denver Water and Aurora came to an
agreement that lets Denver Water utilize the infrastructure constructed by Aurora to capture return flows and store them as emergency supplies when Aurora does not need the infrastructure.” – Bart Miller, Water Program Director, Western Resource Advocates

• “Having better climatological data will allow water managers to be more efficient and make more informed decisions. This comes down to NOAA and other forecasting agencies becoming more precise, but the reality is that is almost entirely dependent on the amount of funding they receive. Change is not easy, but we need to do a better job of incorporating more data into our decision-making process.” – Grant Davis, General Manager, Sonoma County Water Agency

• “The amount of funding for water infrastructure development from the federal and state governments is declining. The burden of keeping up with infrastructure needs is increasingly being placed upon local communities.” – Grant Davis, General Manager, Sonoma County Water Agency

Possible Solutions

• “Water managers need to work with the Army Corps of Engineers to increase flexibility in reservoir management. The rule curves dictated by the Army Corps of Engineers that set the amount of water allowable in a reservoir for flood control can be problematic when we get a large amount of precipitation. There have been instances where a large storm fills reservoirs, but we must release a massive amount of water as dictated by the rule curve, then we get next to no precipitation for the rest of the year.” – Grant Davis, General Manager, Sonoma County Water Agency

• “Making real-time water usage data available to customers would go a long way towards reducing demand-side water consumption. Some utilities still bill on a bi-monthly basis, and this does not give the customer nearly enough information to facilitate behavioral changes relating to water consumption. We have these sorts of real-time data sharing program for energy and the results show that they are effective in reducing usage. Why can’t we do the same with water?” – Bart Miller, Water Program Director, Western Resource Advocates

• “A large portion of water use occurs on the demand side of water supply. Cost-share programs that allow water and energy utilities to front the initial cost of efficiency upgrades in customer homes just make sense. These upgrades save utilities energy and water, while customers save money. A 25-50% cost sharing program can make all the difference in actually making these talked about partnerships come to fruition.” – Grant Davis, General Manager, Sonoma County Water Agency

• “Chatfield Reservoir in Denver is an example of adapting water management infrastructure to cope with drought. The project did not involve building any new infrastructure, but rather working in collaboration with Army Corps of Engineers to modify the rule curve to allow for more storage in the reservoir. This turned the reservoir from a flood mitigation tool to a water storage system. It is a win-win; we are developing a home-grown water supply, which is great for conservation, while providing water for downstream irrigators.” – Bart Miller, Water Program Director, Western Resource Advocates.
Policy Approaches and Obstacles

Approaches

- “If we could amend forfeiture and abandonment laws to not encourage water waste in the name of retaining a water right, it opens up the possibility of banking and marketing water in a more efficient way. We need to amend the system so that supply and demand can start to align without the law standing in the way.” – Cassandra Joseph, Deputy Attorney General, Government and Natural Resources Division, Nevada Attorney General’s Office

- “Roughly 80% of the cost of water is shouldered by local rate-payers. There is an emerging interest in localized solutions to water conservation. People are waking up and looking for what can be done at the city, town and community level to increase efficiency.” – Cynthia Koehler, Executive Director, WaterNow

- “Citizen awareness is critical to the success of any drought conservation measure. It is difficult to achieve, but it is absolutely imperative that the general public understands the importance of water resource management. Technical discussions don’t translate well to the general public, but we have to make the effort.” – Cassandra Joseph, Deputy Attorney General, Government and Natural Resources Division, Nevada Attorney General’s Office

- “The era of top down mandates for efficiency is not where we are heading. Conservation success at the statewide level is achieved by setting the context for local solutions.” – Cynthia Koehler, Executive Director, WaterNow

- “State policy leaders can facilitate adoption of efficiency measures by leading in policy making that prioritizes conservation sets the framework for local conservation; collecting data to demonstrate conservation measures that work; creating a legal framework that allows for local innovation while making state rules clear; Supporting funding mechanisms like tax credits and incentives; utilizing the state plumbing code to phase out inefficient appliances and plumbing equipment.” – Cynthia Koehler, Executive Director, WaterNow

- “Utah has done away with abandonment rules for municipalities. Municipalities must have a water plan, and as long as they operate within the confines of that plan, they cannot forfeit their water right. That does not mean that we could do away with abandonment entirely, as speculators would likely pull assets off the market and sit on them.” – Ron Thompson, General Manager, Washington County Water Conservancy District, Utah

