

1-1-2009

## 27th Annual Water Law Conference - Change in the Midst of Constants: Adapting Water Law to Meet New Demands

Kathlyn Bullis

Follow this and additional works at: <https://digitalcommons.du.edu/wlr>



Part of the [Law Commons](#)

---

### Custom Citation

Kathlyn Bullis et al., Conference Report, 27th Annual Water Law Conference - Change in the Midst of Constants: Adapting Water Law to Meet New Demands, 12 U. Denv. Water L. Rev. 489 (2009).

This Conference Report is brought to you for free and open access by the University of Denver Sturm College of Law at Digital Commons @ DU. It has been accepted for inclusion in Water Law Review by an authorized editor of Digital Commons @ DU. For more information, please contact [jennifer.cox@du.edu](mailto:jennifer.cox@du.edu), [dig-commons@du.edu](mailto:dig-commons@du.edu).

---

**27th Annual Water Law Conference - Change in the Midst of Constants: Adapting Water Law to Meet New Demands**

can be redefined to exclude wasteful uses, it has transfer processes already built in, allowing shifts to less energy intensive uses, and it recognizes the public nature of water, allowing states flexibility in responding to new uses and shortages.

Finally, Ms. Amos discussed solutions for water, energy, and climate change policy. First, there needs to be recognition of the relationship between water and energy at the legislative and administrative levels. Second, prior appropriation may provide the flexibility needed to address some of these issues. Third, state water agencies need to reorient their mission from water allocation toward water management and planning. Fourth, governmental and other entities need to promote energy and water conservation. Fifth, there needs to be implementation of national water and energy policies that recognize the interrelationships between these two resources.

*Roberta Kennedy*

## **27TH ANNUAL WATER LAW CONFERENCE**

### **CHANGE IN THE MIDST OF CONSTANTS: ADAPTING WATER LAW TO MEET NEW DEMANDS**

**San Diego, California**

**February 18-20, 2009**

#### **WATER LAW 102: GROUNDWATER BASICS**

The conference began Thursday morning with a session entitled "Water Law 102: Groundwater Basics." David E. Hansen, Ph.D., P.E., from Hansen Allen & Luce, Inc., began the session with an overview of the engineering aspects involved in groundwater administration. Dr. Hansen first defined basic groundwater terms and discussed the attributes of mountain and valley geology and its impacts on the flow of groundwater. To illustrate these impacts, Dr. Hansen described the groundwater drilling occurring in the Emma Park region southeast of Salt Lake City, Utah. Dr. Hansen pointed out that, in determining the location of wells, one needs to take into consideration geologic strata that directly affect the distribution of surface runoff between drainages and, subsequently, the seepage of surface water into groundwater. He also addressed the inconsistencies that can occur in groundwater pumping. Under normal well pumping conditions, the water level initially declines quickly, but then stabilizes over time. However, both groundwater mining and changing groundwater conditions can negatively influence groundwater pumping. Accordingly, Dr. Hansen stressed the importance of accurate data collection over time to adjust

pumping rates and thereby maximize the resource. Dr. Hansen also pointed out that groundwater source zones can vary significantly within a region and commonly interfere with each other. Therefore, pumping in one zone can have a direct impact on the water level in other groundwater zones. Finally, Dr. Hansen concluded by noting that while a definitive conclusion surrounding the interaction of groundwater systems may be difficult, it is still important to rely on well-versed experts who can explain, to the best of their abilities, those interactions to judges and juries.

