

Sewer History Web Site Rich With Information and Lore

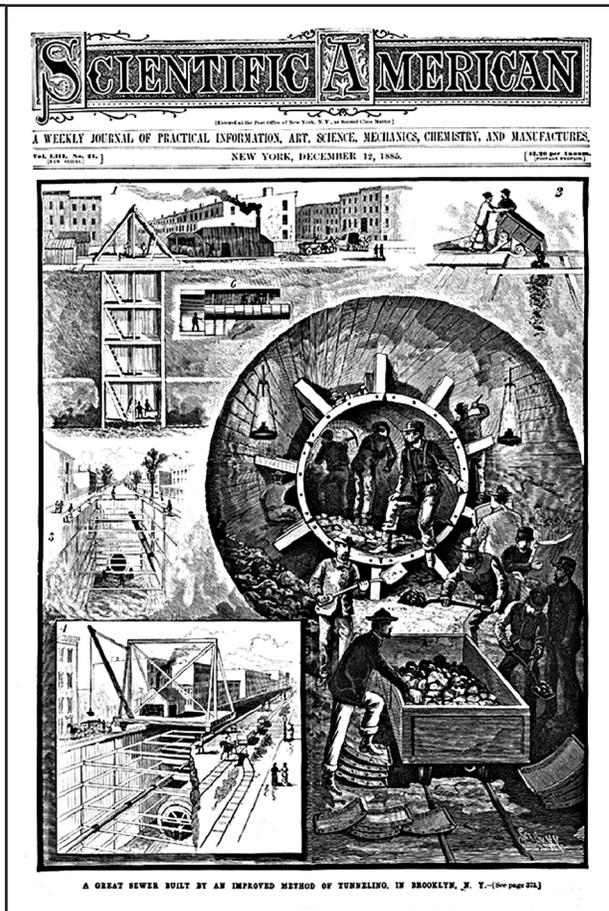
Those who view history as a grand pageant of the rise and fall of civilizations risks overlooking the bricks and mortar of history, the unsung, barely acknowledged details of the everyday workings of nations and empires. And what is more unsung, barely acknowledged and brick-and-mortar than sewers?

Sewers are getting their historical due from Jon Schladweiler, historian of the Arizona Water & Pollution Control Association, who for 15 years has researched varied topics and collected a wide assortment of materials that tell the world sewer story over the past 5,500 years.

The results of his labors are displayed in a sewer history web site. (www.sewerhistory.org) Its intent is to acknowledge the role of sewer operators, engineers, and builders in making our environment, homes and communities better and healthier places to live. Jan McDonald is webmaster.

Many and varied are the topics covered: flush tanks, gates and other flushing mechanisms; manhole covers, their history and early designs; pipes; pumps; odor control design; construction; sewer cleaning equipment - sewer rods and other methods; sewer flushing;

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At left is the front-cover graphic of the publication Scientific American, Dec. 12, 1885. The accompanying article appearing on page 373 is titled, "A great sewer built by an improved method of tunneling, in Brooklyn, NY" and describes work on the Knickerbocker Avenue Extension Sewer. The entire cover is available as a sewer history poster by contacting Jon Schladweiler. (See side story) Other posters in the series include Manhole Covers Through the Ages and Cloacina, Goddess of the Sewers.

Plan to Protect San Pedro River Offers Option for Rural Water Management

by Joe Gelt

New Law Lets Voters Set Up Special Water District

Recently passed legislation will allow Cochise County voters to create a special water management district on the upper San Pedro River as part of a plan to preserve its flow. The legislation has varied significance. Many in the environmental community view the new law as first and foremost a river-preservation effort; others see the bill as representing a breakthrough in the state's ongoing effort to adopt a rural water management strategy.

Either way most would agree that the legislation is certainly timely, addressing critical problems in need of solution, both river preservation and rural water management.

The San Pedro is a river in need of preservation. Groundwater pumping in the Sierra Vista area has reduced flow in the upper San Pedro River, one of Arizona's last free-flowing rivers, and the prognosis is not good. Unless a river management plan is adopted, long stretches of the river will likely dry up permanently in the face of growing water demands in the area.

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San Pedro River...continued from page 1

(This is not an issue confined to the San Pedro River. The effect of groundwater pumping on Arizona river flow is an issue getting increased attention. See Publications on page 8 for a review of a recent Sonoran Institute report, *Guidelines for Meeting the Needs of People and Nature in the Arid West*, addressing this issue.)

Law sets up river protection plan

Arizona lawmakers responded to the plight of the San Pedro River by passing legislation that sets up a nine-member board with a very busy agenda. It is tasked with devising a comprehensive plan for conserving and reusing water in the area as well as identifying water supply augmentation strategies. Further, the board is to consider ways to organize a permanent water district and elect its members. Financial matters are also within the board's purview; it is to determine the cost of meeting established goals and identifying the means of raising money to cover costs.



San Pedro River.

Whether the board's labors bear fruit or not will depend upon voters in the area who, according to the new law, will decide whether or not to accept its recommendations. Their opportunity to vote is contingent, in turn, upon the Cochise Board of Supervisors putting the issue on the ballot.

If voters do in fact approve establishing a permanent board, they will have an opportunity to vote again if the board decides to levy a tax. The law allows the board to levy a tax of up to 50 cents for every 1,000 gallons of water delivered — but only if voters OK the tax on a separate ballot measure.

Legislators decided that voters would figure prominently in establishing — or not establishing — the district to ensure local control.

Fort Huachuca is the issue

For many legislators the critical issue at stake was not so much environmental but the survival of Fort Huachuca. Environmentalists noted that earlier versions of the bill were so focused on Fort Huachuca they did not even mention the San Pedro River. The military base now operates under the terms of a U.S. Fish and Wildlife biological opinion requiring that the area reduce water use so as to achieve "sustainable yield" by 2011. In effect this means the quantity of groundwater pumped equals the amount recharged. This would ensure continued flows in the river and the survival of endangered species in the watershed.

(Some hydrologists challenge the concept of "sustainable yield" preserving river flow. University of Arizona hydrologist Tom Maddock says, "There is this underlying idea that if you pump less than the natural recharge to the system you are not harming the system. It doesn't work that way; what you are forgetting is that natural discharge is occurring at the same time. So unless you can capture the discharge you are not going to do anything.")

