



River REPORT

Winter 2011-2012

A project of the Water Education Foundation

Bigger, Faster and Stronger: Climate Change and the Colorado River Basin

By Gary Pitzer



One of the regions in the United States most susceptible to the effects of climate change is the Colorado River Basin. Because of the many purposes the river serves, slight changes in temperature and snowfall can have dramatic results for the millions of people throughout the seven states and Mexico that rely on the Colorado River for water.

For years, scientists and water managers have pondered the extent to which climate change is happening and how to come up with the best adaptation mechanisms. Officials are working to provide more credible numbers that can be used to project future conditions and the best response mechanisms. Projections have been offered, some of which call for as much as a 20 percent reduction in the long-term water supply.

A day doesn't pass without further evaluation of what's happening in the atmosphere and its effect on the Southwest. The technology is broad, sophisticated and ever growing, enabling experts to further refine their knowledge of current conditions and to program climatic models. Change is occurring, experts say, though at a pace faster than first imagined.

"There's really nothing inconsistent that's been observed," said Holly Hartmann, director of the Arid Lands Information Center at the University of Arizona. However, a "big surprise" is the pace and scale of change. "The models are chasing the observations," she said. "It's happening faster and stronger than projected in early studies."

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Dear Readers

Since our first Colorado River Symposium in 1997, this biennial, invitation-only event has reflected the tension among stakeholders on a long list of issues. But the Symposium also has featured meetings among the various parties as they strive to find common ground. The panel discussions offer participants the opportunity to hear firsthand the key points/positions held by federal officials, states' representatives, tribes, the Republic of Mexico and the environmental/conservation non-governmental organizations. I believe these symposia have helped pave the way for some of the landmark river agreements reached over the last 14 years.

We held our most recent Symposium in September at the Bishop's Lodge in Santa Fe – site of the 1922 compact negotiations. Panelists at the event, "Solving the Basin's Math Problem: Adapting to Change," spoke about the drivers of change; the agreements reached to date; how to maintain those agreements and how to avoid the "worst case" scenario. One panel was devoted to climate change and the recorded conversation among panelists forms the basis of this article written by Gary Pitzer. The recorded discussions on climate change and the discussions over the entire two-and-a-half day event will be edited and published as a paperback book in 2012.

We at the Foundation remain committed to informing and educating people about the vast and vital Colorado River Basin and will continue to bring you the diverse viewpoints on the Basin's key issues through our Colorado River Project, which includes River Report, our Lower Colorado River Tour and, of course, Western Water magazine. If you have ideas for topics of interest, please let us know. And thank you for your support of our Colorado River Project.



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The mission of the Water Education Foundation, an impartial, nonprofit organization, is to create a better understanding of water resources and foster public understanding and resolution of water resource issues through facilitation, education and outreach.

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WATER EDUCATION
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FEATURE

Continued from front page

It's questionable whether the observations have tempered the argument about the existence of climate change and the extent to which human activity bears some responsibility. The divide is considerable between believers and skeptics, with the former saying the weight of scientific evidence supports human-caused climate change and the latter saying what's occurred is part of normal climate variability.

"There really is little or no scientific uncertainty that there's a human impact on global warming," said Lester Snow, director of integrated resource management with the Resources Law Group in Sacramento, Calif. "That what we do is accelerating what might otherwise have been a natural climate change phenomenon but we are impacting it."

Snow, Hartmann and two other panelists spoke about climate change at the Water Education Foundation's eighth biennial invitation-only Colorado River Symposium held in September in Santa Fe, N.M. In addition to the large-scale revelations, monitoring has picked up some smaller scale peculiarities, such as variable changes in American pika (a species seen as especially vulnerable to climate change) populations in particular locations and the movement of some plants downslope instead of upslope in response to the changing conditions.

As investigations continue, it is with the knowledge that temperatures have crept up a couple of degrees the last 30 years, a phenomenon that has contributed to conditions such as the reduction of the Pinyon-juniper forests on the Colorado plateau, the destruction of trees by bark beetles and the size of wildfires, Hartmann said.

"We are seeing some very large-scale changes," she said.

A number of entities are documenting the changes and advising response mechanisms, including the University of Colorado at Boulder's Western Water Assessment (WWA), a cooperative effort of the school and the National



American pika

Oceanic and Atmospheric Administration (NOAA). WWA's 2008 report, *Climate Change in Colorado – A Synthesis to Support Water Resources Management and Adaptation*, "has become a gold standard" for reporting climate impacts and climate change projections, Hartmann said.

