



Medieval Colorado River Drought, A World Event

University of Arizona researchers recently found evidence of an epic medieval drought occurring along the Colorado River. More persistent and long-lasting than any drought on record in the region, the 60-year, 12th century drought reduced Colorado River flows to 15 percent below what is now considered normal for 25 years.

That the drought was described as medieval is interesting. It is not a term one often encounters applied to developments in the western hemisphere or the New World. No scribes or monks were present to record events and occurrences from the fifth to the sixteenth century. Whatever information is available about medieval times in this part of the world comes mainly from archeological, geological or scientific studies such as the tree-ring research that identified evidence of the megadrought in the twelfth century.

Fitting the twelfth-century western drought into some kind of world view perspective would serve to link the New World with the Old and might make us more comfortable with a medieval period in our part of the world. The Colorado River drought can then be better



Above is a detail from "Along the River During Qingming Festival", a painting by Zhang Zeduan, a Chinese artist of the twelfth century. The painting depicts the daily life of people from the Song period at the capital, Bianjing, near today's Kaifeng. (See side story.)

Conservation Easements, A Strategy to Check Development, Preserve River Flow

by Joe Gelt

An incentive-based approach to conservation

Yet another conservation easement has been worked out along the Babocomari River, making the fourth such agreement in the area since January. The total area now protected stands at 1,410.2 acres and 4.61 miles of river.

What is occurring along the Babocomari River reflects a national trend: the increased use of conservation easements as a strategy to protect natural resources. According to the Land Trust Alliance the amount of land protected by local and state land trusts using easements doubled to 6.2 million acres between 2000 and 2005.

In brief, a conservation easement is a legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land for the purpose of protecting its conservation values. By agreeing to an easement landowners give up some of the rights associated with the land; they still own the land, however, and can pass it to heirs or sell it, with the easement in force.

Many and varied are the lands protected by conservation easements: coastlines; farm and ranchland; historical or cultural landscapes; scenic views; streams and rivers; trails; wetlands; wildlife areas; and working forests. In Arizona, a state anxious to preserve its few remaining flowing rivers, conservation easements are especially useful as

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a river management tool. Any river with private ownership of land along side it that has conservation value is a candidate for conservation easements.

Conservation easements along the San Pedro

Consider the San Pedro River: with its reduced flows raising concerns, the river is a veritable active easement area, with many conservation easements having been negotiated with more in the works. Experiences along the San Pedro demonstrate the workings of conservation easements as well as their possibilities and effectiveness as a river management tool.

The Brophy family, owners Babacomari Ranch, has been a willing partner to working out conservation easements. The ranch is located along the Babocomari River, a key tributary to the San Pedro River. In the recent agreement, mentioned above, The Nature Conservancy purchased an easement protecting 487.3 acres of grasslands that contain valuable wetland habitat. Over time, Fort Huachuca will reimburse TNC \$1.9 million for the easement.

Earlier this year Fort Huachuca purchased two other ranch easements, adjacent to one another, for \$830,000 to block development along the Babocomari River corridor. Later the Bureau of Land Management purchased a third ranch easement for \$2.7 million that protects 674.6 acres including three and one-half miles of the Babocomari River channel.

In allowing an easement, a property owner accepts an obligation. Tom Collazo, TNC associate state director, explains: "Every conservation easement is acquiring a partial interest in a property and what type of partial interest you acquire depends on your conservation objects and what you can reasonable negotiate with the landowner, what the landowner is willing to give up in other words"

The main conservation objective along the San Pedro is to limit water use, with property owners relinquishing water rights by accepting a conservation easement. The U.S. Geological Survey has identified the shallow aquifer underlying the Babocomari River as one of the most important contributors to the San Pedro aquifer in the upper San Pedro Valley.

Collazo says the TNC views the Babacomari ranch easements "as the first installment of a much larger, long-term program to protect as much of the Babocomari River corridor and watershed as possible. ... The Brophy family has identified about 16,000 acres of ranch they would like to see placed under conservation easements."

Department of Defense involved with easements

Of the three key players involved in purchasing the ranch easements — The Nature Conservancy, the Bureau of Land Management and Fort Huachuca, the fort might stand out as an unlikely partner in a conservation deal. Part of its interest in the easements, however, is preventing development that would encroach on the fort and interfere with its operations. Confronting economic pressures, ranch owners and landowners are increasingly in need of financial resources to maintain their operations. By selling an easement they needn't resort to selling their land for development. Fort Huachuca has an interest in preventing development.

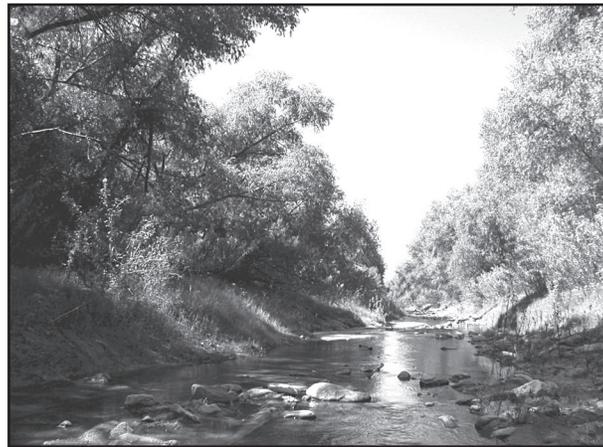
Fort Huachuca also has a natural resource interest in establishing conservation easements. The fort is legally obligated under an agreement with the U. S. Fish and Wildlife Service to offset water withdrawals with water recharge by 2011 as part of an effort to conserve endangered and threatened species dependent upon the Upper San Pedro River ecosystem. The water savings resulting from the easements count as credits toward the army's goal of reducing groundwater pumping.

Earlier TNC had worked with Fort Huachuca to acquire easements along the San Pedro River in the Palominas area, where the river crosses the border into the United States from Mexico. In that situation, TNC acquired property, then, through conservation easements, restricted groundwater pumping and development. It then resold the property to private buyers with the easements reserved. The fort paid for the easements and received credit under its biological opinion for the number of acre feet of water the easements reduced.