If the 2011 deadline is not met, the fort would be out of compliance, jeopardizing any plans for future growth and even threat-

ening the fort with closure. Fort Huachuca, the state's third largest employer, looms largely in the area's economy.

Environmental benefit noted

Some in the environmental community are guardedly optimistic about the law. Andy Laurenzi, Sonoran Institute land and water program director, is concerned that a number of critical decisions depend on voter approval. He says, "Someone might argue that it is a pretty high bar when the need for water management authority is so evident in the system." He adds, however, that the new law is "a positive step, but a small step on the path to sustainable management."

Sandy Bahr, Sierra Club conservation outreach director, says, "The law is not going to do the job but we think there are provisions that take us a step in the right direction." She believes some new ground was broken with the law stating that the district's goal is to maintain the aquifer and base flow conditions needed to sustain the upper San Pedro River.

She says, "The recognitions that in order to sustain the river you have to maintain the aquifer is a very important provision." She does not recall seeing this wording in other state laws. She says, "I know water bills have come out of previous task forces with recommendations about

limiting groundwater pumping within a quarter of a mile of a river or near riparian areas but by the time language was drafted there were huge exemptions."

She believes the provision could strengthen river protection efforts in the state. She says, "One of the problems we have had protecting rivers in Arizona is this arbitrary disconnect between what happens with groundwater pumping and maintaining the flows in the river."

Folks along the Verde River, another Arizona river threatened by groundwater pumping, are paying attention to San Pedro River developments for the likely influence they will have on managing the Verde River. This thinking probably prompted the Central Arizona Homebuilders Association's involvement in the San Pedro River legislation.

CAHA raised more objections to the San Pedro legislation than the Southern Arizona Homebuilders Builders Association, which has a direct interest in development along the river. It is likely that CAHA, realizing that the Verde River in central Arizona is the next likely choice for similar legislation, sought input into a law that might serve as an example of what it might expect.

A rural water management model

There is another side to the San Pedro River legislation, beyond its immediate concern with preserving river flow. Some officials view its main importance as representing a breakthrough in the state's efforts to develop an appropriate rural water management plan. The need for such a plan has been much discussed and debated, to limited effect.

Herb Guenther, director of the Arizona Department of Water Resources, says, "(The law) is a unique concept in water management for Arizona. It is the first locally designed, watershed-specific — in this case groundwater basin-specific — proposed water management plan."

He says decisions will be made and implemented at the local level

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Water Vapors

USGS's Nick Melcher Retires

Nick Melcher, U.S. Geological Survey's Arizona Water Science Center director, is retiring after 34 years with the agency; 13 of those years have been in his current position. He began his career as a staff hydrologist in Montana, later became sub-district office chief in Kentucky and district chief in Iowa before coming to Arizona. In a statement prepared by staff Melcher was lauded for having "developed one of the broadest and most innovative ground-water programs in the nation, advancing critical studies on ground-water availability, land subsidence, ephemeral channel recharge, and ground-water/surface-water interactions in the Verde, San Pedro, Yuma, C-aquifer, and Tucson areas among others."

Melcher also was involved with the Water Resources Research Center, serving on its advisory committee, participating in its activities and supporting its operations. WRRC Director Sharon Megdal says, "The WRRC has enjoyed an excellent working relationship with USGS, thanks to Nick's leadership. We appreciated Nick's strong commitment to sound water management, and we wish him the best in his retirement."

John Hoffmann will replace Melcher. Hoffmann has been the AWSC associate director and section chief of the Hydrologic Investigations and Research Program.

Peter Gleick Presents Tucson Public Lecture

Peter Gleick, co-founder and president of the Pacific Institute for Studies in Development, Environment, and Security, will be presenting a lecture at the Temple Emanu-El, 225 N. Country Club, Tucson at 7:30, Aug. 30. He will discuss innovative strategies for achieving sustainable water use. The lecture is free and open to the public.

Gleick has a PhD from the Energy and Resources Group at the University of California at Berkeley. He is a recipient of the prestigious MacArthur Fellowship for his work on water issues, and the BBC named

him a "visionary on the environment" in its Essential Guide to the 21st Century. He is the principal author of the recent publication, *The World's Water 2006 - 2007, The Biennial Report on Freshwater Resources*, published by Island Press.

Sponsors of the event include Pima County, Arizona Hydrological Society, Southwest Hydrology, Southern Arizona Leadership Council and Temple Emanu-El. Along with Southwest Hydrology the other University of Arizona sponsors are the Water Resources Research Center and the Institute for the Study of Planet Earth.

Gleick is in Tucson participating in a regional water symposium, "Sustainable Water, Unlimited Growth, Quality of Life: Can We Have it All?," an event sponsored by the

AHS and Southwest Hydrology. Check the symposium web site for information about the event: www.watersymposium.org.

WRRC Co-sponsors Research

The WRRC is using its TRIF Water Sustainability Program funds to co-fund Translational Science Fellowships in Environmental, Water, Land and Natural Resources. Translational refers to activities that inform the public, promote a sound basis for decision making and facilitate the implementation of sustainable technologies and knowledge systems in the private and public sector.

The WRRC-co-sponsored researchers are Janick Artiola, Department of Soil, Water and Environmental Science and Eric Betterton, Department of Atmospheric Sciences. Artiola is building a citizen science program in conjunction with Cooperative Extension's Master Gardeners to analyze arsenic and lead levels in fruits and vegetables grown in Arizona gardens.

Betterton will work with a private sector partner to scale up a catalytic converter system developed in his lab to treat volatile organic carbon contaminants on Superfund sites and convert the system to use solar power.

(TRIF is the Technology and Research Initiative Fund that derives its funds from a voter-approved increase in the state sales tax to support education.)

WRRC Marks Successful Annual Conference

The Water Resources Research Center conducted its annual conference on June 5, titled "The 20th Anniversary of the Environmental Quality Act and ADEQ: Assessing and Protecting Arizona's Water Quality." Among the issues discussed was whether the shabby hotel that hosted a critical post-Christmas EQA planning session was located in Casa Grande or Eloy. For a summary of some of the more substantive issues addressed at the conference see this issue's center-fold supplement.