Robert "Bo" Abrams, Professor of Law at Florida A&M University College of Law, was next to speak. He presented an overview of groundwater law and its associated regimes. Mr. Abrams first addressed the importance of groundwater as it relates to societal demand, including agricultural, municipal, dispersed domestic, and industrial uses. Groundwater carries with it certain advantages over surface water, such as increased reliability, improved quality, and advantages related to the infrastructure costs of storage and delivery. Historically, American groundwater law developed independently from surface water law due to limits in knowledge and technology. However, states applied common law property doctrines to the resource. Mr. Abrams discussed rules of capture, i.e., absolute ownership and the American reasonable use rule, rules of sharing, i.e., the Restatement Second of Torts reasonable use rule and correlative rights, and the prior appropriation doctrine, based on a rule of priority of use. Mr. Abrams provided a hypothetical scenario in which a city's newly opened rural well farm harms other users by lowering the water table. He then addressed the problem through the lens of each common law doctrine. Mr. Abrams discussed the movement during the twentieth century towards state administrative systems incorporating the permitting of groundwater use. These systems provide states the ability to proactively avoid harm to the resource, and produce statutes and regulations that add specificity to the management of the resource. In conclusion, Mr. Abrams gave a survey of modern problem areas in groundwater law, including the interaction of groundwater and stream water, conflicts between users due to well interference and overdraft, land subsidence from groundwater pumping, saline intrusion, and aquifer storage and recovery.

#### PLENARY PRESENTATION 1: INTERSTATE WATER LAW: NEW COMPACTS AND NEW APPROACHES

Owen Olpin, former Farr Professor of Law at the University of Utah and Special Master overseeing *Nebraska v. Wyoming*, moderated the first session of the day. He began the discussion by describing three pathways for the allocation of interstate water: Article III original jurisdiction, direct congressional allocation, and interstate compacts. Mr. Olpin explored the role of Article III jurisdiction in the *Nebraska v*

*Wyoming* cases over the enforcement of the 1945 North Platte Decree. He concluded with a discussion of interstate compacts and noted that the Supreme Court prefers interstate compacts because the compacts encourage negotiations between the states.

James C. Brockmann, of Stein & Brockmann, P.A. in Santa Fe, New Mexico, spoke about the Pecos River Compact compliance program. He discussed New Mexico's approach to meet its interstate compact obligations on the Pecos River. Mr. Brockman noted that New Mexico succeeded in complying because the state took responsibility and did not try to force the entire solution upon the residents of the Pecos Valley.

Noah Hall, professor at Wayne State University Law School, explained the Great Lakes Compact as a model for interstate water management. He discussed the evolution of the compact from its inception to its negotiations to its final passage in Congress. The compact itself bans all diversion out of the watershed with few exceptions. Further, for water use in the basin, the compact provides a short list of minimum standards for water withdrawal including rules regarding return to watershed, prohibition of adverse environmental impacts, water conservation, and reasonable use determinations.

#### PLENARY PRESENTATION 2: WATER AND ENERGY: UNEASY ALLIANCE

Elizabeth Thomas, from the Seattle, Washington office of K&L Gates LLP began this presentation recognizing the inextricable connection between water and energy – just as energy producers depend on water supplies, so too water producers depend on energy supplies. In order to expound on this idea, the panel members looked at this nexus from a few different angles.

Mark Robinson, Director, Office of Energy Projects, Federal Energy Regulatory Commission (“FERC”), discussed harvesting energy from natural water movement, known as “hydrokinetics,” and the role of the FERC in regulating these energy sources. FERC regulates both ocean hydrokinetics sources, including tidal, wave, and current projects, and in-river projects, which are non-dam turbine systems. Hydrokinetics present a statistical energy panacea of sorts – on paper, the wave movements of the world's oceans produce over 250 terawatts of energy every year. Mr. Robinson does not believe that the United States could ever harvest that much energy, but hydrokinetics could play a large role in increasing the 9 percent share hydropower plays in the nation's total energy portfolio.

Mr. Robinson talked about the various projects under production or in the design phase, as well as the FERC's jurisdictional authority and regulatory process. In short, the FERC has authority over projects that affect federal lands, utilize a navigable waterway, produce energy sold via interstate commerce (like the power grid), or utilize excess federal project water. The city of Hastings, Minnesota uses excess fed-

eral project water on the Mississippi River by placing a power turbine at the bottom of an Army Corps of Engineers' lock and dam system. Similarly, a company testing ocean-based buoy-turbine technology would fall under the FERC's jurisdiction under navigable waters, federal lands, and interstate commerce. Mr. Robinson also stressed the difference between preliminary permits and actual licenses. Preliminary permits do not authorize construction of hydrokinetic projects, but do allow permit holders to conduct feasibility studies and hold the priority of the permit holder to build the project if FERC grants the license. Currently, FERC has only issued two licenses, but they have issued 137 preliminary permits, and have another 88 preliminary permit applications pending.