In the San Pedro watershed, 7,762 acres are set aside as easements, held by the TNC, BLM and the Bureau.

Three-Links Farm conservation easement

In 2002 TNC purchased the Three-Links Farm, an alfalfa farm that pumps more than 3,200 acre-feet per year. Located about 15 miles north of Benson, the farm includes more than six-miles of



Southwest willow flycatcher habitat on Three-Links Farm. Photo: The Nature Conservancy

San Pedro River, with rare cotton weed-willow riparian habitat. At the time of purchase, the San Pedro was not flowing year round on the entire farm or for miles downstream. TNC purchased the property intending to restore and enhance both groundwater

levels and surface flows through about 20 miles of the river.

Collazo says, "We turned off the pumps, and we have seen dramatic recovery of stream flow not only on the property but for quite a ways down river as well and subsequently a dramatic increase in cottonwood-willow habitat and willow flycatcher populations and number of other riparian related species."

TNC is financing the purchase by reselling portions of the property to private owners, bound with a conservation easement. The easement greatly limited the residential development rights and restricted groundwater pumping. Property that could have been divided into hundreds of house lots was limited to ten homes. Easements reduced the 3,200 acre-feet of water used annually on the farm by 90 percent to 300 acre feet, a net saving of 2900 acre feet per annum.

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Water Vapors

Event Set for Tucson Community to Talk Water

Water, a community resource, is a fitting topic for a community forum. Such an event is planned for Tucson. Called "Com-

WRRC Begins Planning 2008 Conference

Plans have begun for the 2008 Water Resources Research Center conference. The conference will be conducted in June in Phoenix and will discuss Colorado River issues affecting Arizona. More information will be available as plans develop.

munity Conversation on Water — Learn, Listen and Participate," the event will be conducted Oct 26; the Water Resources Research Center is a cosponsor.

It is a special Tucson event, befitting the city's reputation for taking an active interest in water issues. Tucsonans are very aware that decisions about the use, reuse and management of water resources are critical to the future of the community.

Presented as a follow-up to the Tucson Regional Town Hall held in May, the one-day water forum will help citizens understand the complex water issues they face and the decisions that lie ahead to ensure sustainable water supplies.

The Community Conversation will begin with fact-based presentations focusing on the state of the Tucson Active Management Area, its water resources, and the effects of drought, growth, and management choices. This will be followed by community members and water experts discussing their views. Their conversation will address some of the key questions facing the region: Do we have enough water? What role does conservation play? Can our community continue to grow? Should it? What about the environment?

Former Arizona Department of Water Resources Director Rita Maguire's luncheon presentation will offer a statewide perspective, viewing issues raised in the morning in the context of those facing central Arizona and the state as a whole. The forum will conclude with

an opportunity for attendees to share their own perspectives and ask questions.

Other sponsors of the forum are University of Arizona; Arizona Department of Water Resource, Tucson Active Management Area; Pima Association of Governments; Southern Arizona Water Users Association; Central Arizona Project; and Southern Arizona Leadership Council.

The event will be conducted 8:30 a.m. to 2:30 p.m. at the Doubletree

Hotel, 445 S. Alvernon, Tucson. Check the WRRC web site for information about registration. (<http://ag.arizona.edu/AZWATER/>); registration fee is \$25 fee. If you want to receive email information about the event contact wrrc@cals.arizona.edu

Film Shoot at AZ Watersheds

Video shows management options

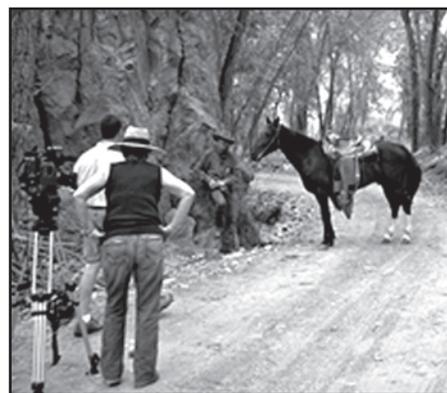
Managing stormwater in arid conditions is the subject of an award-winning video that decision makers, whether municipal officials, watershed partnerships or local associations of governments, will find a valuable resource.

The making of "Stormwater Management from an Arid Watershed Perspective" got its start when Kristine Uhlman, director of NEMO (Nonpoint Education for Municipal Officials) at the University of

Arizona, noted that the Pacific Northwest Regional Water Quality Program's Watershed Issues Satellite workshops did not include video addressing arid conditions.

Uhlman complained; she said they replied, "OK, you do it for Arizona and we did." The Edward R. Morrow School of Communication at the University of Washington, Pullman, provided technical support. Jan Seago, executive producer of the of the series, conducted the interviews and edited over 26 hours of film to the 45-minute final version. Arizona is where all the actions occurs.

Film locations include the USDA Agricultural Research Station near Tombstone, a cattle ranch near the San Francisco River, construction sites in the Sonoran Desert and rain water harvesting project in Tucson. Filming also occurred in Sierra Vista



Dick Kaler and his horse Licorice during filming of the video, "Stormwater Management from an Arid Watershed Perspective." Photo: Kristine Uhlman

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News Briefs

U.S.-Mexico to Discuss Colorado River Issues

Mexico and the United States recently agreed to meet to discuss Colorado River concerns. On the agenda will be issues relating to the two nations sharing the river during drought when competition greatly increases for its diminished flow.

In a joint U.S.-Mexico statement, U.S. Interior Secretary Dirk Kempthorne said talks would focus on the effects of climate change and drought; the two countries' urban, agricultural and environmental water needs; wildlife habitat in the Colorado River Delta; and augmentation strategies such as sea water desalination.

The Aug. 13 statement said existing treaties will expedite planning to enable discussions to occur in the coming weeks. No specific dates have been set. The talks will involve the Bureau of Reclamation and the International Boundary and Water Commission.