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News Briefs

Pipeline Moot as Power Plant Stays Closed

The controversy surrounding the building of a pipeline that would have tapped water from the Coconino Aquifer near Leupp northwest of Winslow, pumping it about 120 miles across the Navajo and Hopi reservations to a Black Mesa mine coal slurry preparation plant is likely to have been resolved. Owners of the Mohave Generating Station which was to receive the Black Mesa coal via the slurry line have decided not to restart the shuttered plant because of the prohibitive costs involved.

The generating station had been closed since January 2006 until Southern California Edison, major owner and operator of the plant, installed about \$1 billion worth of air pollution controls. The Black Mesa mine, whose only customer is the plant, also shut down.

A draft environmental impact study released at the beginning of the year described the social and environmental costs that would result from the project. These included the relocation of 17 Navajo families; some wells in the Leupp area could go

dry; and the survival of threatened fish in nearby creeks during dry seasons could be jeopardized.

The city of Flagstaff also taps into the C-aquifer and considers it a possible source to meet future increased water needs.

The scheduled public hearings for the proposed pipeline were contested by former Hopi chair candidate Valjean Joshevama and religious leader Jerry Honawa. In a suit that was dismissed, they claimed that by setting the hearing during the winter

months the Office of Surface Mining were insensitive to traditional Hopi beliefs prohibiting participation in political affairs during ceremonial months.

The construction of the

proposed pipeline included plans to allow the Navajo Nation and Hopi Tribe to construct lateral pipelines tapping into the main trunk to provide water for people living along the pipeline route. According to the proposal, C-aquifer water would have allowed expanded mining operations, from 4.8 million tons to 6.35 million tons a year. This would increase tribal royalties by 10.5 percent and add about 220 jobs.

Black Mesa mine is now without a customer for its coal. Various options are being discussed that would allow the plant to reopen. These include constructing a power plant near the site, processing coal into gas or shipping coal to other users via a rail line. The mine is a source of jobs on the reservations and \$29 million annual royalties to Navajo Nation.

Help Wanted: Global Warming Consultants

Global Warming portends change, in myriad and diverse ways including the job market for hydrologists and others able to advise clients about coping with the effects of a warming world. They may find climate change is a cloud with a silver lining.

In need of such professionals are organizations whose interest is water resources. They include utilities, flood control and irrigation districts as well as an assortment of water agencies at all levels of government, from the local to the national and international, not to mention organizations in the private sector. Global warming sounds a note of uncertainty to such operations.

Will less water supplies be available? What will be the effect on water resources if the seasonal weather pattern changes? Will increased water storage capacity be needed? Will climate change in a particular



The Mohave Generating Station. Photo: Kjekolb

Sewers In History...continued from page 1

maintenance and safety; public baths and latrines from ancient and modern times; toilets, earth closet, and house plumbing; sewage treatment; sewer history by region and era; disasters; sewers in culture and much, much more. Text, photos and graphics are provided.

If the topic is sewers the web site covers the ground — or rather the underground.

Nor is literature neglected. Included is a poem by seventeenth-century British poet Ben Jonson titled "On the Famous Voyage" that recounts the journey of two men in a boat down London's Fleet River, adrift in raw sewage, animal carcasses, and filth. The poem offers a graphic view of the unsanitary waterways of London in the 1600s and is said to be "among the filthiest, the most deliberately and insistently disgusting poems in the language."

A web site visitor will discover that the historical significance of sewers is not confined to sanitation, that sewers have played a significant role in other kinds

of historic events. For example, the web site tells of the Warsaw Uprising during World War II when the Polish underground fought to liberate the city. The sewers served as an evacuation route for partisans and civilians and for courier traffic. One particular exodus involved 5,300 people.

This website is an educational, non-profit project sponsored by Pima County Wastewater Management Department; Arizona Water & Pollution Control Association; and Collection Systems Committee of the Water Environment Federation.

Schladweiler has developed an exhibit documenting sanitary sewage conveyance activities from the 1870s through the 1950s which includes collection system photos, artifacts and articles. The exhibit is available for display at conferences or other events. Schladweiler also is available as a speaker to discuss the evolution and development of sanitary sewers over 5500 years. He can be contacted at 520-297-7904; jcschlad@msn.com

Water Officials, Researchers From Around the World Visit Arizona

AZ Chosen for International Recharge Forum

Arizona's reputation as a center for aquifer-recharge research and development projects is the reason the state was chosen to host the 6th International Symposium on Managed Aquifer Recharge, an event that will draw scientists and practitioners to the state from 27 foreign nations. The conference meets every other year; it was held in Adelaide, Australia in 2003 and Berlin, Germany in 2005.

Doug Bartlett, of Clear Creek Associates in Scottsdale and co-chair of the conference organizing committee, says, "It is not just researchers and academicians; it also is people trying to figure out cost effective ways to manage water."

Bartlett explains that in Europe recharge is mostly used to treat water. For example wastewater that has been tertiary treated is released into a river then drawn out through wells along the river banks. The water meets drinking water quality standards after passing through the aquifer adjacent to the river.

Confronting severe water supply constraints, Australia is a world leader in recharge research and development. Australians will be well represented at the conference describing work they have done in the field.

Bartlett says, "In the US and more developed countries of Europe and Australia recharge projects tend to be large scale and high-tech. In many other parts of the world that is not the case. Low-tech is more likely to be the rule as inexpensive efforts are devised to capture and retain stormwater or harvest rainfall to store in the aquifer."

Bartlett says, "There are different ways that can be used to cost effectively capture water and get it to the aquifer; we have a number of people coming from India, Africa, Mexico, Australia and the Middle East to present their experiences."

For additional information see Announcement section of newsletter, page 10, or check the web site: www.ismar2007.org

Yuma Desalter Attracts International Interest

Although it had operated at ten percent capacity with limited output during its March 31-May 31 demonstration run, the Yuma Desalting Plant attracted global and national attention from visitors who believed they had something to learn even from its reduced operations. Visitors to the plant have come from Egypt, Libya, New Zealand, Australia, Korea, Canada and Mexico.

