

The photo to the right is the Casa Grande Power Plant. Construction began about 18 months ago and is expect to be completed at the end of the summer. This plant was the second plant sited in the growing list of power plants proposed for in Arizona.

The increasing number of power plants wanting to locate within the state has prompted speculation that Arizona may become a "power farm," an apt description since some of the plants intend to use water from retired farm lands. The proposed plants could possibly double the state's generating capacity, a supply much beyond its immediate needs. Energy will be generated for out-of-state sale.

Power or its lack has been much in the news lately, the issue precipitated by the crisis in California, Arizona's archwater rival. The water-power connection is important in various ways, the most obvious being water is needed to generate power. In this light, water used to generate power for California will likely attract special notice. But the water-power issue is much broader than the Arizona-California water rivalry, raising questions about Arizona's use of its water resources to its best economic advantage.

The lead feature of this newsletter discusses power plants and water use. A feature in the next edition of the AWR newsletter (March-April) will focus on the economic implications of power plants using state water. (Photo: Ellen Endebruck)



## Power Plants in Arizona – an Emerging Industry, a New Water User

### *Is review under way to ensure wise water use?*

The generation of electrical power is a growth industry in Arizona, with 19 power plants proposed for various areas of the state. The surge in the number of power plants wanting to operate within Arizona is a relatively recent occurrence. The movement began in the fall of 1999 when a power plant was proposed for the Kingman area and continues with Nogales and Vail mentioned as possible future sights. One official remarked that Arizona promises to be a hub for power plants.

The privately owned plants are being constructed to profit from the emerging energy market resulting from deregulation. Called merchant plants, these power operations are gearing up to sell energy in western markets. Various reasons are given for Arizona's attraction as a sight for these plants including access to natural gas, lower cost of land, labor and operations, and less restrictive regulatory statutes.

One other decisive reason given for Arizona's suitability for power plants deserves special attention and scrutiny – the availability of water. This raises some critical and fundamental water questions: How much water will the power plants use? What is to be the source of the water? What review process ensures that power plant water use is consistent with state water priorities and policies?

The table on the next page lists power plants and their water use. Water for the plants will come from various sources. For example, Harquahala and Sundance will use CAP water. Red Hawk's main supply is expected to be effluent. The Casa Grande plant

*Continued on page 2*

C O N T E N T S	
Water Vapors .....	3
News Briefs .....	4
AZ Water	
Community News .....	5
Guest View .....	6
Legislation and Law .....	7
Publications .....	8
Special Projects .....	9
Announcements .....	10
Calendar of Events .....	11

*Power Plants...continued from page 1*

will use either CAP water or effluent. Kyrene plans to use either Salt River Project surface water or effluent supplied by City of Tempe. San Tan will use either SRP water or water from the City of Gilbert. Plants using surface water will rely on groundwater as a backup supply.

Groundwater, however, will be the main source for the power plants, contributing about two-thirds of the supplies, or 67,900 of a total of 97,550 acre-feet. Much of this groundwater will come from retired farmland. For example, the operators of Mesquite and Arlington Valley plants purchased agricultural land within the Phoenix Active Management Area. The land was retired, with the grandfathered irrigation right converted to Type I water right for use in the plants. Big Sandy and Griffith, both located outside AMAs, also will rely on groundwater.

Does the water use of projected power plants pose a problem to Arizona? Viewed individually the plants do not consume large quantities of water, but their collective water use is significant. Also, the likely prospect that additional power plants will be proposed for the state raises further water concerns. This provides grounds for a debate about the implications of an increased number of power plants using a greater share of the state's water.

Some find little reason for concern. They view the new and ex-

panded plants and their water needs as mainly a shift in water use from agriculture to industry. Water formerly used for agriculture will now be utilized for power generation.