Next, Thomas W. Beauduy, the Deputy Director and Counsel for the Susquehanna River Basin Commission, spoke about the impact of gas development on the water resources of the Susquehanna River Basin. According to Mr. Beauduy, the Marcellus Shale Formation has the potential to produce 50-400 trillion cubic feet of gas, but in order to recover this gas, developers must use approximately one million gallons of water for each one thousand feet drilled for gas wells. Put together, this much water use in the Susquehanna River basin, which would eventually drain into the Chesapeake Bay, is cause for concern not only for the Susquehanna River Basin Commission, which is responsible for monitoring the water use, but also the municipalities and other large water users in the area the water use would also affect.

Finally, Kristy A. Niehaus Bulleit of Hunton & Williams in Washington, D.C. addressed the various issues regarding the use of water in the actual production of energy in power plants. Ms. Bulleit provided an overview of the use of water in power production, and how different kinds of plants use water in different ways. "Wet" power plants use a neighboring water resource to cool condenser coils, either in a system that uses water once and returns it to its source or in a system that recycles the water. There are Clean Water Act regulations that cover the location of water withdrawal and return locations for these water sources. However, while the regulations favor the closed systems that recycle water, there is still an open question regarding the cost-benefit analysis of certain types of cooling mechanisms and how the Clean Water Act regulations cover cooling condenser water discharges.

#### BREAKOUT SESSION 1A: EMERGING AND NEW BALANCES IN TRIBAL AND FEDERAL WATER RIGHTS

Jeanne S. Whiteing, of Whiteing and Smith in Boulder, Colorado, provided an overview of the *Winters* federal Indian reserved water rights doctrine. She discussed the basics of the doctrine, namely, that upon the establishment of an Indian reservation, the federal government reserves sufficient water to the reservation, and the priority date is the date of establishment of reservation. However, the questions still

stand: Who reserved the rights? Did the Indians reserve from the reservoirs, or did the federal government reserve on behalf of the Indians? The *Winters* case and subsequent cases have not answered this question.

Ms. Whiteing further noted that in the second half of the twentieth century, settlements have quantified the water rights of most reservations, with the exception of the quantifications of the five reservations in *Arizona v. California* and the Wind River Reservation. To date, the United States and various tribes have completed twenty-three Indian water rights settlements, and Congress has approved most of them. Several settlements are also currently pending in Congress.

Next, Scott Bergstrom from the Division of Indian Affairs, U.S. Department of the Interior, offered a federal perspective. He began by establishing the context for the federal outlook. First, the United States holds legal title to water that it holds in trust for the Indians. Second, although the parameters are hazy, the United States has responsibility to protect Indian water rights. Third, federal water rights must ensure that there is sufficient water for the purpose that the water was originally set aside, especially to make reservations livable. Fourth, Mr. Bergstrom explained the effects of the McCarran Amendment, which waives the sovereign immunity of the United States in a suit designed to establish the rights to a river or other source of water, and where the United States appears to own or be in the process of acquiring rights to any such water. Ultimately, state courts may adjudicate federal water rights claims under state law.

Mr. Bergstrom subsequently examined some unique issues, such as fishing rights. The Supreme Court has not focused on fishing or other purposes that led to the establishment of Indian reservations, and thus has not examined off-reservation uses for water. Fish that rely on off-reservation water may support the inhabitants of the reservation. Thus, reserved fishing rights include water rights sufficient in quantity and quality to support the fishing rights.

Jeremy Jungreis of Nossaman LLP investigated the future of *Winters* rights in a time of drought and climate change. He introduced some emerging issues. First, can federal entities acquire federal water rights on acquired lands through public domain rather than reservation in the West? Second, can the federal government obtain federal rights in riparian jurisdictions? Third, if federal rights exist, how should courts or stakeholders measure them? Fourth, who gets priority in a riparian system when there is a drought, and temporal priority is not a factor? Finally, what should federal agencies do to protect their rights? Mr. Jungreis then reviewed the fundamentals of riparianism and concluded with a discussion of *Alliance to Save the Mattaponi v. Commonwealth of Virginia*.