Jack Simes, U.S. Bureau of Reclamation public relations official, says the plant had drawn international attention because "It has been used as a model for construction of several hundred other desalting plants around the world."

Those with plants built with YDP specifications are interested in the condition of the pipes and the plumbing now that the plant has begun operating after having been mothballed for 15 years.

Simes says foreign visitors also were interested in the way the pretreatment process had been modified, an alteration that resulted in reduced costs.

Also attracting attention was the environmental monitoring program of conditions at the Cienega de Santa Clara. Simes says, "People know that the monitoring program is part of the demonstration run and will be interested in the numbers once they are published."

Mexico of course is interested in the monitoring program that affects a site within the country. New Zealand and Australia also are interested.

Whatever the demonstration run might show to other countries, its first and foremost purpose was to demonstrate to U.S. officials that the plant could still function and at what cost after having been shutdown for 15 years. Results showed that the plant with improved technology operated more efficiently and at less cost than was projected. The operation of the plant resulted in more than 4,000 acre feet of water returned to the river.

area result in increased or decreased water demand? What will be the results of increased evaporation of surface water? With uncertainties looming on the horizon, professionals knowledgeable about likely options will be in demand.

Preparing for the effects of global warming has taken on greater significance as skepticism about the phenomenon lessens, with more people realizing that something must be done.

A news story in the April 1 edition of the Santa Cruz Sentinel quotes Brent Haddad, associate environmental studies professor at University of California, Santa Cruz, as saying, "The demand is

growing. Water agencies are starting to take climate change seriously, so they're looking for help."

Persons employed in some present positions, such as disaster and emergency planning, drought mitigation, or planning and preparing for climate extremes such as heat waves and storm, may find their services in demand to cope with global warming developments.

In taking on global warming hydrologists will be confronting a challenging task. Although a scientific consensus exists that global warming is occurring, its effects in a particular area or region are not known for certain. Most climate

change models are better at the big picture than providing a focused view of a particular area.

Some dire consequences may be ahead that forewarn that global warming consultants would have a formidable assignment in the Southwest. For example, a projection anticipates a 30 percent decrease in water resources in the area. Also some scientists warn if global warming results in the melting of Sierra Nevada snowpack, California faces the potential collapse of its agricultural industry. Coping with such developments would task the expertise of the most knowledgeable consultants.



Guest View

Integrating Water Quality and Water Quantity for a Sustainable Future

Andy Laurenzi, Sonoran Institute land and water program director, contributed this Guest View.

Arizona has been, and will continue to be one of the fastest growing states in the United States. Rapid growth brings many challenges and when coupled with climate change forecasts that describe increased drought conditions, changes in precipitation patterns (i.e. less precipitation falling as snow), and higher annual temperatures, it suggests that intensifying water scarcity will be the rule with all water users, both human and environmental, competing for what is fundamentally a finite supply. Some would argue that the sustainable management of our water supply to meet the needs of people and nature may be the greatest environmental issue facing Arizona.

During much of the 20th century, issues related to water quality were viewed outside the impending water supply crisis. What is now becoming increasingly clear is that water quality and quantity are integrally related parts of the same sustainable water management equation. Industrial, agricultural and residential and commercial development place strains on both the supply of water as well as the quality of water. Declines in water quality will further limit future supplies exacerbating an already difficult management situation.

While policies and regulations have evolved to manage both water quantity and quality, these laws and policies have evolved along separate tracks. Quality issues driven by federal laws (principally the Clean Water Act and Safe Drinking Water Act) and subsequent state level implementation of these laws while water quantity management has developed as an outgrowth of individual state policies and laws, with significant underlying regional variations (i.e. prior appropriation vs. riparian surface water right systems), that date from the time of statehood. Water quantity management is further complicated in that groundwater and surface water systems may be managed under distinct legal doctrines, and in the West particularly, the federal government plays a significant role through the federal reserved water rights system and federal reclamation projects.

The question remains, despite the separate developments of policies and programs, why are water quality considerations not better integrated into water quantity considerations when discussing future water supply? A case in point is suggested by the recent 85th Arizona Town Hall hosted in October 2004: "Arizona's Water Future: Challenges and Opportunities." The plenary summary states that "Arizonans expect a safe and reliable water supply to support Arizona's diverse and increasing population, sustain our varied economic interests and preserve our wonderful quality of life now and for future generations" and that "Through statewide leadership and local control, Arizona must address regional concerns while improving water quantity and quality." While these statements are straightforward enough and conceptually in keeping with the point that quantity and quality are different sides of same sustainable water management coin, the session summary indicates that the discussion was largely about water quantity management. Despite the inclusion of "safe" into the goal of the convening, the summary report fo-

cused principally on meeting future water supply needs through supply side management. The Arizona Department of Water Resources was the singular agency to which the report was addressed and the Arizona Department of Environmental Quality was mentioned in passing as simply an agency with which greater coordination was needed.

One school of thought that has been articulated to me by a knowledgeable water expert is that traditionally water resource managers have viewed water quality as largely an issue of technology, its application and by extension largely a financial decision. At the point where the TCE-contaminated groundwater underlying Phoenix is needed to sustain growth, we will pay the full costs of cleanup and use it for our drinking water. One might argue given this perspective that water quality management choices within a water supply management context are simply engineering solutions driven by economic considerations independent of a larger, sustainable water resource management framework.

Looking forward, is it wise to view water quality considerations in this way? I would argue that when we consider the dismal state of our nation's infrastructure, the cost of simply maintaining what we have, let alone investment in new infrastructure, is going to require some hard choices regarding future investment. Climate change is no longer speculative, it is occurring, and regardless of how well we respond to mitigate our burgeoning carbon footprint, lag times in the global system suggest that adaptations are necessary now. The costs to adjust will be high, making investment decisions even more challenging.

It is time we bring water quality into the water management discussions in a more substantive manner. Here in Arizona there is certainly coordination occurring at least among the principal agencies, ADWR and ADEQ at some programmatic levels (i.e. ADWR recharge program) and informally among other programs (e.g. Adequate and Assured Water). Can there be more coordination and planning? My guess is yes. In addition, emerging watershed groups and partnerships offer significant opportunities for more holistic thinking, yet most are in an early, nascent stage of development, and the amount of state level support is limited in both technical and financial resources.

