

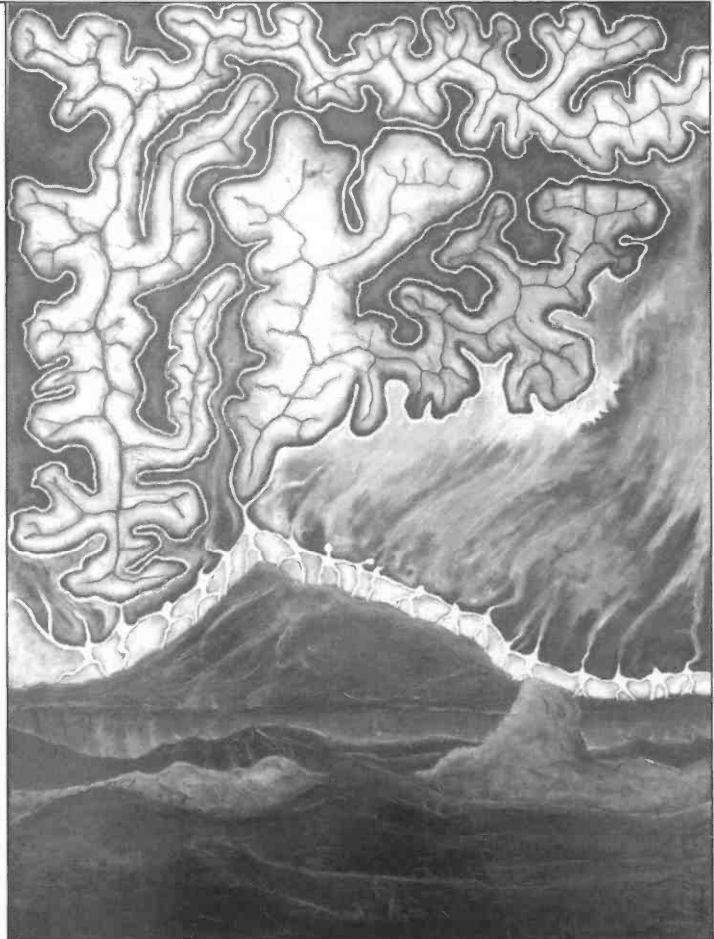
Monsoon 2005

by Andi Berlin

This year's monsoon season may have been a late bloomer but was typical in most other respects. According to the National Weather Service Office in Tucson, the July 18 starting date was one of the latest on record, second only to a July 25 date in 1987. This year's tardy monsoon was due to a ridge of high pressure centered over northwestern Mexico that prevented moisture moving into Arizona and New Mexico. Although the monsoon started late, it gained lost ground with a heavy August rainfall.

Later monsoons historically tend to have relatively dry patterns at the end of July, but are heavy in August and then taper off by September. This year was no exception. Most cities in Arizona saw more rainfall in August than in June, July and September combined. During each month, rainfall was distributed unevenly: 0.10 inches in southwestern Arizona to more than ten inches in portions of east-central Arizona and northeastern and south-central New Mexico. But in total, most regions saw between one to six inches of rain. In most areas this represented a below average rainfall.

While some locations received below average rainfall, other areas got more precipitation than usual. Sierra Vista usually receives an average of 8.53 inches each monsoon season; this year it received almost ten. The reverse also occurred: the Douglas



The above oil painting, *Rain Dance at Topowa #2*, was done by E. Michael Conteras. It was shown as part of *Lluvia: A Monsoon Exhibition* at the Raices Taller 222 Art Gallery and Workshop in Tucson. Artists in the exhibit displayed their interpretations of the longingly awaited rainy season. Art brought results: the show and Tucson's summer rains

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Rural Water Info is Key to New Laws

New info will boost statewide water planning

by Joe Gelt

Many observers held high hopes for far-reaching legislative action on rural water issues during the recent session. Although such hopes went unfulfilled, the Arizona Legislature did pass two laws relating to rural water affairs. House Bill 2277, the Community Water System Planning Act, requires statewide water planning, and Senate Bill 1336 established the Rural Arizona Water Study Committee.

HB 2277 requires for the first time that all water systems in the state work out designated planning strategies including a water supply plan, conservation plan and drought plan. The law distinguishes between large and small providers, with large providers required to submit their plans to the Arizona Department of Water Re-

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sources by 2007 and small providers having until 2008 to turn in their plans.

The new planning requirements will not likely be burdensome to larger providers, especially those within Active Management Areas, since many of them already collect and report various kinds of data and information. In fact, the new law exempts providers within AMAs from having to meet its water supply planning requirement.

The bill is breaking new ground, however, by requiring smaller water providers, many located within rural areas, to gather and submit hitherto unreported information.

Drought and the threat of inadequate water supplies prompted passage of HB 2277. Believing that better state water planning is essential to effectively confront drought, the Governor's Drought Task Force urged legislation requiring water systems throughout the state to develop water plans.

Information from Arizona's rural water utilities, however, will serve a wider purpose than just its use in drought planning. Some rural areas are relatively uncharted territories, with not much water supply information available. In responding to the new law's requirements, some of the rural utilities will be filling an informational gap that has hindered statewide water planning and management.

Rodney Held, manager of the ADWR's Drought, Conservation and Riparian Protection Planning Section, is implementing the new law. Held says, "The goal is to gather information that's missing and make it available to improve statewide water management. Not only for the state but for local governments and local communities.

"The goal is for the department to have information available on the web. People will be able to log in and look at what's going on within different community water systems: look at their planning, look at their usage, look at their supplies and all that. It's going to be a good planning tool from that standpoint."

(See sidebar below for information about the ADWR water monitoring web site.)

Grant Helps ADWR Implement New Law

Arizona is one of six western states awarded a U.S. Department of Interior "Water 2025" grant. The grants are offered to help recipients identify innovative ways for planning and using scarce water supplies. Arizona's \$190,000 award will be used to implement provisions of the state's Community Water System Planning Law. Passed last session, the law requires water providers in nonAMA areas of the state to develop water-supply, drought-preparedness and water conservation plans. (See main story.) Most of these are rural areas.

ADWR will serve as a clearinghouse for the local plans and make the information available to community planners as well as cities, towns and counties.

ADWR will use the funds to develop a web-based analytical tool for enhancing water resource monitoring throughout the state as a way to better promote regional cooperation and reduce water conflicts in rapidly growing areas of Arizona.

The other western states to receive "Water 2025" grants are Idaho, Texas, Montana and New Mexico.

Karen Smith, ADWR deputy director, sees rural communities as especially benefitting from the planning effort. She says, "I anticipate some substantial work coming out of the effort: a template for strategic planning that would give rural watershed groups a roadmap to plan their water future."

ADWR is now in the process of developing a guidance document to assist providers in working out their water plans. Held says he expects soon to have the document on the web for input. The document will be finalized after the input is reviewed.

Smith says, "I think there is going to be a substantial educational effort involved for all of us because these are typically smaller water systems. They probably haven't done a water supply plan before, much less a conservation and a drought plan. So, I think there will be a substantial educational investment for everyone, as well as the need for some substantial amount of assistance from the department."

ADWR will be hiring extra staff to help implement the law. Held says the first position to be filled will be drought supervisor; two other staff members will be hired later depending on funding. At this point, however, Held is concerned that ADWR staff limitations hindered efforts at gathering input about the guidance document.

ADWR will be providing technical assistance to water providers as they work on their required planning documents. Presentations will be conducted throughout the state; also special forms are being developed. Held says, "Small water providers will be able to fill out the forms and that will constitute their plan."

By requiring rural water providers to submit information to ADWR the law touches upon what at times has been a sensitive issue. Such mandates have been perceived as a threat to local control.

Doug Nelson, executive vice president of the Arizona Rural Water Association, describes the wary attitude many rural folks share regarding state mandates: "There's those two ghosts out there that always plague state water managers: one is if more information is being requested somebody else is going to regulate besides yourself; the second is if they know how much then they can tax it."

