ARIZONA
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Navajo Sue U.S. to Protect Colorado River Rights

In a case that bristles with far-reaching implications, the Navajo Nation has sued the federal government in an effort to obtain recognition of tribal claims to Colorado River water. A consideration of such rights could result in a rethinking of current state and federal water management policies and practices.

The suit, which is not about identifying a specific amount of water, is, at the same time, a step in that direction. Navajo tribal attorney Stanley Pollack describes what ultimately is at stake: "The tribe has unquantified, unrecognized main stem Colorado River water rights that we want recognized. We want the rights to be quantified, and we want an entitlement."

The suit argues that the U.S. Interior Department 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 the department from allocating any unallocated water from the Colorado River until Navajo rights are quantified to meet the needs of the Navajo Nation.

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Shown above are the "Day of Thanksgiving for Water" festivities of April 26, 1941, to celebrate the end of a long drought. Along with the inevitable political speeches — considering the occasion one hopes they were not too dry — the event included a chuck-wagon lunch served in downtown Phoenix. With much of the today's water news taken up with the ongoing drought — see Special Projects, page 9 for discussion of the state's drought management plan — it is heartening to be reminded that droughts have come and gone in the past. (Photo: Salt River Project Research Archives)

"Source Tracking" Identifies Origins of Waterborne Pathogens

DNA fingerprinting does detective work

After identifying a particular contaminant in a water body, a water quality specialist's next task is to find or track its source. Once an inexact and uncertain science, source tracking has gained greater precision, with molecular techniques now available to identify the specific source of a contaminant, whether livestock, wildlife or human.

And even more specifically, some source tracking techniques can identify the type of livestock and wildlife, whether cow, pig, goat, geese, deer, raccoon, beaver, etc. as the source of fecal contamination in a water source.

The use of source tracking at Sedona Creek demonstrates its potential. Sedona Creek is sporadically closed to swimmers and waders during the summer months due to high coliform bacteria counts. Arizona Department of Environmental Quality officials faulted leaking septic tanks in the canyon. In an effort to determine specifically the contaminant source, Gordan Southam, then a professor of environmental microbiology at Northern Arizona University, conducted DNA testing on water samples taken from various sites in 1998 and 1999.

He found the main culprits were nonhuman critters, with raccoons contributing 30 to 35 percent of the coliform bacteria and other animals, including skunks, coyotes, elks, horses and even lamas, contributing about another 50 percent. Humans were responsible for about 16 percent of the bacteria.

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Source Tracking...continued from page 1

Credit for the discriminating detective work is due to source tracking, also called genetic fingerprinting because the actual source of the contaminant is fingerprinted.

In applying source tracking or genetic fingerprinting, pure cultures of *E.coli* (or other enteric pathogens) are isolated from both the receiving water and the suspected sources. For example, the Sedona study involved isolating cultures from Sedona Creek and also from the various possible sources of the contaminant within the watershed, including wildlife, livestock and septic tanks. DNA isolates from the various watershed cultures were then compared to isolates found in the creek to determine the specific sources of pollution.

The use of molecular techniques in source tracking is relatively new, in use for about the last six years. It is an emerging field, with various methods having been developed and more being worked on as research intensifies to expand its potential.

Much of the impetus for developing and applying source tracking techniques came from the U.S. Environmental Protection Agency's application of the total maximum daily load concept. Since source tracking methods are effective tools for determining origins of fecal contamination of water bodies, they can be used to design best management practices to reduce fecal loading.

The molecular approach has distinct advantages over the cultural technique, once the standard method for identifying waterborne pathogens. University of Arizona assistant research scientist Kelly Reynolds says, "We use to rely on growing organisms in the laboratory on specific media until we found out that only about one percent of the organisms in any environment are actually culturable.

"Molecular techniques look at a much bigger, broader, diverse picture of the microbial community than do cultural techniques. They have enabled us to look at more of the ecosystem instead of only organisms that grow on food we feed them in the laboratory. Molecular methods have definitely taken the forefront."

Milwaukee Crypto Outbreak Ten Years Ago

April 5 marked the tenth year anniversary of the *Cryptosporidium* outbreak in Milwaukee. The epidemic led to fundamental changes in public health, disease surveillance, and water treatment and testing. Investigators initially focused on farm runoff as a potential source, but genetic analysis revealed that stool samples from infected Milwaukeeans contained a human strain of *Cryptosporidium*, not a bovine one. The official tally of the outbreak included 403,000 sickened, 44,000 doctor visits, 4,400 hospitalized, more than 100 deaths, 725,000 lost work or school days, $96 million in lost wages and medical expenses and $90 million for a new water purification system.

Reynolds adds, however, it is not an either-or matter, that cultural and molecular techniques are sometimes combined, to take advantage of the benefits of each method. She says, "Typically, people use a variety of methods to make an assessment of the overall picture."

A researcher attempting to determine the source of a pollutant has various source tracking strategies to choose from. One of the more widely used techniques is ribotyping. Ribotyping is able to detect with a high degree of accuracy sources of bacterial contamination, perfectly matching isolates from humans and many different animals.

Each microbial pathogen, including individual strains or subspecies of bacteria, has a unique genetic makeup, and ribotyping determines DNA "fingerprints" of the bacteria or virus. The sample is then matched with E.coli isolates from a contaminated site and potential contaminant sources in the project area to determine a specific source.

Another commonly applied source tracking technique, antibiotic resistance analysis (ARA) relies on patterns of antibiotic resistance of bacteria from human and animal sources. Human fecal bacteria and animal fecal bacteria differ in their resistance to certain antibiotics since humans and farm animals are exposed to different sets of antibiotics. Further, various agricultural species, e.g. cattle, pigs and poultry, each receive different antibiotics. In contrast, wild animals receive relatively little exposure to antibiotics. As a result, their fecal bacteria would not be expected to exhibit substantive antibiotic resistance. ARA's determination of the ability of bacteria to grow in the presence of different antibiotics is a type of fingerprint, used for identifying individual sources of bacterial contamination.

Identifying a pollutant source can be the key to resolving a particular problem. Chuck Gerba, UA professor in the Soil, Water and Environmental Science Department, says, "An advantage of source tracking is that the source can be identified, and this helps determine a solution to the problem. Before, there was a lot of guess work."