Arizona's Groundwater Management Act of 1980 and the Aquifer Protection Program established in the mid-1980s are in many respects nationwide groundwater management models that speak to the both quantity and quality. Building on these noteworthy approaches, and given the increasing emphasis on water management in the face of rapid growth and climate change, the time may be right for a larger conversation on how we can become a leader in integrating water quality and water quantity decisions into our water management planning to put Arizona on a more secure path to a sustainable future. ■



Legislation and Law

Rural AZ Can Restrict Growth if Water Supplies Inadequate

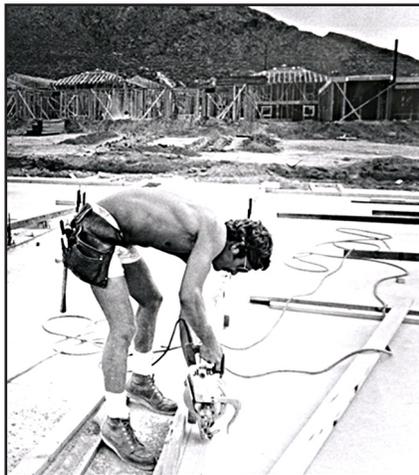
Some view the new state law enabling Arizona rural communities to restrict development if adequate water supplies are not available as a mixed success. It is true that rural communities now have a tool to better manage and protect their water supplies, but to apply that tool to block development requires the unanimous assent of the Board of Supervisors. A single nay would scuttle a restriction.

Nevertheless the bill is a breakthrough in finally addressing a concern that many have argued needed urgent attention: rural water management. The 1980 Groundwater Management Act enabled other more populated areas of the state, those within Active Management Areas, to link growth with the availability of water supplies.

A lingering issue, however, has been water management in rural areas of the state. When the GMA was passed rural areas generally felt confident about their water supplies. As such areas grew, attracting a greater number of residents, many rural areas began facing the same threat as AMA communities: an overdraft of groundwater supplies that threatened present water users, future development and the flow of rivers and streams.

Meanwhile in such areas a person could withdraw groundwater for a reasonable and beneficial use. No restrictions existed to drilling new wells, with no limitations on new uses of groundwater and no enforceable requirements to meter wells or conserve water. A developer proposing a subdivision had to demonstrate to the Arizona Department of Water Resources that an adequate water supply was available. An ADWR determination that the water supply was in fact inadequate would not deter the developer from selling lots in the subdivision. Whether city and county governments have authority to deny a subdivision because of an inadequate water supplies was uncertain.

It was generally agreed, however, that managing water in areas outside AMAs required a distinctive approach, not the centralized, broadly applied rulemaking of the GMA. The new legislation grants authority to elected officials in such areas to enact their own laws regarding development and available water supplies. ■



Rural areas are rapidly growing. (Photo: Arizona Daily Star photo file)

U.S. Supreme Court Rules CWA Trumps ESA in Arizona Case

Officials at the Arizona Department of Environmental Quality must have felt a sense of relief when the Supreme Court recently ruled that the Clean Water Act trumps the Endangered Species Act. In its 5-4 decision in *National Association of Homebuilders v. Defenders of Wildlife* the court determined that U.S. Environmental Protection Agency did not break the law when it allowed Arizona primacy to administer its own stormwater discharge program. Developers often must obtain such permits before they begin construction.

The immediate effect of this decision is that Arizona may continue to issue wastewater discharge permits under the CWA. The broader issue is that the ESA does not trump the CWA when EPA grants primacy to a state to issue water-pollution permits.

Environmentalists had sued EPA arguing that the agency did not consider the effect the transfer decision might have on endangered species when it granted primacy to ADEQ. They said the state, when taking on what was previously a federal responsibility, does not have the same ESA enforcement authority and responsibilities as EPA.

The Supreme Court decision reverses a previous appellate court ruling that agreed with environmental interests stating, "that the EPA did have the authority to consider jeopardy to listed species in making the transfer decision, and erred in determining otherwise. For that reason among others, the EPA's decision was arbitrary and capricious."

Justice Samuel Alito writing for the majority stated that the "must" in the CWA overrides ESA and that the ESA's consultation requirement should apply only to "discretionary" actions.

Writing for the minority, Justice John Paul Stevens stated that limiting ESA to discretionary actions is inconsistent with the text and the history of the law. He wrote that the court's response to the "problem of conflicting 'shalls'" raised by the case should have been to direct federal officials to find the means of complying with both laws.

If read narrowly the case could be said to apply only to water permits in question in the case. Interpreted broadly the ruling could be used to justify additional ESA exemptions in other situations. The critical question is: Does the ruling open the gates for further ESA challenges?

In response to the ruling Steve Owen, ADEQ director, issued a statement that said: "From the beginning we have operated our state program in accordance with the Clean Water Act. Our state program provides adequate protection for endangered species, and we have always been confident that our program would be upheld in court."

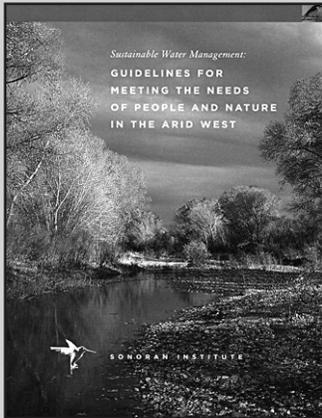
This was considered a landmark case with national implications and one of the most significant ESA cases to come before the court in a decade. ■



Publications & On-Line Resources

Report: Protect River Flows For Human and Environmental Needs

A recent Sonoran Institute report reminds us that the flow of rivers cannot be taken for granted, a premise readily supported by the sight of many dry river beds in Arizona and the West.



Titled *Sustainable Water Management: Guidelines for Meeting the Needs of People and Nature in the Arid West*, the report argues that flow depends upon wise river management to ensure that sufficient water is available for human uses as well as the needs of flora and fauna. The report, part workbook, part primer and part guide, points the way to protecting river flow in the West

According to the report public dialogue is important when water sustainability planning is afoot. Productive public dialogue, in turn, requires understanding of the issues that in one way or the other affect sustainability. By broadly covering the ground, from the fundamentals to the application of a sustainable water management framework, from hydrology to public policy, the report is providing information to spur public dialogue.