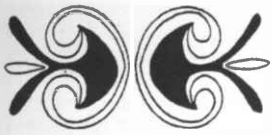
Nelson, however, feels other considerations will prevail and overrule these concerns. He says, "I think that (attitude) has de-

WRRC Funds Research, Invites Proposals

One of the projects the Water Resources Research

Center selected last year for funding under the Water Resources Research Act, Section 104B studied fish. The study estimated the upper thermal tolerance of 11 native and seven non-native fish species found throughout Arizona. Above is a common carp, a nonnative fish. WRRC is announcing a new round of 104B funding. See Announcements, page 10 for information.





Water Vapors

T'is Water Festival Season For Fun and Learning

Fall is festival season, and nearly 4,800 fourth graders got into the seasonal mood by attending Arizona Make a Splash With Project Wet Water Festivals in various areas of the state. From its humble beginnings as a special event for 300 students in Tucson in 2000, the Arizona water festival has grown this year to six full-fledged community-wide events and several school-based ones, with over 175 teachers and 400 volunteers conducting the festivals.

National Project WET originated water festivals to celebrate National Water



Above is a lesson about the water cycle. Students pretend to be water molecules and stand by stations representing parts of the water cycle: cloud, glacier, soil, plant, animal, groundwater, river, lake, or ocean. They roll dice that direct them to other stations and gather beads at each station to make water bracelets. Shown above is a lake water molecule. Photo: Lynne Fisher

Education Day. Arizona Project WET, a component of the University of Arizona's Water Resources Research Center, carries on the tradition by organizing the events in this state. Wherever they are celebrated the

Water, Growth is Topic of WRRC Spring Conference

The 2006 Water Resources Research Center's Annual Statewide Water Conference has been scheduled for June 20 and 21. The conference topic will be "Providing Water to Arizona's Growing Population: How Will We Meet the Obligation?" This is the latest in a series of annual WRRC water conferences.

A full-day program featuring a mix of keynote speakers, panel discussions and commentary will be followed by a half-day of more in-depth discussion and analysis.

The conference will be held at the

Hyatt Regency, Phoenix at Civic Plaza. Registration options will include only the first day or both days.

Additional information will be provided on the WRRC web site, <http://cals.arizona.edu/AZWATER/> and via email. Contact us at wrrc@cals.arizona.edu to have your name added to the conference email list or if you have questions about the conference.

Please mark this important event on your calendars, post it in your newsletters and/or websites, and pass the information along to others.

water festivals share an educational goal of encouraging students to understand basic water concepts such as watersheds, water supplies, groundwater, the water cycle and the impact water has on human history.

The festivals create a ripple effect. The experience of students and teachers involved in off-campus, interactive, hands-on activities encourages continued water studies in the classroom throughout the year.

Water festivals were celebrated in Phoenix, Safford and Tucson on National Water Education Day, Sept. 23. (Gov. Napolitano proclaimed Sept. 23 Arizona Water Education Day as well.) Flagstaff's water festival occurred on Sept. 27; Sierra Vista's festivities on Oct. 21. Single-school festivals in Phoenix continue through Thanksgiving. Yuma conducted its first festival in May, with a second scheduled Nov. 3.

Persons wanting additional information about the festivals or who want to volunteer should contact Sandra Rode: 520-792-9591 x24 or srode@cals.arizona.edu.

UA Sponsors Water Forum

Water projects sponsored by University of Arizona's Technology and Research Initiative Fund will be featured at the UA Student Union, Tucson Room, Nov. 9, 3:00-4:30 p.m. Updates will be provided on the Arizona Water Institute, Water Sustainability Program grants RFP and the new Arizona Water web site. Posters and displays featuring water-related projects, programs and departments from across campus will be in the South Ballroom, 2:00-6:00 p.m. For more info and to RSVP for this event, email: jmoxley@cals.arizona.edu.



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News Briefs

Report: Thinning Snowpack Threatens Water Supplies

Rising temperatures in the higher elevations of the West will have severe consequences to the region's water supplies. According to a recently released study such warming is now underway; its most far-reaching consequence will be less snowpack and earlier snowmelt and runoff.

off scored a record low in 2002.

The Colorado River basin's most recent five-year period was the hottest in the past 110 years. The temperature in the upper Colorado River basin during 2000-2004 was 2.1°F hotter than the historic average.

Colorado River basin warming has not been random throughout the year. A review of increased temperatures between 1995 through 2004 shows greater warming in January, February, and March, at a time when warming has the greatest potential to

cities; early warming can result in reservoirs lacking sufficient storage, with the result that runoff will need to be released. Further, an early peak water flow will disrupt the summer peak flow that occurs at a time when cities, farmers and ranchers most need water supplies. Since snowpacks contribute to the region's groundwater supplies less snowpack means less recharge.

In effect, warming will prevent mountain snowpacks from functioning as efficient western reservoirs as they have in the past; this has serious consequences to the region. The region obtains about 70 percent of its water supplies from mountain snow runoff; about two-thirds of the water used in Arizona's largest cities is runoff.

The report, "Less Snow, Less Water," was written by the Rocky Mountain Climate Organization. It is available at: <http://www.arizonapirg.org/AZ.asp?id2=19441>

Bottled Water Diversion Contested

Legal action and a product boycott are being considered to stop a water bottling company from diverting water from Seven Springs in the Cave Creek watershed. The 38 million-gallon annual diversion allowed since March 2004 is posing a threat to the Spur Cross Ranch Conservation Area.

Concerned with the environmental consequences of the diversion, Maricopa County Parks and Recreation, Sierra Club and Cave Creek are questioning whether the Sedona Springs Bottling Company's diversion of the water is legal. The Tonto National Forests maintains that it is legal.

Water that would normally be carried from Seven Springs through the Cave Creek Watershed and down into Spur Cross is

EXHIBIT A 2005 RESIDENTIAL RATE SURVEY STATISTICAL SUMMARY

WIFA

ARIZONA DRINKING WATER SYSTEMS

Monthly Charges - Varying Levels of Usage

	Average Monthly Charge	Median Monthly Charge	Highest Monthly Charge	Lowest Monthly Charge
Arizona Survey Total - 2005				
5,000 Gallons	\$24.46	\$22.60	\$77.40	\$5.00
7,500 Gallons	\$30.36	\$27.75	\$102.90	\$5.22
10,000 Gallons	\$36.60	\$32.48	\$129.15	\$6.40

The above is one of the tables included in the 2005 Water and Wastewater Residential Rate Survey for the State of Arizona conducted by the Water Infrastructure Authority of Arizona. WIFA's survey provides data on the unit rates and total monthly charges assessed by utilities throughout Arizona for water consumed and/or wastewater generated. The survey is available at www.arwifa.gov

WIFA's mission is to maintain and improve water quality in Arizona by providing financial assistance and technical assistance for basic water infrastructure.

The report used data from the National Oceanic and Atmospheric Association to study four major western river basins, including the Colorado River basin.

Records reaching back to 1961 show snowpack levels have been below average for 11 of the past 16 years in the Colorado River basin. The records indicate that run-

reduce the amount of precipitation that falls as snow.

The consequences of more winter precipitation falling as rain rather than snow will be smaller snowpacks. The snowpack that does accumulate will then melt off sooner due to early warming. Less snow means a reduced water supply to farms and

Monsoon 2005...continued from page 1

Airport went from an average of 8.19 inches to 7.4 inches this season.

What is said about some other events — it ain't over 'til it's over — might also be said about the monsoon. It is not uncommon for precipitation in one area to switch from below average to above average in a brief period of time. In late August, the Tucson International Airport reported a storm dropping 2.29

inches of rain. This changed its monsoon ranking from the twenty-ninth driest to the twenty-ninth wettest on record. This tenth wettest day on record pushed the Tucson monsoon rainfall total to .64 inches above average.

For the most part, September saw a relatively low average of monsoon rainfall. The Mt. Lemmon area as well as Cascabel and Portal in Cochise County lucked out with over two inches of rain; most other areas stayed well below that number.