An uncertain note in drought planning among Colorado River Basins states has been Mexico's role in such plans. Per a 1944 treaty, Mexico is to get annually 1.5 million acre-feet of Colorado River water or 11 percent of the river's recent annual average flow. The delivery of this same amount during drought would place a greater burden on the states, especially Arizona and Nevada that stand to lose the most water during drought.

Sonoran Institute's Santa Cruz Watershed Work Funded

The Sonoran Institute of Tucson was one of 16 organizations selected nationwide as finalists in the U.S. Environmental Protection Agency's Targeted Watersheds Grants Program. The Institute's Santa Cruz River Civic-Science Conservation Initiative is eligible for up to \$800,000 to supplement \$377,500 from state and local government. Funds will support three components of the Santa Cruz watershed program — restoration, monitoring, and policy — culminating with the creation of a coordinated watershed-wide river conservation steering committee and a State of the Santa Cruz River report. EPA initiated the Targeted Watersheds Grants Program in 2002 to encourage successful community-based approaches to protect and restore the nation's watersheds.



The Santa Cruz River Photo: The Sonoran Institute

"The issues facing the Colorado River basin are complex, and increasing our dialogue with Mexico will make the path to resolving them much easier," Kempthorne said in a news release.

The issues are indeed complex and interconnected as was demonstrated when the United States decided to line the All American Canal that carries more than 3 million acre-feet of Colorado River water a year from Morelos Dam to Imperial County. Objections were raised by environmentalists and Mexican interests that seepage from the canal was a vital water source for the Mexicali Valley aquifer south of the border.

The lining of the canal, however, is part of California's strategy to comply with a multi-state water pact that commits the state to cut back its use of Colorado River water to its allocated of 4.4 million acre-feet. Imperial County's 3.1 acre feet is a large portion of that allocation.

Tucson Voters Confront Broad Water Initiative

Tucson citizens will be voting on an initiative that if passed will give them a significant say in the making of city water policy. Called the Tucson Water Users' Bill of Rights, the initiative has been approved

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understood as a medieval occurrence along with other world events of the twelfth century. While what later became the western United States suffered drought the following events occurred in a distant part of the world.

- The Chinese build an observatory that allows them to calculate rather precisely the length of the year by measuring shadows projected on the ground.
- A central organization known as the Hoogheemradschappen or Main Polder Boards begins administering land drainage in the Low Countries (now known as the Netherlands).
- Houses with chimneys gradually become common, although chimneys had been in use earlier for bakers' ovens and for smelting.
- The Moroccan-born Muslim geographer Muhammad al-Idrisi

publishes his Geography. He was the first to draw a correct map of the world. His maps were used by Renaissance explorers including Christopher Columbus. A Geographical Information Systems software is named after him.

- Thomas Becket is murdered in 1170
- The magnetic compass used in navigation first reached Europe some time in the late 12th century.
- The West's oldest known depiction of a stern-mounted rudder can be found on church carvings dating to about 1180.
- The earliest written record of a windmill is from Yorkshire, England, dated 1185.
- The Chinese painter Zhang Zeduan paints *Along the River During Ching Ming Festival*, a wide handscroll which depicts life in a city.

Mines Look to Make Water Deals

Many Wary of Mining Firm's Offer to Pay to Extend CAP Pipeline

Many Green Valley and Sahuarita residents are wary of a plan to build a seven-mile pipeline to deliver Central Arizona Project water to their communities. On the plus side, the pipeline appears to be water manager's dream come true, an answer to the groundwater overdraft problem that is causing the area's water table to drop about two feet per year.

On the other side, some are wary that Augusta Resource, a Canadian firm seeking approval for a mile-wide open-pit copper mine in the Santa Rita Mountains, would pay for the pipeline. They strongly suspect that the pipeline, costing between \$9 million and \$15 million, is part of a strategy to win approval for the mine.

Discussions have been underway for a while, with Augusta officials having negotiated a letter of intent with Community Water Co. of Green Valley to construct the 20-inch pipeline extending from the end of the CAP canal south of Tucson to Sahuarita. The two parties have set a 120-day deadline beginning July 13 to "form a definite agreement."

Most would agree that the pipeline would greatly benefit the communities. Extending CAP delivery beyond its current terminus to the Green Valley area would provide Community Water access to its 2,858 CAP allocation that has hitherto been out of its reach. Such a pipeline has long been on the area's wish list.

Also the pipeline could be used to compensate the area for any water loss if the mine is approved and built. Its operation over 15 years would require about 100,000 acre-feet which would be drawn from the aquifer beneath Green Valley. The pipeline would deliver about 7000 acre-feet annually or 105,000 acre feet over 15 years, a net gain of 5,000 acre feet. This would help build a needed sustainable water supply in the area.

If the mine operates without the pipeline Augusta would recharge water in the Marana area, rather than at the Green Valley point of extraction.

Darkly clouding discussions about the pipeline is the mine.

Augusta's mine would be located in a scenic and ecologically sensitive area on the eastern slopes of the Santa Rita Mountains, on public and private land in the vicinity of the Rosemont Ranch. The mine is a highly controversial issue, sparking strong opposition from residents and public officials, with both the county Board of Supervisors and the Sahuarita Town Council passing resolutions in opposition to the mine.

Many have trouble warming to the pipeline project, saying it is too good to be true that a no-strings-attached offer would be made to provide water to the communities by a corporation seeking approval to build a mine in the area.

Augusta officials, however, say their motives are pure, their proposal prompted merely by the desire to act as a good corporate citizen. Community Water Company President Arturo Galdon has assured the public that Augusta Resource would pay for the pipeline whether or not the mine is built, that it is willing to sign a binding agreement even before the mine is approved.

Bill Allows Mining Company to Swap Wetland for Mine

U.S. Sens. Jon Kyle and John McCain believe cooperating with a mining company can result in a payoff to the state. The Senators have introduced legislation to allow a new copper mine to be developed on federal land outside Superior. In exchange for the 3,025 acres that the bill allots to Resolution Copper, the mining company would provide the government seven parcels totaling 4,583 acres of environmentally sensitive land in various areas of the state.