### BREAKOUT SESSION 1B: OPPORTUNITIES AND OBSTACLES WHEN CHANGING RESERVOIR OPERATIONS

The session addressing reservoir operations began with a symbolic and analytical take on the reservoirs of the Western United States. To the generation that built them, the dams and reservoirs of the West represent national treasures in the desert. And while they bring power, flood control, agriculture, river transportation, and many other benefits, they are also expensive to build, maintain, and take down.

Steve Cone of the United States Army Corps of Engineers' Institute for Water Resources began the presentation by addressing the role of the Corps in the nation's water supply, especially in the West. At the most basic level, Mr. Cone reiterated that the Corps does not buy or sell water; it leases storage space in its reservoirs. Also, when it comes to building reservoirs in the future, the Corps fulfills multiple uses, including flood damage reduction and mitigation, hydroelectric power, irrigation water, and water storage. Many of the present questions, however, relate to the dependable yield of water storage leases, where a municipality could lease storage in a project but only be able to draw water five out of six years.

Tim Rameriz of the San Francisco Public Utilities Commission spoke about the Tuolumne River, a major water source for the San Francisco metropolitan area. Mr. Rameriz detailed the Hetch Hetchy Water and Power system, a series of three reservoirs that provide almost 85 percent of the city's water supply. One of the changes to this project include controlled floods intended to mimic spring snowmelt conditions, but as the Mr. Rameriz stated, the opportunities are few and the obstacles many.

### BREAKOUT SESSION 2A: PRIVATE WATER TRUSTS: AN EMERGING FORCE IN WATER MANAGEMENT

Janet Neuman, Professor of Law at Lewis & Clark Law School, filled in on short notice to moderate this panel discussion on the legal and institutional issues that arise for land trusts and water trusts, including their roles in managing surface and groundwater for the protection of species habitat and water quality. The panel included Amy W. Beatie, Executive Director of the Colorado Water Trust, Konrad Liegel, partner at K&L Gates LLP, and Steve Shropshire, managing shareholder at Jordan Schrader Ramis PC.

The panel began by discussing the structure of land trusts as they lead to water trusts. Mr. Liegel, with his extensive experience as counsel to land trusts, set forth the basic organization of land trusts as tax-exempt, non-profit organizations organized under state law. Land trusts have been very successful in terms of land preservation and therefore carry large political clout. These incentive-based trusts attempt to work within the context of existing regulations to find willing



sellers and buyers of land. Mr. Liegel noted that the best land trusts are those that are community and mission oriented, proactively working on conservation projects that fit the needs of a region. Mr. Shropshire discussed the water trust as a constructive form of interaction with senior water rights holders, based on the land trust model. A water trust is an out-of-the-box alternative to litigation that can ensure the appropriate stage agency acquire instream flows for conservation. Ms. Beatie outlined the history of the Colorado Water Trust ("CWT") and its role in providing "teeth" to the Colorado Water Conservation Board's ("CWCB") program for stream and lake protection.

The panel next discussed the importance of understanding the framework of state law in administering a water trust. All panelists stressed the need to understand the legal context that surrounds these entities. Following a question from the audience on the monitoring of streams to ensure that conservation water is not used, the panelists noted the importance of monitoring and how some organizations have their own monitoring system, while others rely on USGS data.

The next topic for discussion was the funding of water trusts. Ms. Beatie stated that the CWT, as a young organization, tries to gain funding any way possible. CWT utilizes state funds the CWCB received for instream flow acquisitions, as well as recouping costs through the re-marketing of historical consumptive use below the lower terminus of a protected instream flow. Mr. Liegler related water trust funding to land trusts, pointing out that land trusts receive funding from transactions, members, donors, and government grants. Mr. Shropshire added that funding could also stem from federal funds associated with the listing of fish species as endangered under the Endangered Species Act. However, he warned that the administration of such funds could be less than streamlined.