Court Strips Arizona Department of Environmental Quality of NPDES Primacy

A recent federal court decision vacated the Environmental Protection Agency's approval of the Arizona Pollutant Discharge Elimination System. AZPDES was authorized by the Arizona Legislature in 2001 as part of a strategy for the Arizona Department of Environmental Quality to gain authority to issue permits and manage compliance with the National Pollution Discharge Elimination System, the storm water runoff program that evaluates compliance with the federal Clean Water Act rules.

The court's divided ruling strips ADEQ of the authority that EPA granted it.

Before Arizona obtained EPA approval for its program, EPA administered, in cooperation with ADEQ, NPDES in the state, with permits jointly drafted by EPA and ADEQ. The federal agency, however, actually issued the permits.

EPA's approval in 2002 of Arizona's request to manage its own storm water discharge program was criticized by environmental interests. They feared the state's program would not enforce endangered species regulations as thoroughly as federal statutes. The Defenders of Wildlife and the Center for Biological Diversity filed suit in 9th U.S. Circuit Court of Appeals arguing the state administration of the NPDES program would be to the disadvantage of endangered species.

The main issue before the court was: does the Endangered Species Act authorize, even require the EPA, when considering transferring water pollution authority to a state, to take into account the impact its decision will have on endangered and threatened species and their habitat. Plaintiffs argued that it does.

The court sided with the environmental interests and denied Arizona authority to issue water discharge permits. Federal law allows a state to take over the Clean Water Act pollution permitting program from EPA, if the state meets applicable standards. In its review of Arizona's application, the EPA relied on a Fish and Wildlife Service's biological opinion proposing the agency lacked the authority to consider its decision's impact on endangered species and their habitat. Plaintiffs in the case challenged EPA's transfer decision, particularly its adherence to the proposition

that its authority is limited.

The court held, "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." For the text of decision see: <http://caselaw.lp.findlaw.com/data2/circs/9th/0371439p.pdf>

Navajos Seek OK to Administer CWA

The Navajo Environmental Protection Agency is seeking authority from the U.S. Environmental Protection Agency to administer portions of the Clean Water Act. If it is approved, the NNEPA would administer the Water Quality Standards and Certification Programs under Sections 303 and 401 of the Clean Water Act. Granting of the authority would allow NNEPA to adopt, review and revise water quality standards for all surface waters within the Navajo Reservation.

Arizona Department of Environmental Quality Director Steve Owens expressed his support for the NNEPA's request in a letter sent to the USEPA stating, "ADEQ wholeheartedly supports the Navajo Nation's request."

Last year the NNEPA became the first tribal agency in the nation to receive delegated authority to issue air quality permits under the federal Clean Air Act.

Shorn of authority to issue any further water discharge permits, ADEQ is left in an uncertain position. The court action puts in jeopardy the more than 20,000 general permits issued annually to developers whose construction activities could affect storm water runoff. Concern also has been raised that the ruling may invalidate permits ADEQ already issued to projects now in progress.

Representatives of home builders in the state say the decision could block development. The National Association of Homebuilders is expected to appeal the decision.

now "heading downtown in a semi-truck," says John Gunn, Spur Cross Ranch Conservation Area supervisor. "Every gallon that goes out in the back of those trucks is a gallon of water not nourishing a willow or providing a frog with a wet spot to sit in."

Gunn reports that the diversion has killed native fish and had additional negative impacts on lowland leopard frogs and trees, including sycamores and velvet ash.

Concern has been raised that the watershed is deteriorating, although early spring rains ensured its productivity for this year.

The Tonto National Forest's position is that the Sedona Springs Bottled Water

Company diversion is legal because the Newman family, owners of the bottling company, have claimed water rights when they purchased the old Cartwright Ranch near Seven Springs. The ranch's original owner claimed diversion rights dating back to 1866 for domestic and irrigation purposes.

One of the legal questions raised is why the Newmans are allowed to change this traditional use to commercial purposes.

"Apparently these things are more complex than might meet a reasonable person's eye," says Gunn. He says lawyers are now coming close to reaching a position

statement for the county about whether to move forward or not. The Maricopa County Board of Supervisors must approve any legal action that might be taken.

Gunn hopes the matter will be ultimately negotiated outside the courtroom. "Certainly at this point we feel like we've been completely left out of the process and completely disregarded as a downstream stakeholder," he says. "And we're trying to reverse all that and get back to a tradition of dealing with each other as normal and equal partners." Both agencies have a duty to protect the ecological integrity of the watershed.



Guest View

Keeping the Faith — Water Conservation in Arizona

Warren Tenney, assistant to the general manager, Metro Water District, contributed this Guest View.

OK, let's admit it; many of us in Arizona are a little miffed with the attention that the Southern Nevada Water Authority has received for its conservation program. Cash for turf! Sounds good if you can pay a lot of lucre to save an acre foot of water. Suddenly, their finding religion seems to imply that Arizona is full of conservation heathens.

Yet, Arizona has been walking in the light since at least 1980 with the Groundwater Management Code. Conservation, however, often is seen as a lesser doctrine of water management; a quaint Sunday school lesson rather than a fist-pounding sermon on the canon of the Law of the River. Our challenge may not just be keeping the faith in conservation but making sure good works remain with that faith.

Perhaps issues surrounding conservation in Arizona are best represented by the Central Arizona Project Board's recent debate whether the Central Arizona Groundwater Replenishment District should have a role in conservation. Some members say yes: CAGRDR should take an active role as a means to reduce its replenishment obligation. Debate, however, has stirred over how much conservation proselytizing CAGRDR should do. Should it set standards on homes to ensure that less water is used? Should conservation fees be paid to build?

The development sect contends that the Arizona Department of Water Resources already has conservation requirements, and a separation between CAGRDR and ADWR should remain. This is disingenuous since ADWR has not been enforcing its conservation program which by itself did not necessarily achieve conservation. This demonstrates the fallacy that conservation in Arizona only occurs because of ADWR; The truth is conservation continues in Arizona regardless of ADWR.

Municipal providers have practiced conservation independently of ADWR. ADWR has had difficulty recognizing that the flock of providers has advanced conservation, with expertise coming from municipal providers in the trenches.

Wisely, CAGRDR staff has advocated partnerships for any conservation efforts; thereby learning from those with experience. ADWR should follow this approach when revisiting its municipal conservation doctrine to determine if a new interpretation might actually promote conservation.

Others contend that CAGRDR should not be involved in conservation, fearful that it implies the State or individual providers are not doing enough, leading ADWR to seek more regulations. Or worse: such blasphemy may cause Reclamation to swoop in and impose more stringent conservation requirements on CAP users; something highly unlikely to occur only because we want to "improve" and "enhance" conservation. Ironically, Reclamation has been more innovative than ADWR in recent years in assisting con-

servation efforts in Arizona.

We need to be willing to consider improvements and avoid being conservationists for one day of the week. Water CASA will soon publish its three-year research project, a comparative cost-benefit analysis of programs with water savings data. This should give new revelation on more effective conservation methods.

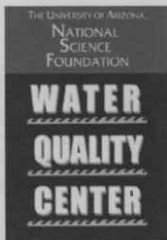
Another key argument against CAGRDR's conservation effort is that no development occurs without a 100-year supply certificate from ADWR. A developer proves a 100-year supply by showing: 1) physical availability; 2) financial capability; 3) legal availability; 4) sufficient quality; and 5) renewable supply. Tenet 5 is only achieved by CAGRDR membership! It is because of the CAGRDR that 100-year supply certificates are issued! CAGRDR must then go out and ensure it can meet that replenishment obligation.

This article will avoid the larger debate of whether the CAGRDR is still part of intelligent design or evolved into a ravenous creature. The point is that any entity with a responsibility to manage water including the CAGRDR should be able to use conservation as a tool. Municipal providers implement conservation programs they conclude will enhance their water resources. Some CAP Board members rightly recognize that conservation can play a role in managing the finite supply CAGRDR is increasingly obligated to provide. Municipal water providers should care; if CAGRDR reduces its replenishment obligation, the inevitable competition for future water resources between CAGRDR and municipal providers decreases.