For example, Gerba was involved in study at the Tres Rios wetlands in Phoenix, a constructed facility fed by water released from a wastewater treatment plant. Water leaving the wetlands tested with high levels of *E.coli*. Whether the high levels were due to human or animal sources was at issue. If the increase traced to a human source, water leaving the wetlands might need further treatment. Using antibiotic resistance analysis and biochemical fingerprinting, Gerba found that although some increase was due to human sources, birds also were a factor.

Gerba says, "We did fingerprinting of the birds and the sewage, and we found it to be about 50 50." The bird percentage increases during the winter when migrating birds pass through the area. The situation did not warrant further water treatment.

Gerba says source tracking also has helped to identify causes for diseases of previously unknown origins. For example, he says, "Epidemiological relationships have been established between drinking untreated groundwater and ulcers, and nobody would have guessed that 20 years ago. They can fingerprint what is in your ulcer and what is in your tap water and find the same bug."

Establishing the source of a pollutant serves other than just public heath purposes. That direct responsibility for an waterborne outbreak can be determined means liability also can be ascertained, thus opening the door to litigation. Gerba warns, "It can become a field day for lawyers."

Water Vapors

CA, AZ Settle Dispute, Confer

Lest one has the impression that every water encounter between Arizona and California is marked by suspicion and hard feelings, a couple of recent events are worthy of note, if only to demonstrate that the two states are at least on speaking terms. Admittedly these are rather slight matters in the larger scheme of things, but they are heartening nonetheless.

CA takes our land, and our water

California and Arizona are on the verge of settling their long-running border conflict. Near Yuma, about 20 miles north of the U.S.-Mexican border, are two disputed parcels of land, one claimed by Arizona, the other by California. Land claimed by Arizona is in California, and land claimed by California is in Arizona.

New Source of Water Found

To get children to think about the hydrologic cycle, Leslie Meyers, water conservation coordinator for the U.S. Bureau of Reclamation, asked a group of them, "Where does water come from?" Recently, for the first time since she had been asking children this question, a child answered, "From the store."

The once-meandering Colorado River set the states's boundary in this region. Thanks to the Army Corps of Engineers the river was straightened, with a fixed boundary established in 1963. Nether state, however, relinquished its claim to land along the now-dry river bed.

Laws passed by the California and Arizona legislatures last year are expected to resolve the issue. California will be permitted to assume authority over six square miles on its side of the official boundary but on Arizona's side of the old riverbed. For its part, California will relinquish claims to 11 square miles now located within Arizona.

In a statement that would likely provoke controversy if the disputed resource were water, Nick Simmoneta of the Arizona State Land Department said, "We both felt it would make more sense for California land to be in California and Arizona land to be in Arizona."

L.A. wants to be like Tempe

Los Angles is considering damming the graffiti-bespattered concrete channel that is the Los Angeles River to create an artificial lake. Los Angeles would then have its very own downtown water body, with all its attendant amenities — a water front, recreational opportunities and a boost to redevelopment. Not only that but the project is expected to bring back the natural beauty of the Los Angeles River.

A Los Angeles Times article said the idea "might sound like the kind of return to natural beauty that only a Los Angeles real estate huckster could conjure up." Arizonans know better. Tempe had already done it, and L.A. City Councilman Ed Reyes, a projector supporter, acknowledges its Tempe ties.

As the project is promoted Tempe's Town Lake often is touted as a worthy example for Los Angeles to emulate. Reyes wants to copy the Tempe design by using inflatable rubber dams, installed at two ends of downtown, to create the lake. L.A. officials cite Town Lake's commercial and recreational successes and its use as a community resource as selling points for their own project. L.A. officials confer with Tempe officials as they work out the details of their proposed water project.

WRRC Researcher Gets Fulbright to Study Border Effluent Use

The Water Resources Research Center's borderland expertise received a boost when Terry Sprouse, WRRC senior research specialist, was awarded a Fulbright Grant to study bi-national effluent management in Nogales, Sonora and Nogales, Arizona. Sprouse's study is titled "Developing options for equitable management of Mexican effluent in Ambos Nogales."

Southwestern United States and northwestern Mexico have a number of things in common including a generally dry climate and rapidly growing populations. Also both countries share the limited water resources of the area. The use of effluent is a strategy to increase the quantity of available water for both countries. Resolving the issue of Mexican effluent use has broad implications for long-term watershed management in that region.

Sprouse will be working in cooperation with M.C. Arturo Vallalba Atondo, Profesor-Investigador, Universidad de Sonora, Departmento de Investigaciones, Científicas y Tecnológicas.

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Arizona Water Resource Staff
Editor: Joe Gelt
jgelt@ag.arizona.edu
Editorial Assistant: Gabriel Leake

WRRC web site:
www.cals.arizona.edu/azwater

WRRC Director: Dr. Peter Wierenga

Arizona Water Resource
Water Resources Research Center
College of Agriculture and Life Sciences
The University of Arizona
350 North Campbell Avenue
Tucson, Arizona 85719

520-792-9592; FAX 520-792-8518
email: wrrc@ag.arizona.edu

News Briefs

Dental Mercury Found in Wastewater

Backers of an Arizona bill restricting dentists' use of mercury fillings say the law would protect the health of children, pregnant women and nursing mothers. Although not touted as a benefit of the legislation, reduced mercury use also might have an environmental pay off. A report released last year titled "Health Care without Harm" says dentists are the largest single contributors of wastewater mercury in the country. The report was authored by environmental and health professionals.

In its focus on the health of children, pregnant woman and nursing mothers, the Arizona bill prohibits dentists from using mercury fillings in such patients and also would require dentists to discuss with all patients the pros and cons of mercury amalgams. Some researchers say amalgams release toxic vapors that cause neurological damage and other health problems. The "silver" fillings dentists use to restore teeth are in fact 50 percent mercury.