The report begins by first describing the hydrology involved in the relationship of groundwater and surface water to rivers and streams. In brief but focused discussions, the text describes the role of groundwater, its storage in aquifers and recharge, its importance in maintaining riparian vegetation and the effect on surface water as groundwater is increasingly pumped. The report builds the case that groundwater and surface water are interconnected and is critical of the undue attention to surface water evident in many efforts to preserve rivers and streams in the West. A broader view is called for.

In moving from hydrology to public policy, the report notes an inconvenient fact, that "Arizona water laws and policies do not closely align with hydrological realities." This understandably complicates any management efforts that are undertaken. Yet the situation does not pose such an obstacle to prevent the report

from proposing a framework for sustainable water management.

The report states, "The application of this framework will lead to a comprehensive set of strategies that collectively will enable sustainable water management that meets the needs of people and nature." The framework consists of a number of steps or directives intending to help focus public dialogue that might otherwise get distracted by the technical and legal complication of water management issues.

The report devotes a section to discussing surface water and groundwater management in Arizona. Here it becomes apparent that the laws governing the use of surface water and groundwater labor an artificial distinction that they are separate and distinct. Further complicating the issue is the fact that most surface water users have not yet had their water rights quantified or legally validated. According to the report water management gained some ground in the state with the Groundwater Management Act, although, true to state form, the act does not address pertinent surface water issues. Meanwhile many rural areas of the state are without water management planning. The result is over pumping of groundwater, causing wells to go dry and threatening surface water resources.

The report then provides three case studies of Arizona rivers that, each in its way, face current or potential threats due to groundwater pumping. Also, each river provides a study for evaluating current water management efforts in reference to the aforementioned water management framework. The report focuses on segments of the San Pedro, Santa Cruz and Verde rivers. These are areas where the press of population and groundwater pumping pose a threat to the river.

The report concludes with a set of four recommendations for managing the three river systems. The recommendations are not intended to challenge current water law or policy but are overriding actions that can be taken within the current regulatory framework. The recommendations are said also to be applicable to other Arizona river systems that depend upon groundwater.

Copies of the report are available by contacting Mía Stier, mstier@sonoran.org or 602-393-4310, ext 4. Also the report can be downloaded from the Sonoran Institute web site: <http://sonoran.org/> The site also includes an executive summary of stakeholder interviews.

Water Law and Policy Symposium Proceedings

The summer edition of the *Arizona Law Review* includes the proceedings of the Water Law and Policy Conference, conducted Oct. 6-7 at the University of Arizona and sponsored by the UA John E. Rogers Col-

lege of Law and the Environmental and Natural Resources Law Section of the Arizona State Bar. Dean Toni M. Massaro's welcoming address stated the purpose of the symposium: "Inadequate resources often generate acquisitiveness and protectionism rather than wise stewardship that will serve the whole community, not just a

particularly forceful or fortunate segment of the community. How should we respond to these abiding concerns in today's complex environment? This Symposium addresses these timeless and urgent issues — issues that have profound consequences for us all." Subscriptions and single issues are available by calling 520-621-1289.



Special Projects

UA's Involvement With Water Broadens With Two New Academic Programs

Water is an emphasis in two new University of Arizona programs. One of the programs provides graduate students and working professionals the opportunity to earn a certificate in water policy. The other is a collaborative effort combining the concepts of law and economics to better understand environmental issues

Certificate in Water Policy Offered

Graduate students and working water professionals wanting to broaden and enhance their water policy expertise will be able to enroll in the recently approved University of Arizona's Graduate Certificate in Water Policy. Earning the certificate requires taking 12 units or four UA graduate courses. Scheduling flexibility is a key to the program, with students able to complete work from one semester to two years. This is to accommodate the different schedules of graduate students and working professionals, the two groups served by the program.

The way it now works is that UA graduate students interested in water issues pursue traditional academic degrees in various UA programs including environmental sciences, social sciences, engineering and law, each program offering a particular focus on water.

Carl Bauer, Water Resources Research Center associate director and certificate program director, says some of these students might want more exposure to water policy. "They might want to round out and deepen their understanding of policy to complement their work in some more established fields."

The interdisciplinary certificate program will provide a water policy grounding to students in these varied disciplines.

Also targeted as students for the policy certificate are working, on-the-job water professionals. Bauer says, "These are people working in the world who have at least a bachelor's degree and maybe more but want the opportunity to get deeper into policy issues."

He says, "Many water managers have scientific or engineering backgrounds without the academic work in policy-related studies. They now deal with policy because of their professional activities. Some realize they need more training in the policy area."

Certificate scheduling has been arranged to accommodate working professionals' on-the-job commitments. The four-course certificate program can be completed in one semester during a short professional sabbatical or courses could be taken over time to fit educational release programs in government and industry. Organizations could use the certificate as a way to provide on-the-job training and educational opportunities to promote career growth.

UA units and departments offering certificate course work include the Department of Agricultural and Resource Economics, College of Law, Department of Geography and Regional Development, School of Public Administration and Policy, and Department of Soil, Water and Environmental Science.

Bauer says the certificate program is helping fill a UA need for water policy or water management instruction. He says, "The UA does not currently offer a water policy or water management degree. We have a lot of faculty expertise in these areas and interested students can find classes in various departments around campus, but

there is not a degree that brings this together and says 'water policy' in the title."

Bauer says the water policy certificate may be the first step toward establishing such a degree. He says, "The university is moving in the direction of a more structured program to strengthen and consolidate water management and policy as a major area of expertise. This is a first step. It will help to institutionalize our expertise in the policy and social science aspects of water."

The water policy certificate program has been approved effective this summer to begin operating in the fall. 🏗️

Program Applies Both Law and Economics to Study of Environmental Issues

Environmental and natural resource studies often rely on the disciplines of economics and law to explain varied and complex issues. The limitation of this traditional approach is that two views are offered: the law view and the economic view. A new University of Arizona program is breaking new ground with a collaborative, interdisciplinary approach to the study of environmental issues that draws upon the insights provided by both legal theory and economic analysis.