The CAP Board should incorporate conservation into its CAGRDR planning. Meanwhile the rest of us might contemplate the relevance of conservation in water management. We should tout loudly our accomplishments. We need to remain vigilant in educating the public and officials about water. We ought to recognize we are at a point of diminishing returns for many conservation programs. We should explore ways to improve and to pursue conservation programs that actually reduce water usage. We need to be certain that water savings, not just good public relations, are obtained.

ADWR has recently indicated a willingness to work with municipal providers in revising its conservation regulations. Hopefully an open consensus process will occur rather than having ADWR predetermine decisions. ADWR's role in conservation should be providing assistance and resources. A statewide conservation office, established with little fanfare, will hopefully bear good fruit.

Rather than the tedious process of calculating and haggling over a new municipal program for the fourth management plan, we ought to establish basic statewide conservation ideals. Despite sectarian views that conservation differs in Arizona, fundamental conservation principles apply statewide. Each provider can then determine and pursue the best conservation programs for managing its water resources. While not single-handedly solving our water challenges, conservation is part of our water management helping us in our search for that holy grail of safe yield. ■



UA Water Quality Center Builds Coalition of Research Interests

The University of Arizona's National Science Foundation Water Quality Center operates on the premise that the most effective approach to resolving water quality problems is building varied, broad-based interest and support. The WQC builds this support by involving the private sector, the public sector, government agencies, and specialists in various water related disciplines. The intent is to form a coalition of interests.

WQC Director Ian Pepper says, "The key to center operations and probably its most novel aspect is the integration of academia, government and the private sector. I think this is a trend you are going to see more of in the future."

The WQC is part of a NSF network of about 50 industry-university cooperative research centers, each with a different area of expertise. The UA program is the only NSF cooperative center to address water quality.

By specializing in water quality, the UA WQC has a broader focus than most other NSF industry-university research centers, most of which specialize in an industry related concern, such as electronics or computers.

The UA research scientists involved in the WQC form an interdisciplinary team, with biologists, chemists, physicists, hydrologists and engineers working together to resolve water quality problems. Along with NSF support, the WQC also receives funds from a variety of companies and agencies interested in specific water quality issues.

This varied source of funding and support is WQC's strength, and accounts for its uniqueness as a research center. It has the operational flexibility to encourage a dynamic relationship between the private sector and the UA, and it promotes university integration with industry and governmental agencies. It is this combination of university expertise and corporate funding that leads

Director's Statement

"Water quality is a critical factor affecting human health and welfare. Any advance in our ability to preserve or enhance the quality of our water supplies is likely to come through state-of-the-art research. The 21st century model to provide this research is through the integration of the government, the private sector, and universities." — Ian L. Pepper



to scientific discoveries that can enhance water quality for the community at large.

WQC research areas include potable water management, water security, water reuse, fate and remediation of agricultural,



Water Quality Center Administrative Offices

commercial and industrial contaminants, wastewater, and mining discharge.

The WQC administrative center is located within the Environmental Research Laboratory, UA College of Agriculture and Life Sciences. The overall goal of ERL, which is within the Department of Soil, Water, and Environmental Science, is to improve the health, welfare and living standards of communities in desert areas through the application of appropriate and sustainable technologies.

WQC Overall Goals

The WQC strives to achieve various goal. One priority is to improve the flow of scientific knowledge affecting water quality, from the UA to industry, government agencies and the general public. This helps build a coalition of interests and encourages a more informed and educated public with regards to water quality issues. Another WQC goal is to ultimately achieve self-sufficiency by bonding with long-term industry and government partners.

The WQC's goal of developing support for water quality research also benefits students. Graduate students achieve a broad industry perspective; students also benefit from interactions with the private sector that could lead to industry job opportunities. Also students acquire training and experience in research laboratories. Further, they have opportunities to present research at national meetings and publish peer review journal articles. Funds for research also are used to support competitively assigned research assistantships.

WQC Funding and Membership

The National Science Center is the prime federal funding source of the WQC. Funding also comes from varied other sources and sectors including local governments, the private sector and non-government agencies

Annual membership fees account for an important part of the funding. Organizations wanting to actively participate in WQC's operation pay an annual membership at one of three levels: \$3,000 for an associate member; \$10,000 - \$15,000 for an enhanced associate membership; and \$30,000 for full membership. Members also might provide additional funding to support specific research projects. Each WQC member appoints one representative from its organization to serve on the WQC Industrial Advisory Board. The board meets twice a year for two days; the first day is devoted to presentations of research project reports and proposals for research. The second day the board votes on which research projects to fund.

Present WQC membership includes eight full members: Brita Products Company/Clorox Company, Pleasanton, CA; Pima County Wastewater Management Department, Tucson; Synagro Technologies, Houston, TX; Triton Systems, Inc., Chelmsford, MA; Tucson International Airport Authority; Tucson Water; and Vortex Corporation, Prescott, AZ. Enhanced-associate members include: Access Business Group, Ada, MI; Amphion International, Columbus, GA; City of Peoria, AZ; County Sanitation Districts of Los Angeles County, Whittier, CA; Northwest Biosolids Management Association, Seattle, WA; Orange County Sanitation District, Fountain Valley, CA; Philadelphia Water Department; and Resolution Copper Company, Phoenix. Associate members are L'Eau, LLC, South Jordan, UT; Town of Marana, AZ; and Water Quality Association, Lisle, IL. Tohono Chul Park, Tucson, is an honorary member.

Various benefits accrue to WQC members. Members gain recognition and status through their involvement with a National Science Foundation Program. As members they do not pay any indirect cost on membership fees, whereas university overhead is set at 51.5 percent. Also members are able to fund additional directed research without paying any indirect or administrative costs. Further, member's involvement in university research ensures credibility with the local community and general public.

WQC Mission Statement

The objective of the WQC is to investigate physical, chemical and microbial processes that affect the quality of surface and subsurface waters including potable supplies.

WQC Research Approach

WQC Director Ian Pepper views his role as a broker to ensure smooth working relationships among various research interests. He says, "A lot of private sector companies are not set up to do research." What then is needed is a way to work out an appropriate match between private entities and university researchers, and that is where the Center comes in. Pepper says, "I find out about the problems of the private sector." He then approaches UA faculty



Multi-University
Industry/University
Cooperative Research
Center



The University of Arizona and Arizona State University are partners in the Multi-University Industry/University Cooperative Research Center. The I/UCRC is based in The University of Arizona's College of Agriculture and Life Sciences (UA WQC) with a partner site at Arizona State University's College of Engineering and Applied Sciences (ASU WQC). The initial I/UCRC was established in 1999 by The University of Arizona. The Multi-University Research Center was established in 2001 in response to the National Science Foundation's interest in multi-university centers.

members with the expertise to take on those problems, and offers WQC support for their research. A private sector interest thus taps into university resources, gaining the services of researchers along with laboratory and equipment.

Pepper views the WQC as operating sort of as a "franchise," linked to the NSF national network, but operating independently in meeting local needs and conditions. This enables the Center to focus on immediate issues, of concern to the here and now. Pepper says, "We deal with issues affecting the quality of water people are now drinking. This is not about modeling, about what might happen 30 years from now. We deliberately have a very rapid response to emerging issues, which I think is important."

Emerging water quality issues

–*Naegleria fowleri*, a parasite found in warm bodies of fresh water that causes fatal brain infection. Infections in humans are rare but may occur through water entering the nasal passages and by inhalation. Two deaths were reported in Maricopa County in 2002. A molecular method of detection is being developed.

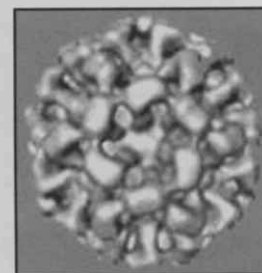
–Emerging viruses and their concerns including calicivirus-cruise ship outbreaks and fate and transport of the SARS virus.

–Antibiotic resistant bacteria and endotoxin.

–Endocrine disruption activity in waters and wastewaters.

–Land application of biosolids-bioaerosol fate and transport.

–Water security-biological fingerprints of water to monitor for intrusion events.