In fact, a case can be made that shifting water rights from agriculture to industry results in a water savings because of the formula that is used to convert an irrigation grandfathered right to a Type I water right. The five acre-feet used annually to irrigate cotton converts to a three-acre foot Type I water right. Proponents of the proposed Toltec power plant say it would annually pump about 10,000 acre-feet of groundwater, in contrast to about 13,000 acre-feet of existing agricultural uses.

The water efficiency of the new plants also is noted in their favor. In contrast to coal fired plants, the new operations rely on natural gas and use significantly less water, about 40 to 60 percent less water per megawatt than a coal fired plant.

Further, it is pointed out that the economic benefits the plants offer to small towns and rural areas are not to be overlooked. For example, some residents of Mobile, a small town of about 75 families between Gila Bend and Interstate 10, said they support the Montezuma plant because it promises paved roads, access to utilities and school improvements. Not all Mobile residents agree, however, some raising concerns about air pollution and sinking water tables. Plants proposed for the Gila Bend and Coolidge areas have

garnered local support. The consensus of the Gilbert community on the other hand is strongly against the expansion of SRP's San Tan facility. Opposition also seems to be growing to the proposed Toltec plant. Objections include the plant's proximity to the new Ironwood National Monument and its water use.

Others, while conceding some advantages to power plants locating within the state, are still uneasy about the development. They question whether long-range planning has been done to determine if power plants represent the best use of the state's water resources. They fear that an over commitment of water resources for power generation will possibly close out future options for other economic opportunities. Also some are concerned about Arizona exporting power out of state. They argue that using water to generate power to benefit other states is tantamount to allowing that state use of Arizona's water. This contention would likely cause many Arizonans to wax indignant at the thought of Arizona-generated power exported to California, a likely scenario.

To help settle various environmental issues, including water supply and use, a Line Siting Committee evaluates power plant applications to decide whether to issue a Certificate of Environmental Compatibility. The application then goes to the Arizona Corporation Commission for final approval. The LSC examines a broad range of environmental issues, including present and future availability of water. A member of the Arizona Department of Water Resources serves on the committee, and DWR hydrolo-

## Power Plant List

## Power Plants Approved by the Line Siting Committee

Power Plant	Power Output (Mwatts)	Water Use (AF/Yr)
Griffith	520	4,200
Harquahala	1,040	6,400
Mesquite	1,250	7,500
Arlington Valley	580	6,800
Red Hawk	2,120	13,300
Buckeye 43 <sup>rd</sup> Ave	650	5,000
Panda Gila River	2,080	10,000
Gila Bend	845	7,500
Sundance	580	600-950
Kyrene	250	1,600
Casa Grande	520	4,200
Sub totals	10,435	67,450

Groundwater Sub total 44,300

Surface Water Sub total 23,150

## No Certificate of Environmental Compatibility Required:

South Point	540	4,800
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## Power Plants in review or proposed:

Big Sandy	720	3,800
San Tan	1,125	6,500
Toltec	2,000	10,000
Montezuma	520	5,000
Sub total	4,365	25,300

## Water Use Summary:

Total Water Use: 67,900

Total Groundwater Use: 67,900

Total Surface Water/Effluent Use: 29,650

Groundwater Sub total 18,800

Surface Water Sub total 6,500

Source: Arizona Department of Water Resources

Continued on page 12



## Water Vapors

### Raising Water Consciousness

Water awareness, once mostly focused on local conditions, has expanded far beyond the close at hand. Whereas during frontier days the chief concern was to locate an adequate water source to support a ranch, farm or settlement, most citizens now realize they have a stake in water as a state, regional and national resource. Further, an expanded water consciousness encourages awareness of global developments and even conditions in outer space.

In fact, water in outer space has recently been a topic of special interest. Scientists have lately made some notable discoveries researching water in outer space. Instead of the solitary prospector traversing desert spaces in search of a watering hole we now have the Lunar Prospector spacecraft circling the moon and reporting back to earth that about 10 million tons of water may be frozen near the moon's pole. Scientists speculate that sufficient water may be available to build a moon village.