The final topic for discussion was the challenges and opportunities that face water trusts in the future. Ms. Beatie pointed out legislation from the 2008 Colorado legislative session that aids the long-term leasing of instream flows, as well as bills providing funding to the CWCB. She did see challenges in Colorado's no-injury rule, where a change of water rights must not injure other water users. In accordance with this doctrine, a change in an irrigation right requires the dry-up of irrigated land, which many rights holders do not understand and can limit their incentive to enter into conservation transactions. Mr. Liegel saw opportunities for land conservation projects to work closely with water trusts to increase the protection of water quality and species habitat. He saw challenges in dealing with federal tax regulations that place restrictions on tax deductions for qualified conservation contributions as they relate to the donation of conservation easements. Mr. Shropshire noted the challenges and opportunities that exist for water trusts to develop confidence amongst agricultural communities where the more senior water rights are. Part of this confidence issue is perform-

ing adequate injury analysis to prevent future injury to other users and thereby deteriorate any confidence within the community. Mr. Shropshire also saw an opportunity in the public's awakening to the concept of sustainability as a way to support the work of water trusts. Mr. Shropshire later noted, during the question and answer period, that another new source of funding for these entities may come from companies interested in reducing their "water footprints," similar to carbon footprints.

#### BREAKOUT SESSION 2B: PRACTICE SKILLS - UTILIZATION OF EXPERTS

It is a well-known fact that lawyers and scientists do not always speak the same language. In water cases especially, this can hamper effective representation of clients. Water law cases often turn on highly technical data; however, lay people decide the outcome of these cases, requiring attorneys to effectively translate the technical data into terms that the fact-finders can understand. Expert witnesses can either help or hinder this process. The focus of this panel was to give attorneys some insight into the effective use of experts.

Gene Franzoy, Fanzoy Consulting, Inc., an agricultural engineer, works with parties in water rights cases. Mr. Franzoy noted that when putting together a team of experts for a trial, they must work compatibly, understand their role in the team, and know how their role interacts with other experts' testimony. Mr. Franzoy has four rules regarding expert testimony in trials. The first rule is that experts should never function as attorneys because they lose credibility if they advocate for a party. Second, experts should always present data without bias. If there is any bias, it may shade the data unfairly, and undermine the science behind it. Third, experts and attorneys should never underestimate the opposing party's experts, nor should they overestimate their own expertise. The fourth rule is that every member of the team should be willing to approach their own point of view as a devil's advocate, to find problems and strengthen the testimony.

Experts may help attorneys in various aspects of the case, including testimony, interrogatories, depositions, cross examination, and post-trial briefs. After discussing several cases that he was involved in, Mr. Franzoy emphasized that experts should know what their job is, and that attorneys should know what to expect from experts.

David Huntley, a hydrogeologist in the Department of Geological Sciences, San Diego State University, focused his discussion on the use of groundwater modeling in disputes. Groundwater modeling plays a big role in understanding groundwater elevation or pressure, the directions of groundwater flow, rates of groundwater flow, directions of contaminant transport, concentrations of contaminants, and the history of release of contaminants. There are several types of groundwater models. Groundwater Flow and Elevation models show the directions, rates, storage, land subsidence, and fluid pressures. Solute

Transport Models show changes in concentration, concentration distribution, and the longevity of concentration.

Mr. Huntley noted that there are both pros and cons to using models. While models are not always perfectly accurate, the data that produces them may only be available for a limited period, and models are the best way to predict future directions, as well as to see the past directions. Models, as opposed to actual measurement, are also able to produce three-dimensional images, and are easier to convey information to lay audiences, like those found on a jury. Mr. Huntley noted that attorneys should keep in mind that three-dimensional models are much easier for juries to read than contour maps, and that simple models are often better than real groundwater models; whenever possible, a physical model will work better than a picture of one. Mr. Huntley also warned that litigants can utilize models “for evil,” because scientists can develop models to support only one side of the conflict, and can mislead judges, juries, and even expert arbitration panels. Ultimately, credibility of the experts is key when using groundwater models.