Norovirus

Current WQC Research

Research is central to the WQC's mission; research topics or areas are sought that have a sufficiently broad application to be useful to a number of WQC participants, including both public and private interests. Current research projects include:

Water Quality Center Laboratory

The Water Quality Center Lab is located in the Fleischmann Building of the Environmental Research Laboratory, an off-campus University of Arizona facility. The Lab focuses on water quality and is equipped to perform state-of-the-art chemical and biological analyses. Chemical analyses include metals, salts, alkalinity, anions and dissolved organic carbon. Biological analyses include



Water Quality Center Lab

bacterial and viral pathogens and indicator organisms. The Lab can also analyze other environmental samples including soils, wastes, effluents, and plant materials.

The WQC lab is equipped to perform water, soil, waste, and plant, chemical and physical analyses using state-of-the-art analytical equipment, in the following categories:

- Inorganic analysis of all types of water samples including drinking water and soil/waste/plant extracts; categories include metals, salts, anions.
- Elemental analysis of solid samples such as soil, plant and waste; this includes total carbon, nitrogen, and sulfur.
- Carbon analysis of water samples; this includes alkalinity, dissolved organic carbon.
- Soil/sediment particle size distribution; this includes sand, silt and clay fractions.
- Soil moisture tension measurement.

The WQC lab can also undertake assays for the detection of bacteria and viruses in environmental samples (total coliforms, fecal coliforms, *E. coli*, salmonella, giardia, helminths).

The faculty and staff associated with the WQC Lab works closely with clients to help them choose their analyses needs.

Biosolids

- Biosolids applications onto mine tailings and agricultural land.
- Development of an injection system for high density biosolids.
- Pathogen reduction in biosolids for land application.
- Antibiotic-resistant bacteria and endotoxins in association with land application of biosolids: possible impact on quality of groundwater supplies and comparison to other routes of work-related and household exposure.

Water Treatment

- Point-of-use drinking water devices for assessing the extent of microbial contamination in finished water and distribution systems.
- Assessment of the amphion international water treatment system for water disinfection.
- Biotechnological exploitation of halotolerant enzymes (NSF Supplemental Grant).
- Demonstration of sustainability of harvested rainwater in arid lands to meet water requirements and to improve quality of runoff.

Pathogens

- Detection of noncytopathogenic and treatment resistant human virus populations in drinking water using ICC/PCR.
- Occurrence and control of emerging waterborne parasites in Arizona.
- Detection of viruses in drinking water using raman spectroscopy.

Source Water Evaluation

- Assessment of the microbial water quality of individual and small systems' groundwater supplies in Arizona and appropriate treatment technology for its control.
- Estrogenic activity in reclaimed water and stormwater.
- Quantifying potential endocrine disruption in effluent dominated and effluent dependent waters within Arizona: fish as habit assessment biomarkers.
- Comprehensive watershed management for the Valley of the Sun and Central Arizona.
- Evaluation of the salinity and eutrophication status of the backwaters of the Lower Colorado River for re-introduction of endangered fish species.

Remediation

- Microbial mechanisms for observed rapid and large-scale denitrification in irrigated desert soils: potential low cost methods to remediate nitrate in soil and groundwater.
- Perchlorate removal from ground and irrigation water using low-maintenance biofilters.
- Arsenic mobilization and transport from water treatment residuals in landfills.
- A multi-phased screening approach to the remediation and stabilization of mine tailings.
- Demonstration project for TCE remediation at samsonite building area, Tucson International Airport Superfund Site.



Water Quality Center provides research opportunities for students.

Water Village, Real-World Setting to Study Water Quality at Tap

Water Village, which is partly funded by the University of Arizona Water Quality Center, consists of a cluster of four houses located on the grounds of the UA's Environmental Research Lab. It will serve researchers as a facility that is part real-world and part laboratory. From the outside the houses appear conventional and unremarkable; inside, however, the houses will be equipped to serve the needs of water researchers.

The UA Water Village is expected to play a national role as a testing facility for securing the nation's water supply in three key areas: safety and security, health, and aesthetics. Charles Gerba, UA professor of soil, water and environmental sciences says "It's a platform to deal with emerging issues in water quality."

UA Water Quality Center Director Ian Pepper says, "You can do some things in a laboratory, but at the other end of the scale, there are some things that you cannot do out in the community. You cannot deliberately put contaminants into peoples' distribution systems. This is an intermediate field-scale testing facility, with a closed loop where we can look at the fate and transport of chemical and biological contaminants."

Key features of the Water Village

- Four unique houses each plumbed with unique distribution lines.
- State-of-type-art access for water quality monitoring within the distribution system.
- Modular system to allow for addition of specific compounds or entities.
- Continuous real-time monitoring capability for water quality within the distribution system; e.g. TOC, free chlorine, oxygen, pH, flow rate, pressure.
- Fiber optics for real-time data acquisition and control.



The above adobe structure, the first house in Water Village to be up and operating, is designed for point-of-use testing.

- Capability to change distribution system water quality as needed to allow studies on household water quality at the tap.
- Automated monitoring of water usage at tap outlets.
- Chemical/microbial water quality laboratory for water analysis.
- Water education and training center.

Distribution System Water Quality Studied

Delivering safe water at the tap is viewed as a critical concern. Treatment plants are well regulated and have guidelines to ensure safe water; the distribution system, however, represents an unknown, with studies needed to look at how water quality degrades through the distribution system.

Water Village Key to New UA Homeland Security Center

Substantial funding from the Office of Homeland Security and the Environmental Protection Agency has established an EPA Homeland Security Center at the University of Arizona and five other schools known as the Center for the Advancement of Microbial Risk Assessment (CAMRA). Three UA researchers are recipients of part of the \$10 million, five-year grant.

The Water Village at the Environmental Research Laboratory will be a key component of CAMRA which will be the first and only EPA and Homeland Security center of its kind in the country.

The three UA principal investigators are Charles Gerba, professor of soil, water and environmental sciences, Ian Pepper, director of the UA/National Science Foundation Water Quality Center, and Christopher Choi, associate professor of agriculture and biosystems engineering.

"The water quality at the source may have nothing to do with the water quality at the tap," Gerba said. "The idea is to understand the performance of the system and how to better protect it and the public.

"The hardest question is knowing where to look. The second question is how do we clean it up. The third is how clean is clean. We can use the facility to examine emerging technologies for contaminant detection and control in a simulated real-world situation."

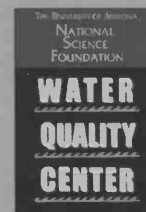
Each house will have a specialized purpose. Completed this summer, House One is designed for point-of-entry/point of use testing. Scheduled for completion in February, House Two will be the water intrusion lab. Here experiments will be conducted on how contaminants — either natural, accidental or deliberate — might enter and move through the water supply. Water quality and aesthetics will be the specialty of House Three, scheduled for completion in September, 2006. House Four, to be completed in February 2007, is the water education and training house.

Along with a recently announced Office of Homeland Security/EPA grant (see sidebar), other Water Village funding sources include Prop 301 revenues, the UA College of Agriculture and Life Sciences, the Office of the Vice President for Research and a number of corporations.

Water Quality Center

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Legislation and Law

Court Upholds ADWR's Right to Issue Instream Flow Permits

The Arizona Court of Appeals recently upheld a decision that the Arizona Department of Water Resources has the right to issue instream flow permits and affirmed the principle that instream flow and *in situ* water rights need not be diversionary.

The decision was in response to a Phelps Dodge objection to a 1999 Tonto National Forest's application for instream flow rights to Cherry Creek, a tributary of the Salt River, above Roosevelt Dam; the intent of the application was to preserve flows for recreation and wildlife purposes. Phelps Dodge argued that ADWR does not have the authority to issue such a permit.

Not only that, but ADWR, according to Phelps Dodge, violated Arizona's Administrative Procedures Act by issuing instream flow rights before promulgating rules for an instream flow permitting program.

Phelps Dodge supported its contention that ADWR is without legal authority to approve instream-flow permits by asserting that the Arizona Legislature never explicitly authorized the state agency to issue such permits. If the Court defers to ADWR's view that it does in fact have such authority, Phelps Dodge says the Court will in effect "reward it (ADWR) for years of usurping legislative authority."