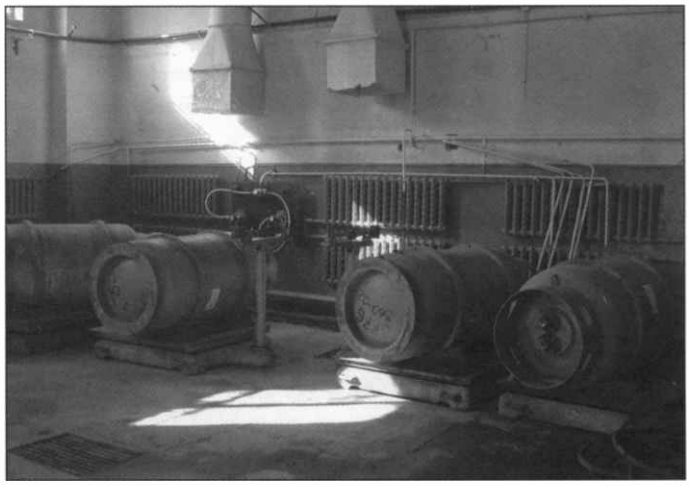
If such restrictions were to become law, it would likely mean that less mercury would be released into the environment. According to the above report, America's 150,000 dentists are the third-largest consumers of mercury in the country, with 41 tons used in 100 million fillings per year. The report says that most of the mercury eventually finds its way into the environment, with much of it rinsed down the drain.

Once the amalgam is released into water and soil it is transformed into highly toxic methyl mercury. The compound accumulates in the tissue of living organisms, becoming more concentrated in organisms higher up the food chain. Pregnant women and predatory animals are particularly at risk. Some countries have banned the use of amalgams.

Alternative filling materials are available. Also, cost effective devices can be installed to properly manage waste dental mercury, including amalgam separation filters to reduce mercury discharges. Yet only a small percentage of dentists nationwide are taking steps to collect and recycle mercury waste. Dental interests generally oppose restrictions on the use of amalgams.

There is some indication that mercury pollution may be declining in recent years. A report released by Mercury Policy Project indicates that Toronto has had a 50 percent drop in wastewater mercury over the past years, the result of using amalgam separators and applying best practices in dental surgeries. The project urges other dentists to adopt such practices.

A report entitled, "Dentist the Menace," discusses the uncontrolled release of dental mercury and is available on the web at: http://www.noharm.org/library/docs/Dentist_the_Menace.pdf.



As part of the Water Resources Research Center's seminar series, Bruce Johnson of Tucson Water and Mark Stratton of Metro Water discussed their visit to Kazakhstan, undertaken through the Sister City program. The intent of their visit was to evaluate the city of Almaty's water security system, emergency preparedness plans and the condition of its water infrastructure. In terms of security, they found that Almaty relies more on physical security, with guards stationed at facilities, than the technical solutions applied in the United States. That the city lacks up-to-date technical resources is apparent from the above photo of a chlorination storage room in a surface water treatment facility.

SRP Signs Gila River Water-Rights Settlement

Salt River Project President Bill Schrader and Gila River Indian Community Governor Richard Narcia signed an agreement that helps pave the way for the settlement of a landmark case involving Arizona's water rights.

SRP is one of the principal parties in the historic Gila River Indian Community Water Rights Settlement Agreement along with the federal government, the Gila River Community, the State of Arizona, the Central Arizona Water Conservation District and numerous cities, towns and irrigation districts.

On Feb. 24, Sens. Jon Kyl and John McCain and Reps. J.D. Hayworth, Raul Grijalva, Trent Franks and Jim Kolbe introduced in Congress the Arizona Water Settlements Act, legislation that would settle the landmark case involving Arizona water rights as well as repayment obligations to the federal government by Arizona for construction of the Central Arizona Project.

If the legislation is approved by Congress and signed by President Bush, and the agreement is approved by the Maricopa County Superior Court overseeing the Gila River General Stream Adjudication, it will mark the end of a decades-long legal dispute among the 35 parties to the agreement.

Under the agreement, the Gila River Indian Community will receive a permanent entitlement to an average of 653,500 acre-feet of water per year. Of this amount approximately 190,000 acre-feet will be new water made available from several sources, including the CAP, SRP, the cities of Mesa and Chandler, and the Roosevelt Water Conservation District.

SRP's share of the contribution will average about 20,000 acre-feet per year, and the agreement provides, with limits, oppor-

tunities for the Gila River Indian Community to store any unused water in SRP's reservoir system. Additionally, SRP has agreed to permit the Gila River Community to use a portion of SRP's water-delivery system to facilitate water exchanges and direct deliveries of Gila River Community's CAP water to its reservation.

In return for these new water sources and funding to help put them to use, the Gila River Indian Community, its members and allottees, and the federal government, on their behalf, will execute a comprehensive waiver and release of claims for water rights, injuries to water rights and injuries to water quality.

Suit Says State Should Not Get NPDES

Arizona's recently acquired authority to administer a storm water runoff program previously under federal control is being challenged as two environmental groups sue the U.S. Environmental Program for turning enforcement power over to the state.

Defenders of Wildlife and the Center for Biological Diversity filed suit in federal court arguing that state administration of the National Pollutant Discharge Elimination System program would be to the disadvantage of endangered species.

Even as the state was developing its application to administer the program some environmentalists saw an ulterior motive in the request. They said federal control of the program ensures better protection of endangered species. In Pima County, the federal program resulted in construction delays in pygmy owl habitat. Some environmentalists fear this level of protection will not be provided by the state.

An Arizona Department of Environmental Quality official says that the state, in taking on a what was previously a federal responsibility, does not have responsibility nor authority to implement or enforce the federal Endangered Species Act. If, when EPA administered the program, U.S. Fish and Wildlife objected to a permit it might be withheld or mitigating activities required.

The official says that as the state administers the program, USFWS would still get draft permits as a matter of public notice as would other interested party. If the state does not deal with USFWS' comments to its satisfaction, the service can then go to EPA and ask the agency to object to the permit. USFWS therefore still has a role, but it is no longer serves as a direct nexus.

Arizona obtained permission to administer NPDES after most other states had already acquired authority to run the program. Arizona was the 44th state to assume implementation of NPDES.

NPDES, a storm water runoff program, ensures compliance with the federal Clean Water Act. ADEQ administers the program for the state.