The mining company would gain land over a large mineral deposit while the land acquired by the government would include wetland habitat along the San Pedro River. The company also would contribute \$7.5 million to a trust account to enable the government to purchase more Arizona conservation land.

Similar bills introduced the last two years failed to pass.

U.S. Rep. Ed Pastor, D-Phoenix is considering sponsoring a House version of the bill.

for the November ballot after the required 11,615 valid signatures were collected and verified.

It is multifaceted initiative taking on various issues. Its most controversial item is a limit on water connections to go into effect once Tucson Water delivers 140,000 acre feet of water a year. Initiative organizers say this is in response to the continued construction occurring despite the ongoing drought. The limitation would essentially result in a moratorium on construction in the area. In 2006, the utility delivered 125,000 acre feet.

Voters also will get to decide on another highly charged issue: the use of effluent or other kinds of reclaimed water as potable water supplies. This has been derisively labeled the toilet-to-tap controversy. The initiative would not allow Tucson Water to use such resources in city drinking water. Water officials had publicly discussed the possibility of using effluent to boost future water supplies.

Also the initiative targets the city's \$14 monthly garbage collection levy which is tacked on to water bills. The initiative would forbid this and other fees from being in-

cluded as part of the water billing. Also the initiative would require developers to pay the full cost of Tucson Water system expansion. Not allowing the utility to enter into supply agreements outside its service area is a further initiative restriction.

Water officials fret that the initiative would limit Tucson Water's options in planning and managing the city's water supplies. Some critics of the initiative question its legality saying that it covers too many issues. Questions also have been raised about the legality of it setting building limits which is the prerogative of state law.



Guest View

Rural Water Issues Not Apart From State, National Affairs

Economy drives policy decisions

Deb Hill, Coconino County Supervisor, contributed this Guest View.

We all agree that water issues and land use are inextricably intertwined. Since land uses in rural Arizona are changing, in some places moving rapidly from rural agrarian to semi-urban, it should come as no surprise that water issues are becoming more visible and concerning. What is not always so apparent is what is driving the changing land uses and impacting water quality and quantity.

As much as Westerners believe in local control, in many ways rural Arizona communities are most impacted by policies enacted at the state or federal levels. For example, the federal energy policy with its heavy reliance on fossil fuels and nuclear energy has an impact on rural water supplies. Current trends in energy production include increased interest in coal fired power and nuclear power plants to meet the country's energy needs. In northern Arizona, several companies are currently conducting exploration for uranium deposits near the Grand Canyon, while coal mining at Black Mesa and just north of Arizona on the Kaiparowits Plateau continues to produce highly-sought-after low sulphur coal.

What are some impacts to water supplies resulting from our national approach to energy production? Groundwater from the Navajo aquifer was, until recently, used to slurry coal, and proposals have been floated to use the Coconino aquifer as a future source. Groundwater is being used to cool power plants such as the one at Joseph City, sometimes directly competing with local agricultural interests. Uranium mining in mid-1900s has resulted in contaminated groundwater supplies in the Tuba City and Monument Valley areas. In the past we have sometimes sacrificed water supplies depended on by local communities for other benefits. How will the current trends in energy policy impact the futures of our rural Arizona residents?

The Clinton campaign coined the phrase "the economy, stupid" as a way of keeping track of a key priority. For many rural communities, it is, in fact, the economy that drives policy decisions, which sometimes results in unintended consequences for natural resources including water. In Arizona, rural economies are heavily tourism-dependent. The more our urbanized areas experience growth and development, the more the rural areas become desirable as places for 'escape'. This great 'escape' occurring throughout rural Arizona sometimes creates conflicts and impacts to water resources.

Every summer rural communities deal with what happens when conflicting resource uses collide. Picture yourself enjoying the cool waters of a rural Arizona lake with your jet skis or motorized craft. The sun sparkling on the lake waters, the cool breezes, the ability to beat the summer's heat...life is good! However that lake is likely someone else's drinking water. How are we dealing with the discharge of fuel and oil from water craft into the water? Then

there are places like Slide Rock State Park, which has been closed 13 times so far in the summer of 2007 when bacterial counts resulting from humans and animals being in the creek exceeded maximum standards. Nothing is lovelier than the emerald green of a mountain golf course laid out among the scented pines, but in some areas the pumping of groundwater to keep that golf course green and healthy is impacting local surface water supplies, to say nothing of the impacts of the runoff containing fertilizers and other ingredients we would prefer not to drink. As the recreational use in rural areas grows, so, too, do the number of difficult water questions.

As much as Westerners believe in local control, in many ways rural Arizona communities are most impacted by policies enacted at the state or federal levels.

Growth in rural communities is generally welcomed and needed, and many areas of our state are experiencing a surge in second home ownership. The healthy economy of the state of Arizona, combined with early retirement and increasing personal wealth, has created a demand for the get-away home, usually located in areas rich in natural resources. Like the proverbial family farm, however, rural communities may be land rich and cash poor. Residential growth adds to our tax bases but also puts additional pressure on infrastructure, such as aging sewage treatment plants.

Even short-term residents, lodged in hotels and guest cottages, can stress the water systems of smaller communities. Imagine the impacts to a small community of the 6 million tourists a year that visit the Grand Canyon. Decreasing grant and loan funding from federal levels makes it even more difficult for communities to put the necessary infrastructure in place to protect water supplies.

All of this must sound pretty overwhelming, and from the local perspective, it certainly can feel that way! However, there are a few pieces of good news on the horizon. This past year the State Legislature approved bills that will allow local policy makers to tie water and development more closely together, as well as creating a funding source for local water projects. These tools can assist local governments to address some of the impacts created by the trends discussed above.