At issue is an interpretation of the prior appropriation doctrine, a monument of western water law used to define surface water rights in the region. The issue is whether an instream flow right, which ensures a reserved instream flow for such uses as wildlife, fish, recreation and aesthetics purposes, is at odds with the doctrine.

According to the prior appropriation doctrine a person obtained surface water rights by indicating an intent to appropriate a supply and then putting the supply to a beneficial use. In the early days diverting water was understood to demonstrate an intent to appropriate a surface water supply. Whatever the use at that time, whether domestic, municipal, irrigation, stock watering, water power and mining, required that water be diverted. That water could serve a beneficial use flowing freely in a streambed seemed an unlikely proposition then and still meets with resistance now.

Much is at stake in this case: a successful challenge would have major consequences to the way Arizona manages its riparian resources. For example, the legal status of the approximately 24 instream flow permits approved thus far by ADWR would be uncertain. Also the future of the approximately 50 instream applications pending before the agency would not be bright.

Phelps Dodge's action might be viewed as a recent chapter in what has been an extended history of challenges to the legitimacy of inflow stream rights throughout the West. If the results of such challenges are any indication, Phelps Dodge is going against the current; beginning with Oregon in 1929 nearly every western state has explicitly elected to protect instream flows.

The decision of the Arizona appeals court did not prove an exception to this general trend. Although the Arizona Legislature

may not in fact have explicitly authorized ADWR to issue instream flow permits, the Court found sufficient legal justification for the agency's actions. It stated: "... Arizona's historic prior appropriation scheme, the current water use statute, and the ADWR's interpretation of Arizona water law do not affirmatively require a diversion to establish an instream or *in situ* water right." ADWR therefore does not need legislative authorization to grant instream permits since present law does not prohibit it.

Bessie the Cow is Not a Diversion Mechanism

In arguing their case, Phelps Dodge attorneys had to contend with a 1969 Arizona Supreme Court decision that allowing cattle to drink from a surface water source constituted a valid appropriation of waters. (*England v. Ally Ong Hing*) Phelps Dodge's case would be strengthened if the cattle watering was viewed as an actual diversion, and their lawyers argued such. The court responded: "We reject Phelps Dodge's contention at oral argument that cattle watering is a diversion, wherein the point of diversion is the cattle's mouth and the water is diverted to where the cattle roam. Creative though this characterization of beneficial use may be, we cannot conclude that the England court saw Bessie the Cow as a diversion mechanism. Such interpretation is too attenuated from the plain meaning of diversion to interpret England as a case of appropriation through diversion."

In its other allegation, Phelps Dodge's assertion that ADWR violated the state's Administration Procedures Act has to do with the agency applying its instream flow guide without codifying it as a regulation. This would be improper rulemaking under the act.

The "Guide to Filing Applications for Instream Flow Water Rights in Arizona" resulted from the efforts of an ADWR-created task force made up of federal, state, county and environmental non-profit stakeholders. Created in 1986, the task force, which worked under the assumption that state law does not require a diversion of surface water to demonstrate an intent to appropriate, was charged with recommending rules to guide the agency in implementing its instream flow program. First issued in 1991, the guide was updated in 1997.

The Superior Court rejected Phelps Dodge's position in part because it found that ADWR had not relied on the guide as a rule, nor had the agency applied it against Phelps Dodge. In its appeal, Phelps Dodge did not address this ruling; the appeals court accordingly declined to address the issue.

In affirming ADWR's right to issue the permits the Court of Appeals upheld decisions by an administrative law judge and the Maricopa County Superior Court. Phelps Dodge is appealing the decision to the Arizona Supreme Court. ■



Publications & On Line Resources

Report Considers Growing Arizona Towns' Ability to Meet Water Needs

An Analysis of the Water Budgets of Buckeye, Payson and Prescott Valley

Rita P. Maguire, Herb Dishlip and Michael J. Pearce, published by ThinkAZ and is available at its web site: ThinkAZ.org

The report focuses on three Arizona communities — Buckeye, Payson and Prescott Valley — to serve as case studies of the ability of growing towns in the state to meet present and future water needs. These towns were chosen because they illustrate some of the most common water concerns now confronting Arizona cities and towns.

Buckeye, a rapidly growing town within an Active Management Area and the CAP service area, has the option of contracting for water through the CAGR. There are future risks, however in acquiring water from this source.

Not located within an AMA, Payson lacks the protections provided by the Groundwater Management Act and is without the authority to institute local regulatory programs to provide similar protections. Residential development continues without needing to identify a long term water supply for present and future subdivisions. Prospects for the town to acquire additional water supplies are dim.

Like Buckeye, Prescott Valley is located within an AMA; developers therefore must identify a 100 year water supply before building. Unlike the three AMAs within the CAP service area, the Prescott AMA is without an alternate surface water supply to replace overdrafted groundwater. Meanwhile a large number of exempt domestic wells — and the number is growing — further complicates water management in the area.

The report says the situation calls for more oversight. Despite the Arizona Department of Water Resources' efforts to regulate groundwater use in AMAs, Buckeye and Prescott Val-

ley managed to grow beyond their water supplies. ADWR's role outside of AMAs has been to encourage local water management through technical support, limited water adequacy reviews and financial incentives. The report recommends a higher level of technical support; this will require expanding ADWR's technical resources and legislative approval of adequate and sustained funding.

The report sees the need for more direct regulatory oversight of non AMA areas at the state level. Acknowledging the value of local control, the report says that at the same time the situation can leave locally elected officials in a difficult position; they must make tough choices between economic development, property rights and adequate water supplies.



Pump test on a new well in Payson.
Photo: Scott Stratton

According to the report ADWR would take on a valuable role in the local decision making process if the agency served as an independent participant and expert voice. The accuracy and thoroughness of technical evaluations would then be ensured and the public's interest better protected.

The report got a strong endorsement in an Oct. 3 editorial in the "Arizona Republic." The editorial stated, "It's a primer that ought to be distributed throughout Arizona and given to every legislator because, despite the inertia in this year's legislative session, the drought is still with us, and adopting better water policies is a critical component to ensuring water adequacy."

ThinkAZ is a Phoenix based nonpartisan research institute.

CITIES IN THE WILDERNESS

a new VISION
of land use in America

BRUCE BABBITT

Bruce Babbitt Visits UA, Promotes New Book

Bruce Babbitt, former Arizona Governor and U.S. Interior Secretary, will visit the University of Arizona Nov. 17 to promote his new book "Cities in the Wilderness, A New Vision of Land Use in America." Events include: 12:00-2:00 p.m., book signing, UA bookstore, Student Union; 2:30-3:30 p.m., water talk, Tucson Room, Student Union, sponsored by

the Water Sustainability Program; and 5:00 p.m., public lecture, Integrated Learning Center, Rm 120, sponsored by the School of Landscape Architecture.

Nature Conservancy in AZ Launches New Web Site

The Arizona Nature Conservancy's new web site serves as a public repository for data and reports generated by its Conservation Science Program. The site currently offers spatial data and the results of studies on the distribution of biological diversity in the Southwest and northwestern Mexico; the ecological condition of grasslands in Arizona and Mexico; a river addressing system for native fish, aquatic and riparian species with status under the Endangered Species Act, and surface flow in Arizona's river systems; and various studies conducted with the Bureau of Land Management and U.S. Forest Service on conservation planning, adaptive management, grazing, and watershed management using prescribed fire. Ecological data pertaining to southwestern forest systems will be posted beginning in the fall. The web site is located at: www.azconservation.org. Those in the fields of biology, conservation, biology, ecology, geography, natural resource management, and public policy will find the data useful.



Special Projects

Research Indicates FEMA Maps Overestimate Floodplain Area

by Mari N. Jensen

For many areas of the West, the Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRMS) overestimate the amount of land area within the 100-year floodplain. New research suggests a way to improve the maps.

The new three-pronged approach combines a new numerical computer model with two additional methods, satellite-image analysis and field observations. Each method serves as a check on the other two. The research team focused on the floodplains for a 10-year flood, a 100-year flood and a maximum flood for two sites in Arizona.