Climate change "will affect Colorado's use and distribution of water," and water supply agencies "currently face specific challenges that may be further exacerbated by projected climate changes," the report said.

Earlier this year the WWA released the final report of its Colorado Climate Preparedness Project, which noted that "even agencies that explicitly and successfully incorporate climate variability into planning are struggling with the inherent uncertainty of long-term climate projections and the incompatibility of the timescales of climate change with existing planning regimes."

Nonetheless, "we know enough about the likely direction and magnitude of climate change impacts relevant to many

sectors to move forward with an initial cycle of adaptation planning in many areas," the authors concluded.

The spate of extreme weather events in 2011 has prompted questions about the relationship of the storms and drought to climate change. Hartmann thinks the question should be framed differently, given that climate change is already occurring. "We are now living in a changed climate," she said. "Because of that ... everything we see now has to be seen in the context of a changed climate."

Because of that, it is reasonable to say that current weather phenomena are influenced by climate change factors, such as increased water vapor in the atmosphere, Hartmann said.

"For a growing number of events that answer seems to be we would not be seeing those specific events without the contribution of climate change," she said.

Not all extreme weather can be tied to climate change, though, and extrapolating cause and effect "takes a lot of effort," Hartmann said, noting that the

tornadoes that struck the Midwest in 2011 have not been connected to climate change in initial assessments.

In understanding what the “new normal” is, Hartmann said the future will be marked by “constant change” that has been tagged with the acronym VUCA, which stands for increased volatility, uncertainty, complexity and ambiguity. Not unique to climate change, the VUCA scenario is one in which droughts and floods are sometimes simultaneous and factors such as dust accumulation (which accelerates snowpack runoff) add to the complexity of understanding.

VUCA can be understood in the same way that a weather forecast calls for a 70 percent chance of partly cloudy conditions, Hartmann said. “The 70 percent is uncertainty, the partly cloudy is ambiguous,” she said.

This issue of *River Report* describes the various perspectives on climate change given by panelists at the Colorado River Symposium. The full written proceedings of the two-a-half-day symposium will be published in 2012.

Many winter vegetables, including peppers, are grown in the Coachella Valley.

Avoiding “Politically Expedient but Poorly Planned Substitutions” for Agriculture

VUCA is not the ideal planning tool for the agricultural sector, which is very sensitive to climactic shifts. As such, communication and coordination are “essential” in the quest for suitable adaptation mechanisms, said Reagan Waskom, director of the Colorado Water Resources Research Institute. “It’s all about managing risk ... including extreme weather,” he said. “Climate is what producers plan on, it’s bad weather they hope to avoid.”

Because climate change has differing effects on crop and livestock production, the Colorado River Basin “in some ways is fortunate in that it has a wide range of agricultural systems and I think they will exhibit different sensitivities to climate variation,” Waskom said.

The Basin’s output “is not trivial” in its contribution to the U.S. market, producing 15 percent of all crop receipts and 13 percent of all livestock receipts from 2.8 million acres of irrigated land. Agriculture faces different stress factors, including bad weather and population growth that encroaches on farmland. The impacts from and adaptation

mechanisms for climate change will be different in the upper and lower basins, Waskom said, noting that farmers in the Lower Basin already have to deal with the “inconvenient truth” of hot and dry conditions.

“We know that ag productivity expands or increases with temperature and an expanding growing season to a point, but the relationship is not linear, meaning you will hit the threshold at some point where production really begins to drop significantly,” he said.

On non-irrigated lands, there is “serious concern” about the increased instance of and severity of fire, which limits grazing potential on public and private lands. Hotter and drier conditions will reduce grazing pasture, meaning ranchers will have to run fewer cattle or use more hay for feed, which they do “at their economic peril,” Waskom said.

Whether the drought in Texas and Oklahoma, with its \$10 billion in damages, is climate change-driven or “a reminder of our periodic susceptibility to bad weather,” no one argues the severity of its impact, Waskom said. “I think climatologists will tell us it’s not an unprecedented drought,” he said. “What may be unprecedented is when you add



those 1, 2, or 3 degrees of temperature and heat on top of an already hot and dry event, the severity of that impact increases significantly."

Farmers used to occasionally battling the weather fear those battles may become more frequent. "Gradual warming is not really what concerns us in ag, at least in the first half of the 21st century," Waskom said. "It's really this increased likelihood of extreme events."