U.S.-Mexico Agree to Fight Border Pollution

U.S. and Mexican environmental officials signed an agreement to make a concerted effort to resolve pollution problems and protect public health and the environment along the 2,000 mile shared border. Critics are skeptical about its chances for success.

The document, Border 2012, was signed by representatives of the U.S. Environmental Protection Agency and its Mexican counterpart, SEMARNAT, as well as by representatives of ten states, including Arizona, from both sides of the border and a number of Native American tribes.

Border 2012 replaces a similar pact that expired last year and covers an area extending 62.5 miles on either side of the border. The new plan is an effort to involve local authorities, including tribal officials, in identifying environmental problems that are most pressing,

Environmental problems are increasing along the border, with the 1992 North American Free Trade Agreement, or NAFTA, contributing to a population surge, particularly on the Mexican side. Further, increased economic opportunities have resulted in greater environmental degradation.

Neither country has made any financial commitment with the signing of the agreement, although officials say it will serve as a framework to help government agencies from both countries decide where to spend money.

Some environmental groups active in border issues expressed doubt that the unfunded agreement will get to the root causes of pollution.

AZ WaterCommunity NEWS

The U.S. Environmental Protection Agency recognized two Arizona water providers as Clean Water Partners for the 21st Century — the **City of Sierra Vista** and **Metro Water.** The award is part of the celebrations for the Year of Clean Water, with EPA recognizing actions taken by local governments to protect watersheds beyond the requirements of the Clean Water Act. EPA received about 200 application from around the country and selected 79 for awards.

Two University of Arizona hydrologists have received high national honors. **Soroosh Sorooshian,** regents professor in hydrology and water resources, has been elected to the National Academy of Engineering, for his work on developing flood forecasting models. Academy membership honors those who have made important contributions to engineering theory and practice. Regents Professor **Shlomo Neuman** has been named the 2003 Horton Medalist by the American Geophysical Union (AGU). The award recognizes outstanding contributions to the geophysical aspects of hydrology.

Governor Janet Napolitano recently nominated three new members for the Water Banking Authority Commission: **Maureen George, John Mawhinney** and **Chuck Cahoy.** As new director of the Arizona Department of Water Resources, Herb Guenther will be joining the commission.

The United States Agency for International Development is funding a four-year program for researchers from **The University of Arizona's Office of Arid Land Studies** to strengthen agricultural programs in Jordan. The country is suffering drought, and researchers will consider ways agriculture could use wastewater for irrigation.

Guest View

ADEQ Helps Small Water Systems Help Meet New Arsenic Standard

Steve Owens, Director of the Arizona Department of Environmental Quality, contributed this Guest View.

Earlier this year, the Arizona Department of Environmental Quality unveiled its plan to help Arizona communities comply with the new federal standard of lower levels of arsenic in drinking water. U.S. Environmental Protection Agency regulations require drinking water systems to meet the new standard by Jan. 2006.

ADEQ's plan to help our communities, called the Arsenic Master Plan, was developed for public water systems with fewer than 10,000 customers and guides water systems to the most cost-effective solutions tailored to their individual compliance needs.

The plan is a terrific first step toward helping communities comply with the new arsenic standard, but much more must be done to bring about the needed infrastructure improvements by the imposed deadline.

The new federal standard requires Arizona's 1,700 public water systems to lower the concentration of arsenic from 50 parts per billion to 10 ppb by Jan. 2006. This presents a significant challenge to water systems in Arizona, where arsenic occurs naturally in soil and groundwater at concentrations ranging from 10 ppb to 200 ppb.

The requirement is particularly challenging for the state's 287 small water systems and those in rural areas because they have fewer customers among whom to spread compliance costs and because they rely primarily on groundwater as their drinking water source.

ADEQ understood early on that the state's smaller, rural water systems were going to need help to comply with this new federal requirement. ADEQ's Arsenic Master Plan will save rural Arizona citizens about $6 million that would have been required to develop separate plans for their individual drinking water systems.

In the coming months, ADEQ will work closely with the Arizona Corporation Commission, the Greater Arizona Development Authority, the Border Environmental Cooperation Commission, USDA Rural Utilities Service, the Residential Utility Consumer Office and the Water Infrastructure Finance Authority to identify the needs and potential resources to meet the challenge.

In addition, ADEQ will conduct a customized county-by-county analysis of water systems to review the compliance challenges and options for treatment and financing. We also will provide training sessions for communities around the state.

Because of the complexity of the new regulations, ADEQ is working with larger water systems in our state to develop a "mentoring" program under which small water systems will be able to tap the expertise that the larger systems have.

Mentors can assist small water systems in complying with the new arsenic standard by helping them to understand the goals of the Arsenic Master Plan, identify options and available resources, and develop a plan with specific milestones to achieve compliance.

As part of this effort, ADEQ is currently scheduling training for staff and other technical assistance providers who will then conduct training sessions and provide one-on-one assistance to water systems throughout 2003 and beyond. We also are developing an application for small water systems who want to receive mentoring assistance.

As a result of the new arsenic standard, many water systems that previously had no treatment equipment will be installing and operating arsenic removal systems for the first time. Many of these systems will need to obtain financial assistance for the construction of arsenic treatment systems.

Financing options for water treatment facilities range from obtaining grants or loans to issuing bonds. The Water Infrastructure Finance Authority, Arizona Rural Development, the Border Environmental Cooperation Commission and the North American Development Bank are financial assistance organizations that specialize in financing water system infrastructure projects.

Each of these organizations has slightly different requirements:

The Water Infrastructure Finance Authority is a state agency authorized to finance the construction, rehabilitation and/or improvement of drinking water, wastewater, reclamation or other water quality facilities/projects. Generally, WIFA offers borrowers below- market interest on loans for 100 percent of the eligible project costs. Both public and privately held water systems, as well as tribal water systems, are eligible for financial assistance from WIFA.

Arizona Rural Development under the United States Department of Agriculture, rural utilities service, administers a water and wastewater loan and grant program for Arizona's rural areas. ARD also offers technical assistance, both directly and through contractors. Funds are available to public entities, such as municipalities, counties and special purpose districts, Indian tribes and not-for-profit corporations.