David Sunding, an environmental and natural resources economist in the Department of Agricultural and Resource Economics, University of California, Berkeley, discussed the use of economic testimony in litigation. Mr. Sunding stated that the economics of water resources involves issues of property rights, creation of markets, the valuation of risk and uncertainty, and dynamic optimization. Storage of water has large economic impacts, including the cost of environmental restrictions, and climate change. Main areas in the economics of water resources are the valuation of water rights, groundwater use, water resource infrastructure and water management, and water quality impacts. Several techniques for placing a value on water rights are market data and constructed value, including development of an optimization model. Water economists derive groundwater value from the amount of water available, storage capacity, and its stabilization value. Moreover, economists can utilize various techniques in determining water value, including comparables and optimization analysis. Numerous tools for measuring the value of water quality degradation include market data, treatment and remediation costs, limitations of water management, and survey techniques for measuring nonuse values.

### PLENARY PRESENTATION 3: EPA NPDES TRANSFERS RULE

David R.E. Aladjem, Partner at Downey Brand LLP in Sacramento, moderated the panel as the speakers examined the questions arising from the final rule promulgation on June 9, 2008, of the Water Transfers Rule and its associated litigation.

Benjamin H. Grumbles, former Environmental Protection Agency (“EPA”) Assistant Administrator for Water, began by noting that the Clean Water Act (“CWA”) manages water pollution and not the

movement of water; however, when dirty water moves into clean water, a pollution problem results. He stated that the best reading of the CWA is that water transfers are exempt from regulation, but that a plausible reading may include the need for a 402 permit for moving dirty water into clean water. Because there is a nationwide increase in the movement of water, the government needs to address these issues. Mr. Grumbles next discussed the two main issues arising from the Water Transfers Rule: the state designation provision and the unitary waters theory. He noted that the Transfers Rule allows states to take actions consistent with Section 510 if the states are concerned with pollution.

Next, David Guest, managing attorney for EarthJustice's Tallahassee office, provided a different perspective. He noted that the states do not have a good history of addressing water pollution themselves, and gave the Cuyahoga River fires as an example. He further explained that most of the arguments against National Pollution Discharge Elimination System ("NPDES") permits for water transfers are based on a "bureaucratic doomsday" argument, that every one of the thousands of water control structures in the United States would require a Clean Water Act permit. Mr. Guest stated this argument is flawed, discussing the pending litigation regarding Lake Okeechobee with its flume that extends fourteen kilometers into the lake. The pollution flows at the rate of a medium river, poses a health threat, and can trigger toxic algae blooms. Mr. Guest ended with exploring the possible outcomes of the litigation.

Karen Tachiki, General Counsel for the Metropolitan Water District of Southern California, introduced her presentation by explaining her interest in the Transfers Rule. As a wholesaler of water for the Southern California coastal plain, the District's sources of water are the Colorado River and state water projects. Faced with a severe water shortage in Southern California, the District is concerned that the government will require more and more permits. Ms. Tachiki also mentioned some benefits of the new Transfers Rule: (1) it offers certainty to the states that the federal government will not subject existing supplies to additional permitting requirements; and (2) it recognizes state control.

#### PLENARY PRESENTATION 4: INNOVATION AND ADAPTATION AMIDST CLIMATE CHANGE AND PUBLIC DEFICITS

This plenary presentation looked at three very different areas related to water and how they have undergone changes in the last few years. Starting the panel, California State Assembly Committee on Water, Parks & Wildlife principal consultant Alf W. Brandt addressed the California Commission Study and how the overall climate for discussion about the climate has changed since 2006. California is looking to respond to its own "superdrought," and other government responses,

from the Intergovernmental Panel on Climate Change to the National Conference of Mayors, have bolstered California's desire to look at policy reactions to climate change and water use seriously. In one of the most striking moments from his presentation, Mr. Brandt connected the vast systems that transport water across the state of California to greenhouse gas emissions. According to the California Commission study, at least 19 percent of all energy used in the state of California goes towards the water cycle – transporting, treating, and delivering water.

Next, Professor Dan Farber from the University of California at Berkeley spoke about the impact of climate change on the application of the National Environment Policy Act (“NEPA”), and what tools are available in the current regulatory structure. Additionally, he outlined five key weaknesses in the Act that prevent effective regulation in a post-climate change world. First, the process starts later than it should. Essentially, Professor Farber argued that NEPA is something done after a party has made up their mind – a cart-before-the-horse mentality that is not very effective. Second, there is little systemic follow-up; government agencies and other groups rarely check the predicted outcomes of a project against the reality. This relates to point three – transparency and access. There are very few Environmental Impact Statements and even fewer Environmental Assessments readily available for groups to check. Fourth, Professor Farber discussed the need for robust solutions to uncertainty within the NEPA process. If people cannot agree on the impacts of climate change, it becomes difficult to incorporate those anticipated impacts into the planning process. Finally, Professor Farber stressed greatly the need to avoid a backburner, do-nothing mentality.