In addition, the Governor has supported a plan for managing the health of Arizona's forests and other watersheds. Local governments are becoming more astute and are creating partnerships in order to address issues at the federal level. Of course we are always aware of how many other voices are at the table, and we welcome assistance to help get our message out. Water is crucial for all of us, whether urban or rural, and working together is the only way we will be able to deal with the great challenges ahead. 🏡



Legislation and Law

Bills Seek to Clarify Intended Clean Water Act Coverage

Legislation has been introduced in Congress supporters say would clear up ambiguity in interpreting the Clean Water Act resulting from two Supreme Court rulings and new guidelines aimed at implementing those decisions. Some claim the situation leaves states in the arid West especially vulnerable.

In the House, John Dingell (D-Mich.) and Jim Oberstar (D-Minn.), have introduced the Clean Water Restoration Act. Sen. Russ Feingold (D-Wis.) introduced the Water Resources Restoration Act in the Senate as a companion bill.

The intent of the legislation is to define and strengthen regulatory authority that has been weakened by federal agencies' response to the two Supreme Court rulings, leaving regulators uncertain about which water bodies are regulated by the 1972 law.

In the first case, Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers, the Supreme Court ruled that the government could not act to protect wetlands "isolated" from navigable waters because of the need to protect migratory birds.

Then last year the Supreme Court decided the joint cases of *Rapanos v. United States* and *Carabell v. U.S. Army Corps of Engineers*. That decision reversed a ruling against developer John Rapanos who had filled in wetlands with sand to construct a shopping center.

A split Supreme Court ruled on that case, with five justices saying that the Clean Water Act was restricted to protecting navigable waters, such as lakes and rivers, and bodies connected to them, and four justices arguing that the law applied to other waterways. Although aligned with the majority, Associate Justice Anthony Kennedy's concurring opinion sharply differed, leaving the lower courts the chore of deciding if the law had been violated on a case-by-case basis.

The rulings and guidelines may be of special concern to state regulators in the arid West, a region with streams that often lack flow during certain times of the year and with wetlands not likely connected to a "navigable" waterway. Whereas, according to the National Hydrology Dataset, about 60 percent of the nation's streams are nonpermanent, between 80 and 95 percent of streams in arid western states like Arizona, Utah and New Mexico do not flow year-round.

The term "navigable waters" in Section 404 of the CWA sparked much of the controversy; anyone dumping into "navigable waters" needed a permit from the U.S. Army Corps of Engineers. The proposed legislation would resolve the conflict by replacing "navigable waters" with "waters of the United States" and would further clarify the law's intent by indicating that it would apply to intermittent streams, wet meadows and several other types of non-navigable waters. A savings clause is included confirming that present CWA exemptions, including those for agriculture, mining and silviculture, will be maintained. The bill's sponsors say the bill

would bring the law back in line with the intent of the CWA when it was passed and before judicial decisions confused the issue. All US waters will be protected, not just those that are navigable.

Various industry groups oppose the bill and are organizing strenuous opposition, believing it will bring a storm of lawsuits that will hinder permitting and real estate development. A news release from the National Water Resource Association stated, "No longer will the Clean Water Act be limited to the historic federal concern with navigable waters and Commerce Clause authority under the Constitution. Instead, this proposal will expand federal control over every possible type of water body, puddle, moist land area, man-made waterway, storage facility, conveyance system, holding facility, or re-regulating reservoir. The new definition of 'waters of the United States' would include everything from swimming pools and hot tubs to stock watering ponds on private property."

AZ Raises Concerns About Navajo-NM Water Settlement Act

Arizona has some concerns about a bill introduced to settle a Navajo water rights dispute with the state of New Mexico. The Northwestern New Mexico Rural Water Projects Act, H.R. 1970, would authorize the Navajo-Gallup Water Supply Project to provide the means to build, rehabilitate and fund water infrastructure projects in northwestern New Mexico.

The project's high cost was a red flag to federal officials. California and Arizona raised other objections. Testifying before the House Natural Resources Subcommittee on Water and Power, Gerald Zimmerman, executive director of the Colorado River Board expressed concern that the project might end up getting a disproportionate share of the Reclamation Fund, to the disadvantage of other western states.

CRB and Arizona also are concerned that the bill not run afoul of the Colorado River Compact. For New Mexico to take water from the San Juan River to serve Navajos in the northern portion of the Navajo Nation would entail a Colorado River transbasin transfer, from upper to lower basin. The Law of the River prohibits transferring Colorado River water between upper and lower basins.

CRB wants sections of the bill authorizing the interbasin transfer amended and authorization to construct facilities to accomplish such transfers be deleted.

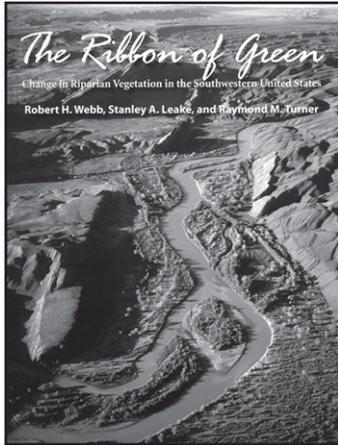
Also Arizona and CRB urge that the legislation not be enacted unless a 2003 lawsuit filed by the Navajo Nation against Interior over its Colorado River claims is dismissed. The suit argues that Interior is not justified in allocating uncommitted Colorado River water since it has failed to take into account unquantified Navajo water rights. The suit requests that the court enjoin Interior from allocating any unallocated water from the Colorado River until Navajo rights are quantified.

The case could have very serious and far-reaching consequences for Arizona water planning and policy.



Publications & On-Line Resources

Book Challenges Perception of Vast Demise of SW Riparian Wetlands



**The Ribbon of Green:
Change in Riparian
Vegetation in the
Southwestern United States**

Robert H. Webb, Stanley
A. Leake and Raymond M.
Turner. University of Arizona
Press, \$75 cloth. For informa-
tion about ordering check: [www.
uapress.arizona.edu](http://www.uapress.arizona.edu)

The loss of riparian areas in the Southwest after years of human settlement is generally figured to be great, with the

loss variously reported from 80 to 95 percent. These figures often appear in the news media and popular and scientific literature and underlie various laws and regional management plans.