Called Economics, Law and the Environment, the research and education program is a joint venture between the James E. Rogers College of Law and the Department of Agricultural and Resource Economics in the College of Agriculture and Life Sciences. ELE co-directors are Kirsten H. Engel, UA professor of law and Dean Lueck, Bartley P. Cardon Professor of Agricultural and Resource Economics and also a professor of economics and of law.

Engel says, "The ELE program is the first formal collaborative program between law and economics in the nation which focuses on environmental issues."

She says law and economics offer complementary approaches to understanding natural resource issues. Laws are applied to manage the environment; economics determines whether resources are being managed in the best interest of society.

ELE has been founded with high expectations that the program will gain recognition as a national center for the combined study of economics, law and the environment. Lueck says, "We intend to not only bring in first-rate scholars to visit the UA and present their work, but also to attract and encourage the best students."

ELE program directors hope eventually to provide funding to support faculty research. Plans also call for establishing an annual lecture series as well as providing stipends to support student research. Engel says this is in the future when funding is available.

Engel and Lueck also look forward to ELE offering more

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Announcements

International Symposium on Managed Aquifer Recharge

The 6th Biennial International Symposium on Managed Aquifer Recharge will be conducted in Phoenix, Oct. 28 - Nov. 2. Considered the world's pre-eminent conference devoted entirely to aquifer recharge, the event is being organized by the Arizona Hydrological Society in partnership with International Association of Hydrologists, Environmental & Water Resources Institute and UNESCO. The program includes three days of technical and poster sessions, an IAH-MAR plenary, four workshops, and two field trips to learn about innovative aquifer recharge projects in the East Salt River Valley in the Phoenix area and in the Las Vegas Valley in Nevada. For more information check: <http://www.ismar2007.org/>



Symposium Ponders Whether We Can Have it All

Southwest Hydrology and Arizona Hydrological Society are joining forces to present the 2007 Regional Water Symposium titled "Sustainable Water, Unlimited Growth, Quality of Life: Can We Have it All?" to be held Aug. 29-Sept. 1 in Tucson. The event is AHS's 20th annual symposium; in honor of the occasion the two organizations will offer an expanded regional focus on the viability, health, and future of water resources in the Southwest. Plenary speaker is Peter Gleick, Director of the Pacific Institute; other notable speakers also will participate. Pre-conference workshops and post-conference field trips are offered. The event is expected to attract water managers, urban planners, hydrologists, environmentalists, researchers, developers and agency personnel. For more information and to register check: www.watersymposium.org

Symposium on Southwest Hydrometeorology

Scheduled for Tucson, Sept. 20 - 21, the Fourth Symposium on Southwest Hydrometeorology will provide a forum to discuss and present research issues associated with mid-latitude, subtropical, and tropical

weather systems that affect the Southwest United States and to discuss the impact of these systems on hydrologic systems. Close working relationships across academic, government and private sectors have opened new areas of investigation to address questions on how to add value to both weather and water forecasts. This symposium seeks to strengthen these relationships and continue to advance our understanding of the complex weather and hydrologic forecast issues in the Southwest. For additional information and to register check: <http://www.atmo.arizona.edu/swhs/>

Arizona Water Law Conference

The 15th Annual Arizona Water Law Conference will be conducted Aug. 9-10 in Phoenix. Issue to be addressed include Arizona's prior appropriation law – history, framework and recent developments; Arizona groundwater law; Indian water rights -- Navajo Nation as case study; Law of the Colorado River -- recent developments; and underground storage and recovery in Arizona. Keynote Speaker Thomas Maddock, III, head of the University of Arizona's Department of Hydrology and Water Resources will discuss Arizona's antiquated law governing groundwater pumping and depletion of surface water capture and subflow. For more information check: <http://www.cle.com/waterazr>

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courses bringing together the disciplines of law and economics to study environmental and natural resource issues. Engel says, "We would like to offer more courses in the future but right now we are offering them under the auspices of either department."

Water figures prominently as one of the environmental and natural resource issues of concern to ELE. Along with expertise in water economics and water law, faculty affiliated with ELE have backgrounds in the economics of natural resources and the law of natural resources, land use economics and land use law, the economics of property and property law, the law and economics of environmental regulation, biodiversity, sustainability, federalism

and risk management.

ELE will be sponsoring a workshop each spring. The workshop this spring featured five nationally known scholars presenting works-in-progress that applied economic approaches to environmental problems and natural resource issues. Conducted as a seminar, the workshop was attended by law and AREC students along with ELE-affiliated faculty members.

Upcoming events include a symposium on October 26 on "Property Rights in Environmental Assets: Economic and Legal Perspectives," to be held at the Arizona State Museum on the UA campus.

For additional information about the ELE Program check its web site: www.ele.arizona.edu



Public Policy Review

by Sharon Megdal

WRRC's Year-in-Review Highlights Varied and Productive Projects



One of my columns each year is devoted to Water Resources Research Center activities as I highlight some of my recent and ongoing projects. Contrary to what some people think, professors do not take long summer vacations. Summer time is work time, with more time available to work on projects!

In collaboration with Cochise County, some University of Arizona colleagues and I are beginning a project to develop an estimate of water use by owners of domestic wells. Jurisdictions need to understand how water demand increases with population growth. We hope our study methodology, which involves voluntary metering of a population sample, can be applied to other communities deciding to undertake a similar study. The identity of individual water users will be kept confidential. TRIF Water Sustainability Program funding is partially supporting this effort, which will take 18 to 24 months to complete.

I am also currently working with a Northern Arizona University colleague to examine the evolution and effectiveness of the regulatory programs included within the Active Management Area Plans. The Arizona Department of Water Resources, which will soon be developing its Fourth Management Plan for each of the five AMAs, and the Arizona Water Institute are funding the study. My research assistant and I will be conducting stakeholder interviews this summer.

An ongoing project has been examining environmental restoration and enhancement projects in Arizona, focusing on their water requirements. With Bureau of Reclamation funding and graduate student assistance, a survey study of 30 Arizona projects was finalized last summer. A graduate student, who recently graduated from the UA planning program, and I are now completing a related Reclamation-funded study.