The source of those extreme events remains inconclusive to some. Waskom said his farm extension colleagues in the Lower Basin have told him that attribution "is really difficult," and that they are not willing to say they are seeing something that is the particular result of climate change. Whatever the case may be, it is clear that agricultural producers are operating under a different paradigm.

"It's no longer certain they can use their past experiences and past observations when making investment and management decisions, especially in the last 10 years," Waskom said. "If the next 10

"As long as they continue to have plenty of water, climate change isn't really an issue for [farmers]."

— Reagan Waskom

years look like the last 10 years in terms of variability it's a concern for them in terms of how they make their investments and how they stay in business."

As it currently stands, climate change impacts are not severe enough to immediately threaten the viability of those that make their living from agriculture up and down the river, Waskom said. "As long as they continue to have plenty of water, climate change isn't really an issue for them," he said. He noted that a June 2011 risk assessment by the U.S. Department of Agriculture said that in the aggregate, agriculture will be "pretty resilient" for the first half of the 21st century,

with changes occurring slowly over time, such as moving crops north and altering varieties and growing seasons.

The WWA's 2011 report concurs, saying that "despite its exposure to risks, agriculture is widely viewed as particularly adaptable in the face of multiple challenges including climate variability, and the sector in Colorado may be in a position to benefit from some anticipated climate changes, such as warmer conditions and longer growing seasons."

Further out, it is essential for better long-term data to emerge that refines the identification of climate change indicators and increases the reliability of forecasting, Waskom said. It is "troubling," he said, that water reserved for agriculture is identified as a "fallback plan" for the urban sector and others should conditions warrant. "That doesn't bode well for agriculture adaptation," he said. "At some point we will have to determine where marginal agricultural productivity lies in the Basin and look

L to R, HDR's Gordon "Jeff" Fassett moderated the climate change panel at the Foundation's September Symposium. The panelists were Holly Hartmann, University of Arizona; Eric Kuhn, Colorado River Water Conservation District; Reagan Waskom, Colorado State University Water Center and Lester Snow, Resources Law Group.



how to make logical substitutions that manage the pain on the ag economy ... before ... we have to make either politically expedient but poorly planned substitutions."

The Battle for Public Opinion

Besides the challenges in monitoring climate change effects and devising management approaches, there remains the resistance to the concept that extraordinary changes are occurring at all. Some of the reluctance is skepticism, while some of it can be traced to the belief that climate change proponents engage in agenda-driven science.

"We are moving backwards when it comes to the public's acceptance of the issues associated with climate and that is going to cause some real significant challenges when we get down to having to deal with things like how are you going to change the operation of a project, [and] how you are going to build new projects," said Eric Kuhn, general manager of the Colorado River Water Conservation District.

While scientific investigation into climate change is rigorous, the same cannot be said about the effort to convey that information to the layperson, many of whom do not understand the difference between climate and weather, Kuhn said, adding "we in the water community are on the losing side of a very difficult public policy issue."

The challenge now, he said, is moving forward "in a rational way" to develop "classic, conservative" management approaches that have political and public support given the scientific uncertainty "and most importantly" the present political divide. The matter "is going to hit home pretty hard" in 2012 with the release of the Colorado River Basin study, which will define current and future imbalances in water supply and demand for the next 50 years, and "develop and analyze adaptation and mitigation strategies to resolve those imbalances," according to the Bureau of Reclamation (Reclamation).

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— Eric Kuhn

"The idea is it's a planning study," said Terry Fulp, deputy regional director for Reclamation's Lower Colorado Region, at a Sept. 21 panel discussion. "It's to provide a technical foundation from which we can move forward in future activities and discussions. And that way it might in fact inform some of these other activities we know are coming at us."

The \$5.1 million study is funded equally by Reclamation and its partners from the seven basin states. An interim report released in June featured four water supply scenarios, including those based on "historical observed and paleo-reconstructed streamflow records as well as future climate projections from global climate models," according to Reclamation. Authors of the report said the mean natural flow of the Colorado River at Lees Ferry, Ariz. is projected to decrease by approximately nine percent during the next 50 years and that there will be an increase in the frequency and severity of droughts.

The next phases of the study will quantify the demand scenarios, assess future system reliability and develop and evaluate "opportunities for balancing supply and demand," according to Reclamation.