Peter Hughes, formerly of CH2M Hill, gave the last presentation of this plenary session on the Masdor Project, a planned city in Abu Dhabi, United Arab Emirates, that CH2M Hill is helping design. The United Arab Emirates and Masdor's designers intend the city to be entirely carbon-neutral, an incredible feat considering its location in the middle of the Arabian Peninsula's scorching desert and the need for massive cooling systems. Mr. Hughes talked about the logistic, cultural, and engineering challenges with this project, as well as the potential for others to share in the designer's learning experience with this project.

#### PLENARY PRESENTATION 5: AQUIFER STORAGE AND RECOVERY

Daniel B. Stevens, a hydrologist and groundwater management consultant with Daniel B. Stevens & Associates, Inc., discussed the technical issues associated with aquifer storage and recovery (“ASR”). Mr. Stevens noted that artificial recharge, which is any engineered process intended to add water to an aquifer, is not a new process; in fact, Mill Creek and the Santa Ana River recharged the Bunker Hill

Basin as early as 1890 and 1911, respectively. ASR is also widespread, as thirty-two states and twenty-six countries use the process. The Environmental Protection Agency estimates that there are 1,185 aquifer recharge and ASR wells in the United States.

The objectives of artificial recharge include underground storage reservoirs, the abatement of water quality degradation, abatement of land subsidence, and to diminish flood impacts. Mr. Stevens noted that the advantages of underground storage over dams are lower capital investments, fewer landscape and cultural impacts, more limited environmental impacts, less public opposition, less evaporative use, and more long-term sustainability.

Sources of water for artificial recharge include storm water runoff, treated or recycled water, and imported water. Mr. Stevens further explained the basic types of artificial recharge systems: spreading basins and channels on the land surface, infiltration trenches, vadose zone and dry wells, aquifer storage, and recover wells. Characteristics of infiltration basins include permeable soil, an unconfined aquifer, and large areas of land, while having relatively low construction costs. Mr. Stevens noted that in spreading basins and channels, wind and sun expose water to evaporation; however, the remainder of the water percolates downward through the soil. After percolating downwards, gravity, geology, and soil properties affect the flow of the water. Infiltration basins require permeable soil, large areas of land, and an unconfined aquifer, while construction costs remain low. Conditions optimal for vadose zone and dry wells include permeable soil above the water table and minimal land requirements; however, construction costs are relatively high, and the process requires extensive pretreatment of wastewater and turbid surface water.

Mr. Stevens discussed Soil Aquifer Treatment ("SAT"), which is the improvement of water quality that occurs as infiltrated water moves through native soil and aquifers. Water users commonly use this to process wastewater as a source of artificial recharge. Regarding SAT, the most important processes occur in the top few feet of soil, where the soil naturally removes or diminishes nitrates, dissolved organic carbon, bacteria, and viruses. Advanced wastewater treatment may include microfiltration, reverse osmosis, ultraviolet light radiation, and hydrogen peroxide, which may allow the water to meet drinking water standards.

Mr. Stevens emphasized during his presentation that artificial recharge is becoming an important part of water management plans. The most common methods are spreading basins and ASR wells. The sources of artificial recharge create public health concerns, and require strict regulations from states. Nonetheless, despite such concerns, Stevens hypothesizes that population growth will necessitate consideration of artificial groundwater recharge strategies.

Rita Maguire served as the Director of the Arizona Department of Resources from 1993 to 2001; however, she currently works as a practitioner for Maguire & Pearce, PLLC. Because of her diverse professional history, Maguire discussed how Arizona implements ASR from both a legal and a governmental perspective.