The Border Environmental Cooperation Commission and the North American Development Bank help preserve, protect and enhance the environment of the border region. BECC coordinates with NADBank, other national and international institutions and private sources that provide capital for environmental infrastructure projects in the border region. Water projects are a priority with BECC. A project must be located within 62 miles (100 km) of the international border to be eligible for BECC/NADBank funds.

The key to achieving compliance with the new federal arsenic standard by the 2006 deadline is cooperation and coordination between all the regulating agencies, associations and water systems. A lot of progress already is being made, but a lot of work will be required between now and the 2006 deadline to reach our goal. As the water systems in our state move toward compliance, ADEQ will update their status annually in the Arsenic Master Plan and advise other involved regulatory entities of the progress. All of this information, as well as ADEQ's Arsenic Master Plan, is available online at: www.adeq.ev.state.az.us.

Legislation and Law

Navajo...continued from page 1

Pollack says, "The premise of the case is that every decision the Secretary makes respecting the management of the river assumes the nonexistence of a Navajo right. Each time the Secretary takes an action with respect to the management of the Colorado River without evaluating the impact on the tribe's unquantified water rights, she is more or less institutionalizing the reliance on unquantified Navajo water by all of the other water users."

The Navajo Tribe seeks recognition for its Colorado River water rights. (Photo: Shannon Kelly)

The suit questions some water management decisions now guiding Colorado River water use. For example, the suit claims the Interim Surplus Guidelines adopted to determine conditions under which the Secretary would declare the availability of surplus water for use within the states of California, Arizona and Nevada did not take into account potential Navajo water rights or needs. Although currently suspended, the Interim Surplus Guidelines are critical to working out an agreement with California to limit its use of Colorado River water.

The suit also claims that the unquantified rights of the Navajo Nation were not considered when the Secretary created an interstate water banking program to enable Arizona and Nevada to bank their Colorado River entitlements.

Further the suit claims that the Navajo were left out when the Secretary contracted Central Arizona Project water to Arizona Tribes. Thus far, the Secretary has contracted with 11 tribes for a water delivery obligation of 388,906 acre-feet, an amount charged against Arizona's total Colorado River entitlement of 2.8 million acre-feet. The complaint states, "Quantification of the Navajo Nation's rights to the waters of the Lower Basin of the Colorado River could result in a determination that the Navajo Nation's rights are superior to those subject to the contracts with the Secretary, and thereby threatens the ability of the Secretary to deliver Central Arizona Project water to the tribal and non-Indian contractors."

An injunction against the Secretary allocating CAP water could threaten the Gila River Indian Community Settlement and the Arizona Water Settlement Agreement. The latter establishes federal and non federal costs and water allocations of the CAP system.

Pollack says resolving tribal claims on the main stem of the Colorado River will help settle Navajo rights on the Little Colorado River. He explains: "The state has said it wouldn't support a Little Colorado River settlement without resolving the big Colorado River issues. Resolving those issues would remove that impediment." The Navajo Nation is a party in the Little Colorado River adjudication along with the Hopis, San Juan Paiutes and Zunis. Negotiations have been stalled since the summer of 1999 as a result of a lawsuit filed by the Navajo Nation against Peabody Western Coal Company, the Salt River Project and Southern California Edison. That lawsuit concerns issues arising out of the 1987 amendments to the Peabody leases.

In response to the suit, Arizona Department of Water Resources Director Herb Guenther says, "I feel it is too bad we resort to these types of litigation. But I understand the Navajo point of view as well. They feel they are running out of time to exercise their claims to the main stem water rights of the Colorado River. The question is how active are they going to pursue this litigation. Or is it mostly intended to attract attention to the issue?

"We are waiting to see where this is going. The first thing is how the Secretary responds to the suit, whether the federal government will vigorously oppose it and litigate or whether they will decide to sit down and talk about the issues. With the two parties at the table a vigorous effort can be made to resolve or adjudicate Navajo water rights to the Little Colorado and the main stem of the Colorado River."

Guenther is concerned about the possible effect on Arizona's water policies. He says, "The suit mentions several state activities which are very crucial to our overall water management goals. ... If the suit is actively pursued we will have to consider what alternatives we have to protect Arizona's interest."

In its suit against Interior, the tribe is counting on the court not relying on the practicable irrigable acreage (PIA) standard to quantify its water rights. The PIA standard is based on a reservation's irrigation potential, and claims to the main stem of the Colorado River based on irrigation are problematic. Although the Colorado River forms the western boundary of the Navajo Reservation, access to the river in the Grand Canyon, several thousand feet below the arable lands of the Navajo Reservation, would be difficult, particularly for irrigation purposes.

In this regard, the tribe may benefit from an Arizona Supreme Courts decision that Indian water rights quantification can be based on other criteria than the PIA standard. The court stated that water rights allocations must respond to each reservation's specific needs.

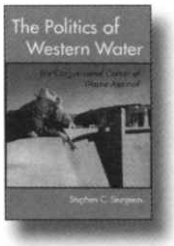
Pollack says, "I don't think they (Navajo claims) have been taken seriously in the past because people have not focused on water rights based on anything other than PIA. The Arizona Supreme Courts decision recognizes we need water for a permanent home land. If the Navajos are going to exist along the banks of the Colorado River, they are going to need future drinking water supplies from the river."

Publications & On-Line Resources

UA Press Features Books About Water Affairs

In its continuing commitment to publish books about western water, the University of Arizona Press recently published three books for readers interested in state and regional water issues. Each book has a different focus that together offer a varied perspective on aspects of state, western and U.S.-Mexican water affairs.

The Politics of Western Water: The Congressional Career of Wayne Aspinall, by Stephen C. Sturgeon has more of a regional focus than the other books. As a congressman from Colorado from 1949 to 1973, Aspinall was a mighty defender of his district's share of Colorado River water, vigorously advocating natural resource development and reclamation projects.



He gained a national reputation by supporting passage of key water legislation, in the process taking on colleagues and environmentalists alike. His role in influencing western water policy expanded when he became chair of the House Interior Committee in 1959, a position he held for more than a dozen years.