In further news from outer space, photos from a satellite orbiting Mars suggest that the red planet once had an abundance of lakes and even small seas. Another mission is planned this spring to further investigate the possibility of Martian water. Earlier the Hubble space telescope detected a significant flux of water at Saturn's inner ring.

Such discoveries add new meaning to the expression, "Water, water everywhere, but not a drop to drink."

### Taking Action

The value of whatever new water consciousness may be emerging, however, will be determined more by a sensitivity to global water conditions than a studied awareness about water in outer space. Statistics demonstrating the deadly effects of the lack of adequate water supplies in various countries sound a mantra of woe. According to the United Nations every eight seconds a child dies of a water-related disease. More than

five million humans die each year due to diseases related to unsafe drinking water and improper sanitation disposal. About a quarter of the earth's human population lacks proper access to water and sanitation. About 80 percent of all diseases and over one-third of deaths in developing countries are the result of consuming contaminated water. The UN reports that about one-third of the world's population lives in countries experiencing moderate to high water stress, partly the result of increased demands due to growing populations. Estimates indicate that by 2025 about two-thirds of the world populations will be under water stress conditions. Such sad repetitive statistics are almost mind numbing.

It is too easy to consider such conditions as remote to our own water concerns, their effects as out of sight as is evidence of water on the moon or Mars. Yet, if a broadening water consciousness does exist and if it raises ethical concerns, then some people will want to make a contribution toward solving global water problems, even if it is at the personal level.

Recently "U.S. Water News" printed a list of organizations with the primary mission of helping to provide safe drinking water to villages. The list is provided below.



*Villagers in Malawi now have safe drinking water available from a well built with the assistance of Lifewater International. Photo courtesy of Lifewater International.*

By contacting such organizations, a church, agency or civic group can contribute to the effort of helping a village meet its water needs.

**Lifewater International**, contact: William Ashe, PO Box 3131, San Luis Obispo, CA 93403, 888-LIFE-H2O, [www.lifewater.org](http://www.lifewater.org); **Water For Life**, contact: Willis Miller, PO Box 456, Kalona, IA 52247, 319-656-5433, [waterforlife@hotmail.com](mailto:waterforlife@hotmail.com); **Waterlines**, contact: David Douglas, 302 E. Coronado Rd., Santa Fe, NM 87501, 505-988-5642, [douglasd@usurf.com](mailto:douglasd@usurf.com); **Water for People**, contact: Paul Sobiech, 6666 W. Quincy Ave., Denver, CO 80235, 303-734-3490, [www.water4people.org](http://www.water4people.org); **Water Partners International**, contact: Gary White, PO Box 654, Columbia, MO 65205, 573-447-2222, [www.water.org](http://www.water.org); **World Vision**, PO Box 1131, Pasadena, CA, 91131, 800-448-6437, [www.wvi.org](http://www.wvi.org)



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## News Briefs

### Lawmakers Target Army Corps of Engineers

Efforts will continue in Washington this year to reform the U.S. Army Corps of Engineers, the government's principal agency for water-related construction projects, with a movement underway to form a Corps Reform Caucus. Representatives Blumenauer (D-OR), Gilchrest (R-MD), Kind (D-WI), Tauscher (D-CA), Shadegg (R-AZ) and Tancredo (R-CO) hope to organize a 50 to 60 member caucus. In a letter to their colleagues, the representatives described themselves as a "bipartisan, geographically and ideologically diverse group that shares a common concern about the Army Corps of Engineers' projects and policies, and their lack of financial accountability and record of environmental protection."

### FEMA Pays Victims of Oct. Flood

Homeowners in Maricopa and La Paz counties victimized by floods last October will soon be able to sell their flood-damaged property and move to unthreatened areas. The Federal Emergency Management Agency recently announced a combined payment of \$1.33 million to both counties, to be used as a buyout to flood victims to prevent a similar catastrophe in the future.