Maguire discussed two programs, the Central Arizona Groundwater Replenishment District (“CAGRDR”), and the Arizona Water Banking Authority (“AWBA”), and she touched on other programs such as the Lower Santa Cruz Recharge Project (“LSCRPR”). Arizona passed CAGRDR in 1993, which allows homeowners and water providers to demonstrate to the Arizona Department of Water Resources that a 100-year assured water supply is available to meet their water requirements. The members (either Member Lands or Member Service Areas) of the CAGRDR pay its costs and expenses. A subdivision may become a Member Land when its owner records covenants running with the land subjecting the land to an annual replenishment obligation, and the municipal provider that supplies the subdivision records a covenant agreeing to annually submit the necessary water delivery information to the CAGRDR. A city or water supplier may become a Member Service Area if it adopts a resolution and executes an agreement that irrevocably declares its service area to be part of the CAGRDR.

The CAGRDR pays to acquire both short and long-term rights on the Colorado River, as well as for the development of storage and recovery infrastructure. The CAGRDR uses three revenue sources, including enrollment fees, activation fees, and an annual replenishment tax.

Arizona created the AWBA in 1996, and has since stored 3.4 million acre-feet of Arizona’s unused Colorado River allocation, at a cost of \$228 million. The Underground Water Storage, Savings, and Replenishment Act of 1994 allowed the AWBA to bank the water. Arizona’s General Fund, water storage fees, and other fees fund the AWBA. The AWBA uses a water storage and credit system. For each acre-foot stored, the AWBA accrues a long-term storage credit, which is redeemable in the future when credit holders need supplies for municipal and industrial use.

Despite the challenges that these programs may face, Maguire believes that Arizona’s reliance on groundwater storage and recovery programs will play an important role in meeting the state’s water management and policy objectives for the foreseeable future.

#### KEYNOTE ADDRESS & HOT TOPICS

John Leshy, a member of President Obama’s Interior Department transition team and former Department of the Interior Solicitor, gave the keynote address for the conference. Mr. Leshy spoke initially about the transition between administrations at the Department of the Interior. While he warned that there would likely be no earthshaking changes, he spoke with confidence about the nominations of both Ken

Salazar as Secretary of the Interior and David Hayes as Deputy Secretary of the Interior. In his opinion, both these men are knowledgeable and experienced.

Mr. Leschy focused the majority of his speech towards the role government should play in water administration. State governments, with better perspectives on water issues than their federal counterparts, are better suited to the administration of water resources. Mr. Leschy sees opportunities for state governments to promote regulations and programs to maintain groundwater resources, foster ecological health, conserve and increase the efficiency of water use, and to improve regulations for water transfers to ensure such transfers are accounted for. Mr. Leschy suggested a role for the federal government of providing conditional federal aid, as an incentive to states to reform and upgrade their laws and administrative systems.

Mr. Leschy also addressed the Obama Administration's stimulus package as an opportunity for the improvement of nationwide water systems. While noting that the political challenges are daunting, this pool of funding should provide an impetus for officials to work together to connect national energy and agricultural policies with water policy. Mr. Leschy urged lawmakers and others to take advantage of the current inspiring political climate to meet the challenges of future water administration.

Thomas C. Jensen, partner at Sonnenschein, Nath & Rosenthal LLP, began the Hot Topics discussion by characterizing the stimulus package as a window into contemporary, albeit somewhat compressed, national politics. He noted that the level of funding going to water projects was extraordinarily small compared to the overall size of the stimulus package. Mr. Jensen identified a disconnect between what many would consider an important issue, western water, and how those issues register in the stimulus package. Mr. Jensen saw this as an opportunity for strong leadership within the water community to better frame the importance of water issues into a palatable light for the public. He analogized to the recent groundswell of public interest in renewable energy industries. If water issues could resonate with similar interest in the public, then public money would be more readily available to address the challenges facing western water management.

The Hot Topics discussion closed with A. Dan Tarlock, Professor of Law at Chicago-Kent College of Law, giving an overview of recent water law cases. Mr. Tarlock addressed United States Supreme Court cases involving interstate water compacts, as well as state cases involving the conflicts arising from increased development and urban growth in the West.

*Kathlyn Bullis, Ryan Malarky, Danielle Sexton, and Paul Tigan*