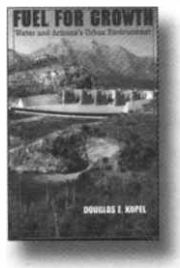
By concentrating on Aspinall, the mover and shaker behind the policies, Sturgeon is to able bring out the mix of political, financial and personal variables that determine the course of water resource legislation. Sturgeon effectively describes Aspinall's importance to reclamation in the West and clarifies his role in influencing western water policy.

Evan R. Ward's, **Border Oasis: Water and the Political Ecology of the Colorado River Delta, 1940 - 1975**, examines the environmental history of the Colorado River delta. The border oasis is an agricultural oasis, with Arizona, California, Sonora and Baja California developing farmland in desert areas at the expense of Colorado River flow. The book describes these environmental changes as wrought not just by irrigation but also by political and diplomatic influences. The result: ecosystem collapse and political power plays.

Ward describes the mistrust between political and economic participants that fuels the controversy, with conflict between national and local officials on both sides of the border further aggravating the situation. Ward says the conflict over preserving the delta is multifaceted, with various factions at work hindering sound binational management of the delta. Ward encourages a broader understanding of the environmental significance of the delta, beyond the view of any single interest.

Douglas E. Kupel's, **Fuel for Growth: Water and Arizona's Urban Environment**, is a contribution to the history of water in Arizona, a generally neglected field of study, at least compared to other states. Kupel uses the Arizona experience to formulate a new theory of western water history.

Kupel goes against the grain of most environmental histories when he states that the West's aridity was not a significant factor in the development of municipal water infrastructures of urban centers. In fact, he says that the West today is a version of conditions found elsewhere in the nation, its urban centers distinct and apart from the arid environment. Upon arriving in the West, urban settlers worked to create an environment similar to their areas of origin. Kupel writes, "Western growth focused on finding diverse solutions to water scarcity to achieve the realization of an urban vision."



In describing how Arizona fits this thesis, Kupel provides a history of water development in Tucson, Flagstaff and Phoenix from territorial days to statehood into the present. This is a strength of the book. Historians charting historically significant developments often overlook local events and occurrences. Yet, as Kupel demonstrates, such developments have an interest and significance that should not be overlooked.

The book shows that some of the water themes emerging today were evident in the early days. Privatization was a concern even before statehood, with municipal officials devising strategies to take over private water companies to ensure better service. Not merely a contemporary concern, water conservation was a theme evident at various times when water demand threatened supplies. The agriculture-urban conflict over water use has early roots. As early as the 1920s Tucson officials were figuring ways to move water from agriculture to urban use considering it a more valuable use of water.

Even security was an issue. Thirsty travelers or "water rustlers" shot holes in wooden pipelines carrying water supplies to Tucson and Phoenix to slacken their thirst. Following Pearl Harbor, Tucson mayor Henry Jaasted, fearing sabotage of the city water supply, ordered chain linked fences topped with barbed wire installed around the city's reservoirs.

This is interesting stuff. More than just a window into the past, this information provides a perspective of current water affairs. But, aside from whatever purposes it may serve, this information is of value unto itself, especially to those with a professional or personal interest in water. The book is a contribution to our water education, its coverage a perk to our curiosity and interest in the fascinating topic of water.

Compared to the previous two books mentioned, Kupel's book covers ground that is closer to home and describes occurrences of seemingly less significance. A book about water resource development in Flagstaff, Phoenix and Tucson might have less general appeal than a political biography of a founding father of western water policy or a study of an international controversy over the use of Colorado River water. But Kupel's book is important as a valuable and needed contribution to the historical narrative of water in Arizona. More needs to be done in this area.

For information about the above titles check the UA Press web site: http://www.uapress.arizona.edu

Special Projects

ADWR Focuses on Statewide Drought Plan

Governor Janet Napolitano recently issued an executive order establishing a drought task force to develop a management plan for drought stressed Arizona. In its adoption of both short- and long-term strategies, the management plan will address immediate concerns as well as emerging, down-the-line drought issues. The Arizona Department of Water Resources will lead the effort.

ADWR Director Herb Guenther summarizes the approach that will be taken: "We are going to look at the urgent aspects first and hopefully mitigate those as we are developing the longer term plan."

In the short term, the state plan will determine if any providers are likely to have difficulties in meeting potable water demands because of the ongoing drought. Plans will then be made to mitigate those shortages through short-term measures such as drilling community wells, hauling water, etc.

Also, areas in the state will be identified where water shortages pose a threat to crops and livestock. Further, ADWR will be working with Arizona Game and Fish to identify areas where extreme drought threatens wildlife and/or wildlife habitat. Mitigation measures for these situations will be worked out.

In turning to more long-term considerations, the plan will be looking ahead, to ensure that drought planning continues when the present drought ends. Acknowledging that drought planning often loses its urgency when precipitation resumes, Guenther says, "We need long-term planning. No matter how hard it rains, even if we have to swim to the meetings, we are going to do a drought plan."

In an effort to cope with the long-term, a plan will be developed with various thresholds to trigger or activate different aspects of drought mitigation. Officials would then know when conditions warrant the declaration of a state of emergency and/or when to request that a federal disaster be declared.

Another of the plan's long-term strategies is to promote water conservation. In taking on water conservation, the state plan is covering ground that utilities and other entities in the state have already worked. In Arizona, conservation is a tried-and-true water management tool. The state program, however, intends to avoid duplicating efforts and eschews an authoritarian role.

Guenther says, "It will not be your typical conservation plan. We are not looking to force statewide compliance. Each community will have to determine for itself, at least at this point of time, what is most appropriate in its area. The state will guide and educate, not police."

For example, with regards to what kind of enforcement should be applied to ensure that drought and conservation guidelines are followed, Guenther says, "That is up to the local subdivision, the one responsible for providing the resources to those living in its community or county. I think they have to judge just how aggressive they want to be on their own constituents."

Some officials caution that an important distinction not be blurred when water conservation becomes part of a drought management plan. They fear that water users, once drought ends, may abandon water conservation activities if such activities are perceived as merely a response to drought conditions.

Tom Babbock, conservation coordinator for the City of Phoenix, explains: "Conservation is a lifestyle. Drought response is a short-term change in lifestyle to accommodate drought. When drought ends then we need to go back to the normal conserving lifestyle and not begin wasting water like crazy because we now have it again. We don't want to destroy the conservation ethic when drought is over."