Kuhn has some concerns about the study's usefulness and whether it will provide "too much information, too confusing information," that inhibits "moving us toward some sort of solution, some sort of reality in the Basin."

"Is it really going to be helpful or is it going to be providing more noise to the system?" Kuhn said. "The studies are out there; there is enough. There are tons of things out there. Doing one more study just adds more static to the system. We

really need to start focusing on how are we going to start adapting."

Kuhn said he's concerned if the Basin Study is too complex "can it be used to really help educate where we need to go?" He also wondered whether Reclamation will consider "realistic" futures for the Colorado River given the rate of growth that's already transpired. "The way I see the future of the Basin, if it wasn't for the study and all those other things, the Lower Basin [has] basically developed all of the Colorado River water it can ... and it has been for a few years," he said.

While the Upper Basin "has got far less development than was anticipated years ago," the rise in temperature will increase the demand for water by agriculture which could mean "a few more little projects are going to get built because that's all practically we can afford or you can have in terms of what the public will support," Kuhn said.

The best alternative, he said, is the no regrets planning that considers "what actions can we take today that won't create problems in the future," mainly water conservation, which includes better reservoir management and better efficiency.

Risk and Uncertainty on Steroids

The inability of planners to account for existing conditions, let alone those wrought by climate change, has some experts skeptical about the ability of agencies to adequately deal with what's expected the next 50 to 100 years. "When it comes to climate adaptation I don't think we've done a good job of adapting to the climate we used to think we had," said Snow with the Resources Law Group.

Snow has had a long career from which to observe adaptation mechanisms, including stints as secretary of the California Natural Resources Agency, director of the California Department of Water Resources and director of Reclamation's Mid-Pacific Region. One of the more common occurrences have been floods, which while powerful and destructive, tend to instill short-term

amnesia in decision-makers once they've receded.

Memory of the destruction is "gone in a heartbeat," replaced by the drive to build homes in a floodplain with an inadequate level of protection, Snow said. And it's not just floodplains but other areas that are clearly unsustainable for housing. "We build houses on coastal cliffs without any consideration of how that cliff got there and we want the [Army] Corps of Engineers to make sure nothing more happens to that cliff," Snow said.

The effects of climate change are visible in California through a "steady trend" of reduced snowpack and higher flood peaks, Snow said, noting "it is just irrefutable and it's been going on for a long time and will continue." Elsewhere, the record floods and drought in the U.S. should serve as dramatic illustration of what the "new normal" might be.

"We all know that a year of weather does not equate to climate, but we better understand these are harbingers of where the trend is headed," Snow said. "And if we think those were gross anomalies that won't be back, we are fooling ourselves and those have to become the markers

that we start looking at as to how we would respond to them."

Because drastic weather swings are not unusual in the arid Southwest, Snow said it behooves water managers to be ahead of the curve and start thinking how things can be done better in reaction to shifting weather patterns. "Climate adaptation for me is not something separate," he said. "It is a piece of what I think we all do as managers. Whether it's a resource manager or managing your own homes, it's managing risk and uncertainty. There's all kinds of uncertainty we manage on a regular basis and with climate change we have to do that in a very proactive fashion."

Working proactively would be a change for state and federal agencies that have dealt with natural resources in a manner "that is just crisis management," whether it is crashing fish populations, or devastating floods and fires, Snow said

"Instead of being proactive to deal with the problem we respond to a crisis, and I think that unfortunately has moved in the wrong direction and we have to change that to integrative resource management and do it in a proactive fashion," he said. "And when we do

that, climate change is not a new risk; [it] accentuates the risks that we already have and ... elevates the level of drought and the frequency of drought so you can think of climate change putting the risk and uncertainty on steroids."

The response to VUCA is scenario-based planning, Snow said. Used by the National Park Service's Climate Change Response Program, scenario planning means "exploring qualitative as well as quantitative models in order to envision future outcomes under a variety of different decisions, policies, or societal pathways," according to a brief posted at the NPS webpage. The brief notes that while there are many different approaches to scenario planning, "all of them rely on the development of story lines that capture the critical uncertainties about a system." Building scenarios "is an iterative and adaptive process that allows participants to explore uncertainties, synthesize their meaning and implications, act, and monitor their success," the brief says.

At least three different scenarios of possible futures should be considered, Snow said, adding "there has to be some determination of acceptable risk as you

Rocky Mountain snowmelt is a major source of water supply in the Colorado River Basin.



look at these things.” For water supply, it is imperative that a portfolio-based approach is followed in which conservation, water recycling, stormwater harvesting, “a lot more storage,” (primarily underground) and irrigation efficiency all play significant roles.