A recently published book, "The Ribbon of Green: Change in Riparian Vegetation in the Southwestern United States," looks at long-term changes in woody regional riparian areas and questions the occurrence of a precipitous riparian loss. The authors identify a paper they believe was the source for the 90 percent figure that got widely circulated.

In their study, the authors, hydrologists Robert H. Webb and Stanley A. Leake and botanist Raymond M. Turner, focus on a geographic area that includes the major river valleys in parts of Utah, southern Nevada, and southeastern California as well as all of Arizona below above 5,000 feet in elevation.

Repeat photography combined with a review of historical context and information on species composition enabled the researchers to document the condition of riparian vegetation

during the last 140 years in the Southwest, a time period ranging from the first use of the camera to the present. The authors studied about a dozen woody species and various herbaceous perennials visible in photographs. To evaluate spatial changes the authors analyzed aerial photography or satellite images available in the last quarter of the twentieth century.

Changes observed in thousands of repeat images were interpreted along with surface water and groundwater hydrologic data, previous periods of climatic variation, land uses and flow regulation, and water usage. In examining the factors affecting the stability of woody riparian vegetation, the authors considered the diversion of surface water, flood control and the excessive pumping of groundwater.

The authors challenge the popular assumption about the vast decline of Southwest riparian wetlands. They make the case that rather than a 80 or 90 percent loss, wetland vegetation has actually increased on many river stretches in the region. This has been due to flood control, favorable climatic conditions and large winter floods that have encouraged ecosystem disturbance, germination, and the establishment of species in newly generated openings.

The authors consider various perceptions that have guided researchers' views of long-term change in the region's rivers. They acknowledge that some scientists perceive humans as ultimately causing regional change, a view prompting them to interpret all changes as bad. Others scientists give more weight to climatic fluctuations as a major influence on rivers of the region. The authors consider that both perceptions are parts of the truth with local effects an added complexity.

The book's contribution to the ecological study of wetlands is the broadening of our understanding of change in riparian ecosystems. This in turn will affect riparian restoration strategies.

Film Shoot...continued from page 3

where the City Council is considering ordinances to harvest rainwater. The Tucson PAG also gets video coverage because of its special efforts to work with local developers and construction companies on stormwater issues unique to the Southwest.

Also included were several community-based local watershed partnerships that were implementing projects to reduce erosion, conserve water, and improve water quality and riparian health. Various Arizona officials were interviewed.

Uhlman said, "We had a lot of interest from small municipalities. They became interested in implementing local stormwater management ordinances to achieve various goals, from reducing erosion and mud on the roads to collecting a water supply."

She says, "The ultimate goal is to change behavior, to change policy, and to put into place the ultimate stormwater man Management tool — local ordinances."

The documentary is available for videostream viewing at: <http://caheinfo.wsu.edu/video/stream.html> Copies are being sent to County Extension offices throughout the state. Interested individuals can obtain copies by contacting Kristine Uhlman, 520-621-5951, kuhlman@ag.arizona.edu

The video won an Award of Distinction for the Communicator Awards, an international competition that recognizes outstanding work in the communication field.

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Special Projects

Context of Water Issues, a Crucial Ingredient When Developing Good Policy

International Water History Association offers historical context

In December, Robert Varady, deputy director of the University of Arizona's Udall Center for Studies in Public Policy, becomes president of the International Water History Association. The organization's focus, as its name makes clear, is on history, with an emphasis on the ways past societies and civilizations have managed and used water. Such an approach can serve as a useful strategy for understanding contemporary water issues. The historical view encourages a broader perspective for analyzing and developing water policy.

As a water-policy researcher, Varady endorses this broader perspective. He believes such an outlook is essential to understand the full significance of water issues. He calls it context. He says, "Context is very important. It makes no sense to work on anything — I don't care what the topic is — without proper context. ... It is cultural; it is temporal; it is spatial; it is everything that has any bearing on whatever subject you are studying.

"In that regard, an appreciation of sociocultural and political roots of an enterprise can be just as important as understanding the physiographic characteristics of its site. This is where historical studies become useful."

One of IWHA's objectives is to further such historical studies. As stated on its web site (www.iwha.net) the purpose of the organization is "to encourage, promote, and foster historical understanding of, and research in, the relationship between water and humankind."

Membership reflects a wide and varied interest. Varady says, "The association differs from most other historical organizations in that about half of the 700 or so members are not historians by discipline. They are anthropologists, geographers, planners, hydrologists, ecologists, engineers, and others — scholars and practitioners — who realize that it is important to understand the context and the background of situations. In sum, IWHA is an interdisciplinary organization whose aim is to promote the historical study of water."

UNESCO's International Hydrological Programme, headquartered in Paris, backed the founding of the association. IHP's head, hydrologist András Szöllösi-Nagy, recognized that such an association would be instrumental in taking the lead in a publishing project that interested the agency.

International water officials have long sought a comprehensive global history of water. The project has been taking form and "The History of Water and Civilization," a seven-volume series, is now a work in progress. The series is organized thematically: ideas of water, including religion, philosophy, and indigenous uses of water; water and technology; water and food production; water and health; water and settlements; water law and policy; and an anchor volume synthesizing the series.

IWHA holds biennial conferences organized with the multivol-

ume series in mind. Presenters are encouraged to take on topics that would contribute to the volumes. The papers range widely in their coverage.

Varady says, "The papers cover a huge geographic area, every continent. ... They could be on very narrow subjects like the history of a basin, a dam or a water scheme or project. Or they can be much larger ... Most tend to be regional and home in on a particular period."

Varady's own research interest is on institutions known as global water initiatives.

Public Participation Serves Varied Political Goals

Among the various factors to consider when making water-related decisions is public participation. Varady says, "In this country it would be the kiss of death to design a water process without allowing the public to have a voice." He says public participation traveled a roundabout political circuit to get to where it is today. At first more or less driven by liberal concerns, public participation was a populist notion to involve people in making decisions affecting their livelihoods and lives. Those on the political right later embraced public participation as a strategy to advance states' rights as one way to "get government off people's backs." In such a view, public participation was appropriated as a way for local residents to take control without interference from Washington or even Phoenix. But while both the right and left may advocate a larger role for the public, citizen involvement in decisions affecting their own watersheds, to take one example, also can serve as a way to bridge opposing ideologies.