Although this is the first effort to implement a statewide drought management plan, officials are not starting from scratch. Various plans already have been implemented throughout the state at the local level. Guenther says one of the first orders of business was to send a survey to state water providers to determine which had plans in place. The questionnaire is to ascertain the current state of drought planning in the state.

He says, "We are not going to undo or redo work that has already been done; what we are going to try to do is build bridges between those who have plans and those who do not have plans."

The drought plan will need to give special consideration to rural areas. Often lacking a redundant water supply, rural areas of the state are likely the most adversely affected by drought. In fact, some urban officials express support for statewide drought planning mainly because it will help rural areas cope with drought conditions without drawing on water supplies needed by urban utilities.

The executive order designates forming work groups to help address specific problem areas including municipal and industrial water supply, agriculture, wildlife and wildlife habitat, conservation education and fire suppression.

The membership of the drought task force will be broad to include various interests. An array of state agencies will be involved including the Arizona Corporation Commission, Arizona Department of Real Estate, Arizona Division of Emergency Management, Arizona Department of Homeland Security along with members of the Arizona House and Senate.

Also included will be representatives from counties, cities, towns and Indian tribes. Federal officials will be invited to act as advisors to the drought task force. It will be a broad based effort, with wide and varied representation and will include individuals, interests and organizations with drought related concerns. Guenther says, "We will be working to include everyone who wants to be included." All meetings will be open to the public and the public will be encouraged to attend.

Compared to other states, Arizona has been late in drought planning. Not long ago the state was considered generally safe from the adverse affects of drought, with only agricultural expected to be impacted. The rest of the state did not worry since it relied mostly on groundwater. A 1986 document prepared by the Western States Water Council stated, "Drought is not a major problem in Arizona due to the state's primary dependence on groundwater reserves."

Announcements

Biennial Symposium on Groundwater Recharge

The 11th Biennial Symposium on Groundwater Recharge will be conducted June 5 -7 in Tempe. The event is sponsored by the Arizona Hydrological Society, Salt River Project, U.S. Water Conservation Laboratory and Arizona Department of Water Resources, and conference topics include: conjunctive use of surface and groundwater, integrated water management, natural recharge of groundwater, public involvement, recharge methods, innovations in recharge technologies, water reuse, research and development, recharge feasibility assessments, soil-aquifer treatment, reuse systems, health impacts and potable use, and pharmaceutically-active chemicals. Also a full-day field trip will be conducted Saturday, June 7 to existing and planned recharge projects in the Phoenix area. For information about the symposium and on-line registration check the AHS web site: http://www.azhydrosoc.org

Law Conference on Water, Climate and Uncertainty

The 24th summer conference of the Natural Resources Law Center, University of Colorado School of Law, will be conducted June 11 at the Fleming Law Building on the UC campus. Titled "Water, Climate, and Uncertainty: Implications for Western Water Law, Policy, and Management," the 3-day conference is aimed primarily at political, legal, academic and resource management professionals seeking to learn from each other and from leading scientists. The conference will discuss how advances in climates science and forecasting will affect what the future may hold for us and how our laws, institutions, and societies might have to adapt. Persons wanting to present posters must submit an abstract by May 16. Contact NRLC for additional information: phone: 303-492-1272; email nrlc@spot.colorado.edu; web site: www.colorado.edu/Law/NRLC/

EPA Funding Microbial Risk Studies

The U.S. Environmental Protection Agency is seeking applications proposing innovative approaches for estimating microbial risk. Research is being solicited in two distinct areas of research: (1) Development of indices or classification schemes, or actual risk characterizations based on data collection and analysis, that indicate relative degrees of potential risk from pathogens in source water, pathogen passage through treatment barriers, or vulnerability of a distribution system to pathogen intrusion or growth; and (2) Epidemiology studies of groundwater or surface water-based systems that generate data to indicate attributable risk from pathogens in distribution systems. Deadline for applications is July 10. Contact person is Cynthia Nolt-Helms; phone: 202-564-6763; email: nolt-helms.cynthia@epa.gov or check the web site http://es.epa.gov/ncer/rfa/current/2003_microbial.html

Funds for Drinking Water Research

The American Water Works Association Research Foundation — a nonprofit organization dedicated to advancing the science of drinking water — has nearly $12 million to fund up to 30 projects dealing with a wide range of topics related to the drinking water community. This year's project agenda focuses on four strategic areas: efficient and customer responsive organization; environmental leadership; high quality water; and infrastructure reliability. Proposals must be postmarked by either May 5 or July 15, as specified in each RFP. Check the AWWARF web site (http://www.awwarf.com/ and click What's New) for a list of the projects for which proposals are being requested and due dates.

EPA seeks nominees for Clean Water Act awards

The US Environmental Protection Agency is seeking nominees for its Clean Water Act Recognition Awards. The awards recognize municipalities and industries for outstanding and innovative technological achievements in the areas of waste treatment and pollution abatement. The program includes awards in five categories including outstanding operations and maintenance at wastewater treatment facilities, biosolids management, pretreatment, storm water management and combined sewer overflow controls. Interested parties should contact their state water pollution control agency or EPA Regional Water Management Division. Nominations are due to the Office of Wastewater Management by May 30. For further information, call Maria Campbell at 202-564-0628.

AWWA's Conference in June

The American Water Works Association will hold its 122nd annual conference and exposition 15 -19 June in Anaheim. The five-day conference will feature more than 70 technical sessions and 13 preconference workshops focusing on such issues as infrastructure management, capital financing, benchmarking, security, and legislative and regulatory challenges. New this year is a special track for upper level managers and public officials. Over 500 exhibitors will demonstrate the latest innovations and technology in the drinking water profession. For more conference information, visit the AWWA web site (http://www.awwa.org/) or call 1-800-926-7337.

Public Policy Review

by Sharon Megdal

Water Bills Included on Arizona's Legislative Agenda

Budgetary worries don't exclude water deliberations

Although attention at the Capitol has focused on budget matters, some bills important to water management are making their way through the legislative process. Their final approval will be evidence that good things can be accomplished even during very tough budgetary times. (Note: At the time of writing, approval of most of these bills was still pending. Bills can be tracked on-line at The Legislature's web site, http://www.azleg.state.az.us/).