“One of the issues that’s near and dear to me is when you look to the future and food production for 9 billion people, we have to do everything we can to improve irrigation efficiency to keep U.S. agriculture competitive in a global market,” Snow said. “There’s just no question that we have to move to higher levels of efficiency.”

Groundwater storage, which is promoted as a more practical alternative than new surface storage, is the type of “no regret” action that should be vigorously pursued. “There’s no down side to adding groundwater storage and it can be a great buffer against the vagaries,” Snow said.

Often overlooked is the value in restoring natural systems, Snow said, noting “the best example” is the surge buffering on coastal wetlands. In that scenario, coastal wetlands serve to absorb large amounts of wave energy that would otherwise do extensive damage. Some research indicates that the height of storm surge can be reduced by one foot for every mile of vegetative wetlands that exists, according to NOAA’s Coastal Services center.

Broadening floodplains by giving rivers more space to meander helps by providing additional capacity for a flood of record and opens up recharge basins, Snow said.

Response actions require investment, however, a challenging proposition in an era of lean budgets and public resistance to rate increases. To Snow, not investing in response measures is a matter of being penny wise and pound foolish.

Not raising rates “is the worst thing we could do,” he said. “In terms of climate change and risk and uncertainty it’s ‘pay me now or pay me later.’ And the response now is cheaper than the disasters that will happen in the future.”

“There’s been tremendous progress in how people, agencies and organizations are thinking about climate change and the specificity of how they’re dealing with climate change.”

— Holly Hartmann

In addition to investing in storage and reuse projects, agencies have to get behind better forecasting methods that help them adapt to climate change as well as re-tool existing resources to take advantage of the altered weather patterns. “We have to do a better job on understanding flood and how to operate the reservoir,” Snow said. “And speaking of reservoirs we’ve got to get the Corps of Engineers in a progressive and rapid fashion to start assessing reservoir operating criteria and modify reservoir operating criteria. I think almost all of them are outdated in terms of what we understand future hydrology to be.”

Toward Sustainable Water Management

Going forward, Snow said it’s imperative the debate about climate change be resolved in order to maintain and accelerate the pace of adaptation. The increasing political uncertainty about the commitment of some to the effort “is very disheartening,” he said

“It’s reminiscent of the 1960s when we actually had a handful of scientists who would show up with tobacco CEOs before Congress and testify there’s no causal link between smoking and lung disease,” he said. “And we’ve got to push that [stuff] aside.”

Those who deny that greenhouse gas emissions are affecting the climate “don’t understand the pace and severity of climate change,” Snow said.

“If you think it’s a natural phenomenon then I believe by your very nature you’re going to assume that it’s slower and much more easily managed,” he said.

“If you understand the greenhouse gas production and the potential effects of that, then I think we will move much more quickly.”

Confronting the hostile political environment means “do what you can using whatever language you have to, whether it’s security or sustainability or risk management or preparedness to focus on what values that community has,” Hartmann said. Another approach “is to create safe places for thinking” that emphasize “thinking the unthinkable and sharing lessons.” One of those “safe places,” she said, is Carpe Diem West, a Sausalito, Calif.-based nonprofit organization founded in 2007 to address climate change and its impact on water in the West.

The group in October released a policy brief, *Charting the Rapids Ahead: Western Water, Climate Change & Public Health*, that notes that effects of climate change on water supply, security and sources “are expected to raise significant public health issues in the coming decades,” that are not being adequately talked about.

“This lack of discussion is of particular concern in the American West, where climate scientists broadly agree that climate change is profoundly altering every aspect of water – its quality, quantity, timing, phase (rain or snow), and temperature,” the brief says. “And in the American West, as in the rest of the nation, longstanding divisions between water users, water managers and health officials have frustrated most attempts at collaboration even before the considerations of climate change.”

Besides unconventional thinking, Hartmann said it’s important to use “appropriate messengers,” such as those within the water community, to talk about climate change and the need to adapt.

“Water managers are often seen as trusted messengers,” she said. “There’s an important role for water managers to bring the science down to that local level and talk about local impacts and challenges.”

Calendar

Kuhn is dubious that progress is being made in convincing people that climate change is occurring and that something needs to be done about it. "It is such a difficult issue [and] it is so easy to demagogue and take the uncertainty in science and turn that into junk science," he said. "And I don't think we've seen the consequences of that yet, and I think we will in the water management community very soon."