In addition to providing better hazard information to the public, revising the floodplains maps could have major economic impact in the rapidly growing Southwest. Often, homeowners in areas deemed to be in a floodplain must buy flood insurance in addition to regular homeowner's insurance.

"I think the important thing is that we have three methods that give darn near the same result, and it's a way smaller floodplain than the FAN model FEMA has generally used," said research team leader Jon D. Pelletier, an associate professor of geosciences at The University of Arizona. "These three independent methods converge on the same answer. ... That was really surprising to us."

The combined method applies to the foothills of western mountain ranges such as the Santa Catalinas and the Tortolitas outside Tucson. Many western cities, including Phoenix, Las Vegas and Denver, have similar foothills.

"You have a lot of small channels draining the mountains, and the floodplains are very complex," said Pelletier. "Back in the day when data that mapped these small channels weren't available, FEMA called it all floodplain. That's fine in the Lower Mississippi Valley, but it's not appropriate out here. These three methods give us a new level of detail. We're looking at a scale of five to 10 meters and can see that the area of the landscape that's prone to flooding is often really small. I predict our result would apply to many other

foothills regions in Arizona."

In the region of the West characterized by towering mountains interspersed with broad, flat valley floors, the land sloping away from the mouth of a mountain canyon, known as the alluvial fan, is criss-crossed by a myriad of small, shallow channels that drain into the valley below. Such topography is found in Arizona, Utah, western Colorado, western New Mexico and parts of eastern and southern California.

Even in a major flood, some upland areas between channels remain dry. However, traditional techniques for assessing the potential extent of floods on alluvial fans often designate those upland areas as flood-prone, thereby overestimating the amount of land in danger of flooding.

To create a computer model to predict flood intensity, Pelletier used very detailed maps of alluvial fans, data from stream gauges and a mathematical analysis that predicted how the water flowed through the numerous small channels on a given alluvial fan during a given storm.

For maps, Pelletier used digital elevation models (DEMs), which are computer-generated maps made from low-altitude aerial photographs that can show changes in elevation of only 4 inches (10 cm). Such maps are available for Wild Burro Canyon in the Tortolita Mountains outside of Tucson and Tiger Wash in the Harquahala Mountains west of Phoenix. Because of the complex topography of those two sites, land that hasn't flooded in thousands of years can be separated from the active floodplain by an elevation difference of only one to two feet. Both areas also have stream gauges or field observations that record the volume of water during past floods.

Pelletier plugged the data for two historic floods — the September 1997 flood in Tiger Wash from tropical storm Nora and the July 1988 flood in Wild Burro Canyon from monsoon rains — into his mathematical model. The computer then created maps that predicted where the waters from those floods went.

Pelletier then compared the computer-generated maps to two retrospective methods of assessing floods on alluvial fans. The computer model slightly underestimated the observed extent of the floods, matching the other methods for about 85 percent of the time. He's now improving the model to increase its accuracy.

"Numerical models like mine are much faster than the other two methods," Pelletier said. "But it's important to have independent verification and the other two techniques provide that."

Pelletier's computer method uses data that are becoming more readily available for more areas. He can then specify the size of flood — 10-year,

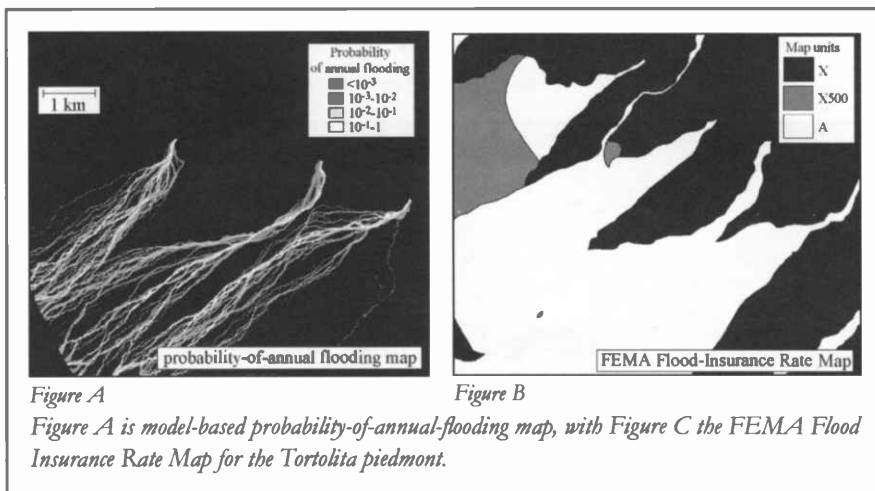


Figure A

Figure B

Figure A is model-based probability-of-annual-flooding map, with Figure B the FEMA Flood Insurance Rate Map for the Tortolita piedmont.

...continued on page 10



Announcements

RFP: Water Resources Research Act, 104(g)

The U.S. Geological Survey in cooperation with the National Institutes for Water Resources requests proposals for the National Competitive Grants Program (Section 104 G of the Water Resources Research Act), to support research of water supply and water availability. Researchers at Arizona state universities are eligible to apply and must submit their applications through the University of Arizona's Water Resources Research Center. Proposals can be for projects of 1 to 3 years in duration and may request up to \$250,000 in federal funds, with successful applicants required to match federal grant funds with non-federal sources. Proposals must be filed on <http://www.niwr.org> by Feb. 10, 2006. WRRC then has until Feb. 24, 2006 to review proposals and submit them to the National Competitive Grants Program. Proposals may be filed on the web site beginning Nov. 1. Complete RFP will be available at: <http://www.niwr.org>

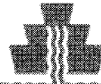
Water Quality Laws and Requirements Seminar

Arizona State University is conducting this 8-hour seminar that will provide participants with an understanding of all major water quality laws applicable in the State of Arizona, including the Federal Clean Water Act, state water quality requirements, and an illustrative overview of local requirements in the major metropolitan areas. Participants will learn what activities are regulated under water quality laws in Arizona, the processes for either obtaining permit or other required approval, how to qualify for general permits or applicable exemptions, and what types of operational changes may trigger the need for regulatory approval. In addition, newly enacted regulatory and statutory provisions will be reviewed, and discussion of key regulatory guidance documents will also be provided. Registration information at <http://www.east.asu.edu/seminars/> or call Denise Kolar at 480-727-1825

World Water Forum in Mexico City

The 4th World Water Forum, titled "Local Actions for a Global Challenge" is scheduled for May 16-22 in Mexico City. A guiding

premise of the forum is that regardless of their root causes, water related problems have their greatest impacts at the local level. Main topics include water for growth and development, implementing integrated water resources management, water supply and sanitation for all, water management for food and the environment, and risk management. The event will also include a ministerial conference, water fair and a water expo featuring companies from all around the world. For more information, check www.worldwaterforum4.org.mx



WRRC Invites Research Proposals

The University of Arizona's Water Resources Research Center is accepting proposals for research grants under the Water Resources Research Act, Section 104B. Funded by the U.S. Geological Survey, Section 104B provides support for small research projects on water-related issues of importance to the state and region. The WRRC usually funds three to five small grants of about \$10,000 to \$12,000. Projects are funded for 12 months.

Only faculty members at the three Arizona state universities may submit proposals. Researchers in the social, biological, physical and engineering sciences as well as such fields as water management, water law, economics and public health are invited to apply. Funded projects start March 1, 2006.

Proposals must be submitted electronically via the National Institutes for Water Resources web site. An electronic copy and 20 hard copies must be submitted to the WRRC as well. Guidelines are available on the WRRC web site: <http://cals.arizona.edu/azwater/> Proposals must be submitted by 5:00 p.m., Nov. 14.

The WRRC will convene an external review committee to review proposals. Reviewers experienced in the field of the proposal also will review each proposal. The WRRC decision to fund projects will be based on this input and available funding.

For additional information contact: Terry Sprouse, 520-792-9591, ext. 13 or tsprouse@ag.arizona.edu


Research...continued from page 9

100-year or maximum level — for a specific canyon, and the computer predicts where and how high the floodwaters will go. His model provides a probability of whether a particular piece of land will be flooded by a specific size of flood.