HB 2088 establishes a Well Administration and Enforcement Fund at the Arizona Department of Water Resources. Fees for filing a notice of intent to drill a well or obtaining a permit, where required, to drill a well would increase in all areas of the state, although the House and Senate had yet to concur on the amount of the increase. The Senate version increases the fee to $150 in Active Management Areas and Irrigation Non-Expansion Areas and increases it to $100 elsewhere.

This legislation is important to provide increased revenues to ADWR, enabling the agency to carry out its mandated responsibilities more effectively. The revenues would go into a special account at ADWR to fund "compliance monitoring, investigation and enforcement activities of the department pertaining to the construction, replacement, deepening and abandonment of wells and capping of open wells." Because of budget cuts, ADWR has had to cut back significantly on its well safety monitoring program. Unlike the revenues for most fees, which are deposited to the general fund, these funds would be appropriated to ADWR. Because this bill involves a fee increase, a two-thirds majority of each house must approve it.

Another important bill would require the Central Arizona Replenishment District to establish a replenishment reserve. Membership in the CAGRD enables those requesting a certificate or designation of assured water supply from ADWR to establish sufficient utilization of renewable water supplies. The CAGRD operates in the Phoenix, Pinal and Tucson AMAs. Because the CAGRD does not have long-term, secure water supplies, storing water in years when excess CAP water is available for meeting future replenishment obligations is prudent. Water available to the CAGRD is expected to become more expensive over time. In fact, it could be argued that, absent long-term contracts for CAP water, the CAGRD will incur water costs significantly above that paid by CAP subcontractors. Draw down of the replenishment reserve will help avoid rate shock for CAGRD members. The bill also extends the CAGRD's planning horizon from 20 to 100 years. Every 10 years, the CAGRD must prepare a plan, subject to approval by the ADWR director. Approval of the plan is very important; it enables CAGRD members to show their continued compliance with the assured water supply rules.

It will be interesting to see how this planning requirement is implemented. It is one thing for the CAGRD to estimate its replenishment obligation for 100 years; it is quite another for the CAGRD to indicate how it expects to meet that replenishment obligation over that time. In addition, the bill allows a member service area (water provider) to de-enroll from the CAGRD if it can establish it is able to meet the assured water supply requirements on its own.

HB 2478 mandates that ADWR provide a water resources status report every two years. This report is to present important information including: (a) the current status of the state's water supply and any likely changes in it; (b) issues of regional and local drought effects, short-term and long-term drought management efforts and the adequacy of drought preparation throughout the state; (c) the status of current water conservation programs; (d) the current state of each AMA and their levels of progress toward management goals; (e) issues affecting management of the Colorado River and the reliability of Arizona's 2.8 million acre-foot allocation of river water, including the status of issues related to the Colorado River basin states and Mexico; (f) the status of any pending or likely litigation regarding surface water adjudications or other water related litigation and the potential impacts on water supplies; (g) the status of Indian water rights settlements; and (h) other matters related to the reliability of water supplies, and the adequacy of the department's and other entities' resources to meet the state's water management needs. The bill has been amended to include session law language authorizing emergency transfer of groundwater between basins during drought, under a limited set of circumstances.

A testament to compromise is HB 2480, the only bill of those listed that is ready to be transmitted to Governor Napolitano for signature. The bill allows the formation of multijurisdictional water facilities districts. Many conditions must be satisfied prior to forming a district, especially in cases involving a private water company. While issuance of revenue bonds is authorized for a district formed pursuant to this bill, issuance of general obligation bonds is not. The latter source of financing was quite controversial during the Governor's Water Management Commission deliberations. This authority has been considered important by water providers who need to join together to finance water infrastructure projects.

The bills discussed are consistent with recommendations that were included in the Final Report of the GWMC. Their implementation was considered important for furthering good water management in the AMAs. In addition, there are several bills addressing water quality matters, and a bill authorizing Yuma basin groundwater transfer (SB 1248) may make its way through the process.

All in all, at this point in time, it's not been such a bad year for water legislation!

UN Report Ranks Nations' Water Quantity/Quality

The recently released United Nations' *World Water Development Report: Water for People, Water for Life,* provides a comprehensive, up-to-the-date overview of the state of water resources in the world today. The report was issued as a resource for the Third World Water Forum, conducted in Kyoto, Japan, March 16 - 23. The event was part of the 2003 International Year of Freshwater.

Included as part of the report's analysis is a ranking of over 180 countries and territories of the amount of renewable water available per capita in each area. This includes all of the water circulating on the surface, in the soil or deeper underground.

Also ranked is the quality of the 180 countries' water. A range of factors figure into this ranking including the quantity and quality of freshwater, especially groundwater, wastewater treatment facilities as well as legal issues such as the application of pollution regulations.

Above are tables indicating the top five and bottom five countries in the water quality and quantity categories. The water quality ranking of the United States also is shown. (Belgium's unexpected bottom ranking is because of its low-quality groundwater, heavy industrial pollution and poor treatment of wastewater).

For complete rankings of all 180 countries and territories check the web site: http://www.wateryear2003.org

Water quality indicator values

Rank	Country	Indicator Value
1	Finland	1.85
2	Canada	1.45
3	New Zealand	1.53
4	United Kingdom	1.42
5	Japan	1.32
...	...	...
12	United States	1.04
...	...	...
118	Sudan	-1.06
119	Jordan	-1.26
120	India	-1.31
121	Morocco	-1.36
122	Belgium	-2.25

Water availability (person/year)

Rank	Country	Water Resources*
1	Greenland	10,767,857
2	United States	1,563,168
3	French Guiana	812,121
4	Iceland	609,319
5	Guyana	316,689
...	...	...
176	Qatar	94
177	Bahamas	66
178	United Arab Emirates	58
179	Gaza Strip	52
180	Kuwait	10

**Total renewable per capita (m^3/capita year)*

Arizona Water Resource

Water Resources Research Center
College of Agriculture and Life Sciences
The University of Arizona,
350 N. Campbell Ave
Tucson, AZ 85721

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