Despite the claims about the legitimacy of climate change science and the skepticism expressed by some elected officials and some of the general public, the landscape has changed in the past five years, Hartmann said.

"There's been tremendous progress in how people, agencies and organizations are thinking about climate change and the specificity of how they're dealing with climate change," she said. "It's really tremendous. If you think even a few years ago, before the change in administration, there were people in agencies that couldn't put the words climate and change in the same report, let alone paragraph and sentence. Then agencies were tasked to develop adaptation plans within 12 to 18 months. What a shift."

Local jurisdictions are taking adaptation measures, including the city of Tucson, the first municipality in the country to require rainwater harvesting for new commercial development and which also requires all new construction of single-family homes and duplexes to include plumbing to distribute gray water for outdoor irrigation. In at least one instance, the city responded to people who were literally taking matters into their own hands, said Hartmann, a Tucson resident.

"People were cutting the street curbs to direct water to their landscapes. Rather than stop it, [the city] created standards for doing that," she said. "And so now a homeowner can hire a contractor to cut the public curb and direct street runoff to their landscaping to provide water harvesting."

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January

- 25-27** **2012 Colorado Water Congress Annual Convention**, Denver, CO
Contact: 303-837-0812 • Web: <http://www.cowatercongress.org/AnnualConvention/index.aspx>
- 26-27** **National Salinity Summit**, sponsored by Multi-State Salinity Coalition, Las Vegas, NV • Contact: 775-473-5473
Web: <http://www.multi-statesalinitycoalition.com/events>

February

- 8-9** **Colorado River Stakeholders Science Roundtable**
sponsored by Interstate Council on Water Policy, Salt Lake City, UT
Web: <http://www.icwp.org/cms>
- 23-24** **17th International Water Conservation and Xeriscape Conference**
sponsored by Xeriscape Council of New Mexico, Albuquerque, NM
Web: <http://www.xeriscapenm.com>

March

- 1-2** **Law of the Colorado River**, sponsored by CLE International, Denver, CO
Contact: 800-873-7130 • Web: http://www.cle.com/product.php?prodid=1316&src=Featured&page=Colorado_Water_Law
- 5-8** **Annual Conference**, sponsored by Nevada Water Resources Association, Las Vegas, NV Contact: 775-473-5473 • Web: <http://www.nvwnra.org>
- 8-9** **Colorado Water Law**, sponsored by CLE International, Denver, CO
Contact: 800-873-7130 • Web: http://www.cle.com/product.php?prodid=1316&src=Featured&page=Colorado_Water_Law
- 14-16** **Water Education Foundation's Lower Colorado River Tour**, Las Vegas, NV
Contact Diana Farmer, 916-444-6240, email: dfarmer@watereducation.org
Web: <http://www.watereducation.org/tours>
- 27-28** **Water Education Foundation's Annual Executive Briefing**, Sacramento, CA
Contact: Diana Farmer, 916-444-6240, email: dfarmer@watereducation.org
Web: <http://www.watereducation.org/conferences>

April

- 2-5** **Annual Conference**, sponsored by New Mexico Rural Water Association, Albuquerque, NM Contact: 505-884-1031 • Web: <http://www.nmrwa.org/conference.php>

June

- 10-12** **Western Governors Association Annual Meeting**, Cle Elum, WA
Web: <http://www.westgov.org>

Contact Sue McClurg with your calendar items from July 2012 through December 2012 for inclusion in the Summer issue of River Report, smclurg@watereducation.org or 717 K Street, Suite 317, Sacramento, CA 95814

California Appeals Court Reverses Lower Court Ruling on QSA



A state appeals court in California upheld part of the Quantification Settlement Agreement (QSA) Dec. 7, reversing a lower court's ruling that had threatened the integrity of the landmark QSA, a complicated document signed in 2003 that includes the nation's largest transfer of water from agricultural to urban use.

The court did, however, order the Sacramento County Superior Court to consider the adequacy of the transfer parties' compliance with the California Environmental Quality Act (CEQA) aspects of the QSA to determine its legitimacy as it relates to the future of the Salton Sea. The Sea, a large inland lake in southeastern California is faced with drying up due to reduced inflow – creating unhealthy dust storms and destroying habitat for fish and birds. The state of California is obligated to restore the Sea, but the high cost, complicated technical issues and vacillating political will have been a problem.