Obstacles

- “Breaking down long-standing institutional boundaries, not just federal-to-state, but among state agencies and between states, is imperative to quickly responding to drought. Lack of collaboration between these agencies, in addition to cumbersome regulatory structures, is hampering our ability to address drought in a timely manner.” – Ron Thompson, General Manager, Washington County Water Conservancy District, Utah
“Agricultural producers are the solution to water supply issues and they are willing to help. But, every community and local agriculture sector is different and has their own needs. You can’t just paint agricultural solutions with a broad brush and expect them to be embraced and successful in all agricultural communities.” – Disque Deane Jr., President, Water Property Investors

“Aging infrastructure is a bigger issue than drought. So much of our water conveyance infrastructure is extremely outdated, and financing sources to update and expand it are desperately needed. At the state level there is good work being done in planning, but at the local level, they lack the resources to adequately update and replace infrastructure. Policy and regulations are baring water managers from dealing with this issue.” – Ron Thompson, General Manager, Washington County Water Conservancy District, Utah

“The lifespan of infrastructure doesn’t match up to the financing mechanisms that we are trying to use, especially in the case of financing through water transactions. Century bonds are a tool that could effectively finance infrastructure investments.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

“Uncertainty prevents the establishment of effective resource markets. Regulatory measures like the recent proposed rule on the Clean Water Act and the US Forest Service proposed Groundwater Directive further uncertainty, and do nothing to realistically solve issues regarding reliable water supply in the West.” – Disque Deane Jr., President, Water Property Investors

“We need to carefully evaluate the impacts and motivations behind agricultural water supply decisions. Often times the consequences of these decisions benefit the farmers themselves, while the cost is born by the laborers.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

“The notion of water being inappropriately applied to low value crops over high value crops gets skewed when the global commodities market comes into play. What farmers prioritize is driven by market forces and the concept of what is a high or low value crop will constantly be shifting as weather patterns become more dramatic across the world.” – Pat Mulroy, Senior Fellow, Climate Adaptation and Environmental Policy, Brookings Mountain West

Initiatives and Opportunities

- **Colorado River System Conservation Program** – In response to declining reservoir levels and decades of drought, water providers in four Colorado River Basin states signed a water conservation agreement with the U.S. Bureau of Reclamation. As a result of the agreement, $11 million are going towards collaborative pilot conservation projects aimed at reducing water consumption in agricultural, municipal, and industrial uses.

- **Integrated Resource Planning Advisory Committee (IRPAC)** – IRPAC is a collective of business owners, community residents, chamber of commerce members, and environmental and education sector leaders established in 2012 to provide input to the Southern Nevada Water Authority and guide water resource planning.
• **Water Efficient Technologies (WET)** – The Southern Nevada Water Authority Water Efficient Technologies program provides monetary incentives to commercial and multi-family properties that install water efficient appliances and technologies. Since its inception in 2001, participants have saved more than 5.3 billion gallons of water.

• **From Forests to Faucets** – From Forests to Faucets represents a partnership between Denver Water and the U.S. Forest Service aimed at improving forest health in watersheds critical to Denver Water’s water supply. Each partner contributed $16.5 million towards forest restoration efforts that will reduce soil erosion and wildfire risk.

• **Trout Unlimited - Western Water Project** – The Western Water Project, created in 1998 by Trout Unlimited, partners with ranchers and farmers to restore stream flows and habitat in prized trout streams. The Western Water Project works with water rights holders to voluntary sell or lease their water rights to supplement in-stream flows for fish habitat while sustaining productivity on the land.

• **Denver Water – Water, Infrastructure and Supply Efficiency (WISE)** – Denver Water partnered with Aurora Water and the South Metro Water Supply Authority to create new supply by utilizing existing capacity in Aurora Water’s Prairie Waters Project pipeline. Unused supplies in addition to return flows from Denver and Aurora are captured and stored. Denver and Aurora can then sell off excess water to the South Metro Water Supply Authority. This collaborative project expands water supply for the Denver metro area through utilizing existing infrastructure and minimizing the need for new water rights purchases.

• **DC Water - Green Century Bonds** – DC Water in Washington D.C. recently issued $350 million in century bonds to finance water infrastructure improvements. The Green Century Bonds represent the first municipal century bond issued by a water utility in the United States. Proceeds from the century bonds will finance the DC Clean Rivers Project, an effort to transport combined sewage to a wastewater treatment plant, reducing combined sewer overflows to nearby rivers.

**Resources and Technology**

- [Google Earth](#) catalog of historic Landsat images
- [United States Drought Monitor](#)
- [Great Basin Weather and Climate Dashboard](#)
- Natural Resources Conservation Service [EQIP](#) (Environmental Quality Incentives Program)
- [PAYS (Pay as You Save)](#) appliance efficiency upgrade cost-share program
- [Central Arizona Groundwater Replenishment District](#) approach to providing assured water supply
- Palo Verde Irrigation District and Metropolitan Water District [fallowing and water supply agreement](#)