We have developed a conceptual mechanism whereby water customers pay for conserved water, with the money being directed into a special fund to be used for purchasing water for environmental purposes. This water conservation banking mechanism, although challenging to implement, deserves consideration by communities interested in finding resources to pay for environmental water needs. The survey study is currently being condensed for publication in the WRRC Arroyo newsletter series. An undergraduate student, whose career objective is to be a science writer, is assisting me with the Arroyo publication.

In collaboration with the UA's Engineering Research Center for Environmentally Benign Semiconductor Manufacturing, a research assistant and I are working on a paper examining high-tech manufacturing water use in Arizona. The desire for more well-paying jobs in Arizona makes it important to understand how the water needs of this segment of the manufacturing sector can be accommodated. Another graduate student is assisting me in a study that characterizes participation in groundwater savings recharge in Arizona. Also,

a paper I co-authored with three attorneys on the Central Arizona Groundwater Replenishment District has been published in a special issue of the Arizona Law Review. (Please contact me if you want a copy of the paper.)

Not all my work is focused on papers and studies. Our annual WRRC conference is always a challenging endeavor, with much effort devoted to developing the program, gaining sponsor support and delivering an informative and engaging event. This newsletter's insert is devoted to our recent, successful conference on water quality regulation. I have begun to develop the program and format for the 2008 conference, which will be a collaborate effort with Central Arizona Project, focusing on Colorado River/CAP water issues.

Also, in collaboration with ADWR, the Pima Association of Governments, and the Southern Arizona Leadership Council, we are developing a program called "A Community Conversation on Water." Scheduled for October 26, 2007 in Tucson, this forum will discuss up-to-date water information, as well as multiple perspectives on water challenges facing the Tucson region. I am an advocate for having people "on the same page" in understanding our water demand and supply situation and our position relative to achieving Tucson AMA's safe-yield goal. Program and registration information will be available in the not-too-distant future.

I recently made a presentation on the recently authorized US Transboundary Aquifer Assessment Program (the subject of my Jan.- Feb. column) to the newly formed Arizona-Mexico Commission water committee. We are hoping that, with broad support, we will be able to obtain federal funding for this program. Stage one of this collaborative process involves developing study plans and priorities for the two Arizona transboundary aquifers specified in the authorizing legislation, the Santa Cruz Valley aquifers and the San Pedro aquifers.

I would be remiss not to mention our efforts to complete the *Layperson's Guide to Arizona Water*, a collaborative undertaking with the Water Education Foundation. My staff has worked hard on the project, with external stakeholders reviewing the work. I look forward to a final draft and a completion of the project.

You may have noticed some commonalities to these sampling of projects. First, most involve significant contributions by research assistants. Interaction with students on projects is a rewarding experience for both me and them. It provides me the opportunity to work with excellent students, both undergraduate and graduate, and they gain work experience. Second, the projects involve collaborations. Through collaboration, more funding is available to employ students, and the work efforts benefit by involving the talents and perspectives of others.

Also, notice the real-world relevance of these efforts, evidence that we at the WRRC are on task with furthering our mission. We are striving to promote an understanding of critical state and regional water management and policy issues through research, community outreach and public education. ■■■

San Pedro River...continued from page 2

with the Department of Water Resources playing a facilitative role as opposed to a regulatory role. He says, "It will be specially designed to meet the goals of the people who occupy those particular basins or watersheds. ...It is a very basic exercise of democratic principles."

He says, "It recognizes that one size doesn't fit all when it comes to groundwater management. This is a concept the Governor has emphasized and directed me to follow up; this is the first of its kind." A San Pedro River Management district could serve as a pilot district to guide other rural areas of the state.

The ringing words lauding local control notwithstanding, the Verde Independent, which serves the Verde Valley area, took exception, critical both of what the law does for the San Pedro River and also its wider water management implications, including its possible effect on the Verde

River. In response to the bill, a June 12 editorial bemoaned the fact that legislators "instead of doing something to actually protect the waterway ... decided to give voters the option of establishing a temporary committee to figure out how to increase water supplies in the area."

The editorial indicated that this approach does not bode well for efforts to protect the Verde River where many different groups — the editorial refers to them as too many cooks — are ineffectually now working on various strategies.

The editorial calls for government officials to "make the tough decisions instead of passing the buck." It stated, "When it comes to river protection issues, we have the Arizona Department of Water Resources and the Environmental Protection Agency. ... Another cook in the kitchen is not the answer." ■

Book Focuses on Water and Education

In 2004, Governor Janet Napolitano called for the development of a "culture of conservation" through education in Arizona. In response, the Arizona Project WET partnership was formed to develop a teachers guide focused on water conservation in Arizona. Arizona Project WET Director Kerry Schwartz co-authored the book with Lissa Howe at the Project WET International Foundation. Key partners and sponsors were the Arizona Department of Water Resources and U.S. Bureau of Reclamation. Writing the *Arizona Conserve Water Educators' Guide* was a group effort involving scientists, water managers, teachers, academics and educators. ADWR Statewide Water Conservation Coordinator Marjie Risk says, "The development of Arizona Conserve Water brought together more than 75 key stakeholders representing a variety of perspectives who participated in curriculum development workshops and reviewed the guide."

The book covers Arizona's unique geography and its history of water resources and is richly illustrated with photos and maps. Lesson plans and activities are designed to give students an awareness that water issues are multi-faceted. Several case studies describe real-life scenarios faced by Arizona water users.

"Many brains developed the concepts and teaching methods in this book," says Schwartz. "It engages people in becoming stewards of Arizona's water resources by first offering an understanding of water resources and uses in the state and secondly an understanding of conservation technologies and reuse strategies in-place and developing."

"We saw this guide as an essential part of the comprehensive water education program offered through four educator resource guides covering broad base water concepts, water quality, the Colorado River watershed and now conservation."

Arizona Project WET is located within the University of Arizona's Water Resources Research Center.

For information about *Arizona Conserve Water*, go to www.cals.arizona.edu/AZWATER/wet or contact Schwartz at kschwartz@cals.arizona.edu or call: 520-792-9591, ext. 26.