He wants to further test the three-pronged approach in other areas, including Clark County, Nev., one of the fastest-growing counties in the country, where Las Vegas is located.

Research results are discussed in an article, "An integrated approach to flood hazard assessment on alluvial fans using numerical modeling, field mapping, and remote sensing," published

in the Sept./Oct. issue of the GSA Bulletin. Pelletier's coauthors are Larry Mayer, UA adjunct professor of geosciences; Philip A. Pearthree, research geologist, Arizona Geological Survey; P. Kyle House, Nevada Bureau of Mines and Geology at the University of Nevada, Reno; Karen A. Dempsey, Portland, Ore.; Jeanne E. Klawon, U.S. Bureau of Reclamation; and Kirk R. Vincent, U.S. Geological Survey.

The research was supported by the National Science Foundation, the Pima County Flood Control District, the Arizona Geological Survey and the Flood Control District of Maricopa County. 



Public Policy Review

by Sharon Megdal

Much at Stake as Arizona Ponders Perplexing Water/Growth Dilemma



Growth and water are much discussed these days. Will we have enough water to serve Arizona's growing population? Will water now used by agriculture be the future water supplies of our cities? Should the Central Arizona Groundwater Replenishment District limit future membership? Do increasing demands on finite water supplies call for more regulation of water, both inside

of and outside of Active Management Areas? Will a prolonged drought create the ghost (dust!) towns of the future?

The public may not be fully aware that many are at work addressing such questions. Each question is complex and answers to them may change as the robust growth of the Southwest continues.

(A Water Resources Research Center conference will address these issues. Titled "Providing Water to Arizona's Growing Population: How Will We Meet the Obligation,?" the conference will be held June 20 and 21. See page 3 of newsletter for further details.)

Public officials, water professionals and the public are all concerned with having enough water for the needs of the state. Last year's Arizona Town Hall concluded 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. Arizonans demand certainty that water will be available to support both consumptive and non-consumptive uses including when they turn on the tap, open irrigation pipes, visit recreation areas and to sustain natural habitats." With more communities bumping up against water-related constraints, it is appropriate to ask: Are going to be able to meet these expectations?

In most parts of the state, long-range water planning involves incorporating usage of effluent (treated wastewater), often treated to high standards. Not long ago effluent was considered a nuisance, a flow to be disposed of. Many communities suspect water will be available for purchase or lease, be it Indian-owned water or agricultural water. But will it be available and on what terms? In many cases the answers are unknown at this time.

Communities are growing into their Central Arizona Project allocations. Those relying on CAGRDR membership to prove an assured water supply face monetary unknowns. As presented about a year ago, the CAGRDR Plan of Operation projected the annual replenishment obligation exceeding 225,000 acre feet by 2035, based on projected membership through 2015. The CAGRDR has virtually no firm supplies for the water needed to meet its replenishment obligations.

How much will replenishment water cost in 2025 or 2035? No one can make intelligent estimates at this point. Should limits be imposed on future CAGRDR membership? The answer to this policy question has significant implications considering CAGRDR's role

in facilitating compliance with the renewable supply use requirement of the Assured Water Supply Rules. The CAGRDR was created in 1993 because developers and others without CAP subcontracts and/or access to CAP infrastructure worried about meeting the requirements of the impending rules. Present CAGRDR members now worry about pressures future membership will place on the cost of replenishment water. Once again, there are many unknowns.

Should water be further regulated within Active Management Areas? While in some quarters regulation is viewed as a nasty concept, uncertainty poses greater troubles to businesses and investors. With several large water utilities updating long-range plans, developers and others perceive more water supply uncertainties now than ten or fewer years ago.

The Groundwater Management Act imposed groundwater use regulations only in the AMAs. With much of Arizona experiencing phenomenal growth the last 25 years, groundwater overdraft has become problematic in non-AMA parts of the state. Watershed and other groups have worked to understand their water supply situations. They have gathered information and data, hoping it will assist them in developing regional water management plans.

The preference is for locally generated approaches to water management as opposed to state-imposed regulations. Laws that require showing water adequacy prior to development approval have been opposed. Opposition has arisen inside and outside AMAs to enacting regulations governing the drilling of wells, which, once built, are exempt from regulation. These proposals have attracted both strong support and opposition. Who is adversely affected by enacting the proposals? Who is adversely affected by failure to act? Often the complete answers to these questions are unknown.

We have all witnessed drought's serious effects. As communities develop drought and conservation plans, we will continue to grow. Our future options to address drought may be different than present options. We don't know we are in a drought when it first begins, and we don't know a drought has ended until some time after its end. Even with this type of uncertainty, we can be prepared for drought if we continue to pursue these planning exercises seriously and not let our guard down because one season's rainfall is plentiful.

Will water be available for the environment? What water quality implications result from increased use of Colorado River water and effluent? Will we develop cost-effective methods to address arsenic or will the new arsenic standards cause water supply problems in Arizona communities? Will Nevada find sufficient water supplies or will an effort be made to change the laws governing Colorado River water allocation?

One column cannot address all these questions; nor can one conference do justice to them. However, we are going to make an attempt to provide a stimulating dialogue on growth and water at our 2006 Conference. We invite you to attend the conference and join the discussion. ■

Legislation...continued from page 2

clined over the years. I think that a lot of folks realize there are major consequences. ... With the data and the planning you have a wider set of alternatives; you can make more judicious decisions that will make everybody better off."

The Legislature also passed Senate Bill 1336 creating the Rural Water Legislative Study Committee. The committee will evaluate water information pertaining to rural Arizona and determine the most effective options and methods for either enhancing water supplies or finding new water.

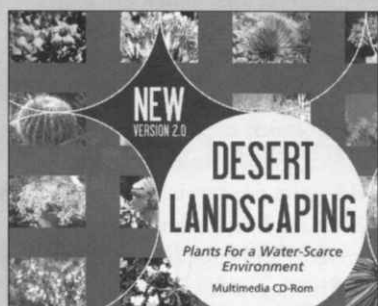
Its first meeting was conducted Oct. 18, with rural water sys-

tem presentations on the agenda. The committee is to submit a report by Dec. 31, 2006. The 14-member committee includes six members of the Legislature and eight members of the public.

In a July 11 Arizona Republic opinion piece, Senator Jake Flake said the bill "is another significant effort to address rural Arizona's water issues. ... It (the committee) was created to help local areas help themselves."

Local areas helping themselves is the critical rural water issue. Some advocate creating a statewide AMA that would impose uniform regulations; presently AMAs are mainly urban areas. This concept is highly unpopular in rural Arizona. ■

Announcing Version 2.0 Desert Landscaping: Plants For a Water-Scarce Environment A Multimedia CD-ROM



The University of Arizona's Water Resources Research Center announces the release of Version 2.0 of its popular CD-ROM, "Desert Landscaping, Plants for a Water-Scarce Environment." Arriving in time for the fall gardening season, Version 2.0 main-

tains features that made Version 1 a popular success and adds new and improved tools to further increase the usefulness of this valuable resource.

The creative gardener will find the Desert Landscaping CD-ROM an especially valuable tool. By identifying plants with the desired characteristics to meet specific landscape conditions the CD-ROM enables gardeners to custom design their landscapes.

Not only does the multimedia CD-ROM provide a range of information — landscape tips, interactive plant selector, description of soil and sun requirements, identification of places of origin, reviews of plant books, plant trivia quiz — but it is also fun to use.

Desert Landscaping 2.0 can be ordered directly from the Water Resources Research Center for \$30, including shipping and tax. To order, send a check or money order for \$30 made out to The University of Arizona. (See page 3 for WRRRC address) Check the WRRRC web site for purchasing CD with credit card. (<http://cals.arizona.edu/AZWATER/>) Call for quantity pricing. (520-792-9591)

The WRRRC web site includes a walkthrough of Version 2 that demonstrates various features of the new CD.

WRRRC produced Desert Landscaping 2.0 as part of its educational outreach program. Sensible desert landscaping means water savings.



Arizona Water
Resource

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