IWHA discussions are underway to establish a scholarly periodical, the "International Journal of Water History." Plans call for it to be published twice a year, initially only on-line.

There is more to understanding context, however, than an awareness of history. Varady says, "I don't say we need to know what happened so we don't repeat mistakes. ... I view history as just another element of context. I am not so naive to think all problems can be solved by looking back at history and discovering the right case to find the answer."

Varady says the advantages of multi-criteria decision making are generally now recognized, that rather than focus on a small range of factors, or perhaps a single one such as technological solutions, more factors are being considered to better ensure informed decisions.

The U.S.-Mexico border region, which Varady has studied since the mid-1980s, offers a good case in point. Among the many water-related issues in this area, one of the most significant relates to growing shortages of freshwater in the dry Southwest. For Arizona and its neighbors to the north and west, the Colorado River Basin is

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Announcements

Conference of Research on the Colorado Plateau

The 9th Biennial Conference of Research on the Colorado Plateau will be conducted Oct. 29 - Nov. 1 at Northern Arizona University in Flagstaff. The conference focuses on research and resource management efforts related to the physical, cultural, and biological resources of the Southwestern United States, with a special emphasis on the Colorado Plateau. Conference activities include meetings of partner organizations, sessions on special scientific and management issues, oral and poster presentations, and evening social gatherings. For more information: http://sbsc.wr.usgs.gov/cprs/news_info/meetings/biennial/2007/index.asp#maincontent

WATER CASA Water Conservation Conference

On Sept. 21 the Water Conservation Alliance of Southern Arizona will be celebrating its tenth anniversary with a conference titled "Conservation Unplugged," to be held at the Arizona Sonoran Museum, Tucson. The event is advertised as a "Whing Ding' of a Conference" and a "day of water conservation how to's, why's and why not's." The event seeks to raise awareness among a broad range of audiences with a vested interest in sound water management, to foster consistency in the programs and policies we implement in the future, and to make clear that we all go down the drain if we aren't all working together to maximize our resources. Space is limited, and early registration is encouraged. For additional information and register registration forms check: www.watercasa.org



U.S.- Mexico Water Forum Planned

A binational water forum planned for La Paz, Mexico is tentatively scheduled for Oct. 18 - 20. The forum objectives are to share experiences between Baja California Sur and Arizona on water quantity-quality problems and strengthen the collaboration efforts to address water shortage issues. Plans call for two days of conferences, with a field trip on the third day to the City of La Paz and

Todos Santos wastewater treatment plants and to a desalinization plant located in Los Cabos. For additional information about the event contact Mario Castaneda, GateWay Community College, Phoenix, 602-286-8663; castaneda@gatewaycc.edu

Western Governors' Water Conference

Water Policies and Planning in the West: Ensuring a Sustainable Future, a conference organized by the Western Governors' Association and the Western States Water Council, will be conducted Oct. 10-12 at Salt Lake City. The conference is in response to topics raised by a report released by Western Governors, with participants developing policy options and identifying case studies relating to three topics: water planning to deal with challenges resulting from growth; effective watershed approaches to water planning; and responding to climate change and drought impacts. The conference will address the interests of local, state, interstate and federal agency representatives, as well as other stakeholders from non-governmental organizations, and individuals interested in the future of western water planning and management. For additional information and to register go to: www.westgov.org

UA Event Begins Sustainability Week, October 24-31

The University of Arizona and the local community are sponsoring Sustainability Week, Oct 24-31. The UA kicks off the week with a National Campus Sustainability Day, Oct. 24, with the theme "Building a Durable Future: Community, the Campus, and Deep Economy," followed Oct. 25 by a UA Research Forum and Poster Competition, "Water & Energy Sustainability: Roadblocks and Roadmaps to the Future." "Educating for Sustainability Conference" (www.arizonaee.org/aee) Oct. 25-27 is a session for teachers. On Oct. 26 is the "Community Conversation on Water" (www.ag.arizona.edu/azwater/); Viva Verde! Festival (www.arizonaee.org/aee-events/fall-conference/viva-verde) and "Make A Difference Day" tree planting (www.tucsonaz.gov/tcb/docs/makeadifferenceday2007.pdf) are featured Oct. 27. Events conclude with the Community Sustainability Forum Oct 31. Check for updates on the new UA Campus Sustainability web site (www.sustainability.arizona.edu) or email contact@sustainability.arizona.edu.

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the dominant source of surface water. The allocation of water to the U.S. states and to Mexico is governed by an old treaty that was signed in the 1920s, under different climatic conditions and with less advanced scientific tools available to determine average flows. Now with greatly increased demand driven by population growth and with the availability of far better technology, some have advocated amending the treaty to allow for an exchange of desalinated seawater for Mexico's allocation of 1.5 million acre-feet of water.

But Mexico would need to agree to any changes to the treaty,

and since the mid-19th century that country has been strongly resistant to any perceived diminishment of its sovereignty — and the loss of its share of Colorado River water, Varady believes, would likely be seen as a concession to U.S. interests, regardless of any benefits obtained in exchange.

"To attempt 21st century engineering and fiscal solutions to water-supply problems that have binational implications," Varady says, "requires a detailed understanding of political and economic factors that are deeply rooted and transcend strictly cost-benefit criteria."



Public Policy Review

by Sharon Megdal

Beachside, Columnist Ponders Arizona's Water Resources' Horizon

Major accomplishments don't always get their just public due



Every summer I spend about two weeks enjoying the cool air, beaches and newspapers of Southern California. My beachside newspaper reading included coverage of speeches of Gov. Schwarzenegger explaining his new \$5.9 billion spending program for California's water system. The call to action was attributed to the confluence of three challenges: climate change, growth and drought.