Challenged by Imperial County for the adequacy of its environmental review, the QSA was invalidated in December 2009 when Sacramento Superior Court Judge Roland Candee ruled that California unconstitutionally committed through a Joint Powers Authority (JPA) to writing a blank check for projects designed to offset the environmental consequences related to the transfer.

But the opinion by the three-judge panel said Candee "erred in determining that the [JPA] violates ... the California Constitution."

"While the agreement does unconditionally obligate the state to pay the excess mitigation costs beyond those for which the Imperial [Irrigation] District, Coachella [Valley Water District] and San Diego [County Water Authority] are responsible, the imposition of that obligation on the state does *not* violate the appropriation requirement of ... the Constitution because nothing in the

[JPA] gives those three water agencies (or anyone else for that matter) the right to *enforce* that obligation by drawing money from the Treasury without an appropriation by the Legislature," the opinion says.

Supporters of the QSA welcomed the court's decision. "The Water Authority is very pleased with the appellate court ruling," Maureen Stapleton, general manager of the San Diego County Water Authority said in a press release. "We were confident we would persevere and prevail."

San Diego received 80,000 acre-feet of water from the Imperial Irrigation District as part of the QSA. Even with the court decision, "there's still considerable work to do in turning this agreement into one that is environmentally sustainable for the Salton Sea and economically viable for Imperial Valley agriculture," said Kevin Kelley, general manager of IID, in a press release.

Reduced water use by agriculture has lowered the amount of runoff that flows to the Salton Sea, increasing its salinity and exposing more of its shoreline, which is blown away as harmful dust.

Plaintiffs in the lawsuit said the appellate court ruling was but one piece of the larger QSA puzzle. "An important distinction is the court emphatically did not validate the QSA," Antonio Rossmann, attorney for Imperial County, said in a statement. "It ruled that Judge Candee erred in invalidating it on the appropriation/debt doctrine, but sent it back to superior court to determine other grounds for invalidation. Those grounds include CEQA, which becomes even more important now that the court has determined that the obligation of the state cannot in fact be enforced except by the Legislature's future grace to appropriate." •

— Gary Pitzer

FEATURE

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The efforts of Tucson and other like-minded communities are part of a revamped paradigm that stresses sustainability as its buzzword as it relates to water, though defining sustainability can be a matter of interpretation.

"We all talk about sustainable water management and we'd like to define that, exactly what that means," Snow said. "We all know what unsustainable is. A community gets all of its water from a single well, and it's in a contaminated aquifer that's being depleted, [that's] not sustainable. Or another version is you get all your water from a surface supply and it's being diverted out of a critical habitat for an endangered species. So you can come up with examples of what's not sustainable, it's another thing to actually start defining what sustainability looks like."

Adaption and planning cannot be confined to the Colorado River Basin, but must encompass a much larger region, Kuhn said.

"When you deal with climate change, you ... have got to deal with adjacent basins," he said. "The Colorado River system itself is a regional asset. What happens in the Platte, the Arkansas, the Missouri, the Great Basin [and] obviously what happens in California along the Sierra is going to impact what we do in the Colorado River system. Climate change throughout the West should be our focus, not just the Colorado River Basin."

Integrating the knowledge gleaned from all the data gathering into revamped management probably won't happen through the "normal water resource channels," Snow said. Instead, the thought is to convey the message about the need for long-term planning to where it matters most: the bottom line.

"What we've been trying to do is make water supply reliability relevant to the business CEOs and community leaders," he said. "And the business community needs to understand that they've



One of the Water harvesting tanks at Tucson Botanical Gardens.

got a dog in the fight and I think right now they don't."

Snow said that "absent progressive action, water supply unreliability is going to start affecting their bottom line and jobs."

In the meantime, knowing the pace and, most importantly, the variability of climate change remains a work in progress. "Sometimes the state of the evidence is such that it could have multiple interpretations," Hartmann said. "It

takes time for that to play out. You may have multiple interpretations for a while, but you still have to be able to move forward."

"Things are much more complex than we thought and it never gets any simpler," she said. "It gets more and more complex. That's just the future. We're going to have to deal with the increasing complexity which means dealing with the surprises that complexity can bring." •

For More Information

http://wwa.colorado.edu/CO_Climate_Report/index.html

<http://carpediemwest.org/what-we-do/public-health-water-and-climate-change>



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