Reading the articles prompted me to reflect on the status of Arizona's dialogue on water resources management. Fundamentally, our state faces the same challenges as California. How do we ensure that current and future populations have safe and adequate water supplies in the face of rapid growth, drought, and climate change? What investments are needed? What will it mean to Arizona communities when shortages on the Colorado River require cutbacks in water deliveries through the Central Arizona Project? To what extent will municipalities use water currently allocated to agriculture? How big a role does conservation play in meeting future water demands? What will be the source of the next bucket of water? Explaining the soundness of our Active Management Area systems despite various unknowns is often difficult.

Many of us devote considerable time explaining the accomplishments, as well as challenges, of Arizona's water management system. I still refer my students and others to the 2001 Final Report of Governor Hull's Water Management Commission. Although the numbers may be dated, the basic findings still pertain. I also mention the report prepared for the 2004 Arizona Town Hall on water along with many other papers and presentations.

Yet some of our major accomplishments are our best kept secrets, unknown at least to the public. Consider the following: our AMAs have assured water supply rules with more stringent demonstration of water availability for residential growth than anywhere in the country. Consider also that to address the prospects of shortage declaration on the Colorado River, the source of 2.8 million acre feet of Arizona's water supplies, the Arizona Water Banking Authority has stored millions of acre feet of Colorado River water. It might as well be a secret to most residents that we've had this legislatively created body in place for over 10 years. Further, how many people know that our state's water leadership has worked tirelessly to mitigate the impacts on Arizona of its junior priority of the Central Arizona Project? State water officials have vigorously urged the proposal that declarations of shortage will not necessarily mean cutbacks in water to the cities. Even if cutbacks are required, farsighted planning has resulted in water being stored over the last ten years that could be used to mitigate the impact.

The Statewide Water Advisory Group recently focused on wa-

ter management challenges for the non-AMA areas of the state. Its labors paid off when some of its key recommendations became law last legislative session. Non-AMA portions of the state are beginning to stock their community toolboxes with water management tools.

In many ways, we, the people of Arizona, are in this together. As the state grows into its allocation of Colorado River water and water use increases, identifying the water policies and investments to shore up our water future is critical. We need to seriously consider the use of effluent for more than turf irrigation. With improvements to treatment technologies, we will better understand cost and quality implications of alternative approaches to treating various source waters. Many people are greatly interested in the potential of seawater desalinization to expand Arizona water supplies, but at what cost and over what time horizon?

According to foremost experts, climate models agree that the Southwest is going to be on average drier and warmer. Much of the research being done on the implications of global warming cites the need for adaptive management. But what is adaptive management? According to Wikipedia, "adaptive management (AM), also known as adaptive resource management (ARM), is a structured, iterative process of optimal decision-making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision-making simultaneously maximizes one or more resource objectives and, either passively or actively, accrues information needed to improve future management. AM is often characterized as 'learning by doing.'"

A key word here is "uncertainty." Decision making under uncertainty is not new, but the types of uncertainty and the ways they affect decision making may be. For example, information on the length and severity of historical droughts, acquired through tree ring studies, provides input for modeling the Colorado River and scenario building. Improved decision support tools, often crafted in collaboration with university researchers, can help water managers and policy makers understand the options available and the implications of following one path versus another. Development of improved treatment technologies also results from partnerships among the academic, public and private sectors.

We are in this together in the broadest sense — the decision makers, the researchers, the technical and water professionals, and the public. We need to work diligently to develop an understanding of solutions to our water management challenges. We need to be ever-vigilant in implementing our water policies and in monitoring. Inside and outside AMAs, we need to work to identify the assured water supplies to accommodate growth. We ought to watch the responses of California to critical issues like climate change. It is essential that the dialogue on Arizona's water management be broad and deep. 🏠

Conservation...continued from page 3

The easements were sold to the Bureau of Reclamation for mitigation credit applicable to work it undertook to modify Roosevelt Dam. That project resulted in the flooding of habitat of the Southwest willow flycatcher, an endangered species. The purchase of the Three-Links Farm easements will protect habitat of the endangered bird, offsetting the loss at Roosevelt Lake.

Cost of Conservation Easements

The costs of conservation easements vary. Cost is decided by having an appraiser determined the value of the land without the easement and then its value with an easement. The difference between the two appraisals is the cost of the easement. Generally an easement diminishes the value of property from 20 to 80 percent; the average is about 50 percent.

The appraisal value depends on the market condition of the property and the type and severity of the restriction the easement imposes on the property. In the case of the Three-Links Farm a fairly substantial amount of the purchase value of the property was represented by the easement.

The value of property with an easement can be an issue when property taxes are determined. An owner of property reduced in value due to an conservation easement might not unreasonably expect that the property tax should be reduced. In Arizona, county assessors have generally not agreed. Some states have adopted legislation requiring that property tax assessments must take the diminished development potential into account.

With funds usually in short supply, organizations need to prioritize areas for their conservation easement efforts. TNC is focusing on the Verde and San Pedro rivers, although its activities along the Verde has so far been mostly purchases rather



Do You Want to Remain on the WRRC Mailing List?

Our mailing list has been compiled over the years, often one name at a time. Every once in a while mailing lists need to be updated, with obsolete names and addresses, inelegantly referred to as dead wood, removed. The result is a leaner, meaner mailing list.

A postcard will soon be sent to everyone on our mailing list. Check the appropriate box if you want to remain on the list and continue receiving our newsletters, the Arizona Water Resource and Arroyo. Or you can email us at wrrc@cal.s.arizona.edu.

You also have the option of being notified by email when the newsletters have been posted on the WRRC website, rather than receiving a hard copy in the mail.

We look forward to hearing from you.



than working out easements. It is an area, however, considered ripe for further conservation easement activity.

Colazzo explains: "You focus your resources on a few places where you can retire a lot of water use or preclude a lot of new water use. You need a private landowner community predisposed to want to work with you, and you need partners, the public and political support for the funding.

"We evaluated where are all the ingredients are present, and those two rivers seem to be the places where we can see things coming together."