The money is in addition to \$9 million in emergency federal funds for use to repair infrastructure. The two towns hit hardest by the flood are the main focus of the buyout, with Aguila in Maricopa County getting \$732,975 and Wenden in La Paz County receiving \$596,910.

"Nature has shown us that the area is dangerous," said Jan Brewer, chairwoman of the Maricopa County Flood Control District. "We want to maintain the area as open space and move people out of harm's way."

People are not being forced to leave the area but they remain at their own risk. Mike Ellegood, chief engineer and general manager of the Flood Control District, explains, "It's a voluntary relocation, but they're

on their own in the event of another flood."

Aguila and Wenden are situated at the edge of Centennial Wash. Beginning Oct. 21, heavy flows filled the usually dry, shrub-and-tree-filled wash, with water flow peaking at 24,250 cubic feet per second. The officially designated "100-year flood event" swept one man to his death and destroyed more than 200 buildings.

### Chilled Water to Cool Hot Phoenix Buildings

A district energy-efficient cooling system that relies on chilled water is being installed to cool downtown Phoenix buildings. The first of its kind in Arizona, the system provides an option to the costly installation of individual air conditioner systems in each building. Recycled chilled water, pumped from ice plant to buildings and back again, is the central feature of the system.

The cooling source will be the plant now used to cool Bank One Ballpark. The plant is being expanded for greater capacity to service buildings that will be relying on the system for their cooling.

Each night the plant will manufacture three million pounds of ice, at a time when utility loads and rates are the lowest. The ice will be stored in a tank measuring 70 feet long, 40 feet wide and 40 feet high. In the heat of the day, at peak cooling times, the ice will be melted. The chilled water will be pumped through 24-inch diameter pipes in an underground distribution network to cool on-line buildings. The water pumped back to the ice plant for reconditioning will be about 54 degrees.

Two new Maricopa County buildings will be on the cooling loop, the 600,000 sq. ft. Fourth Avenue jail and a new 500,000-640,000 sq. ft. administration building, both scheduled to be completed in summer or fall of 2003. The county expects to save about \$800,000 per year with the new district cooling system. Along with the Bank One Ballpark, other downtown buildings to be included in the system are the Dodge Theater, now under construction, and the Crown Plaza Hotel.

## AZ WaterCommunity NEWS

The **Central Arizona Project** recently awarded \$15,000 to nonprofit groups involved in water education in central and southern Arizona. Recipients of the awards are: Arizona Humanities Council (\$3,000); Pima County Cooperative Extension (\$2,500); Southern Arizona Regional Science and Engineering Fair (\$2,500); Phoenix Zoo (\$2,000); Water Resources Research Center, University of Arizona (\$1,500); Central Arizona Environmental Education Center (\$1,000); Fountain Hills Museum and Historical Society (\$1,000); Arizona Environthon (\$500); the Melvin E. Sine Elementary School (\$700); and Tucson Chapter Hydrological Society (\$300).

Funding was provided through the Charitable Contributions program to organizations within CAP's three-county service area involved in water education issues and environmental projects supportive of CAP's efforts. Grants are awarded in June and December of every year. Grants awarded in June must be received by May 1; those awarded in December must be received by November 1.

The Arizona Supreme Court has assigned **Judge Eddward Ballinger, Jr.** to replace Judge Susan Bolton as the presiding judge for the Gila River adjudication. He assumed his duties as a Maricopa Superior Court judge in May 1998. Earlier the Supreme Court indicated that once the Gila River adjudication judge was appointed the judge cannot be disqualified by a party except for cause. In other civil cases a party can request a "change of judge" without specifying a reason. What makes the adjudication different is that there are 27,000 involved parties. Hence the Supreme Court's directive against such preemptory challenges.

## Water Conservation News Briefs

### Critics Say Law Urging Tenants to Conserve is Flawed

Concern has been raised that legislation intending to promote water conservation in apartments and other common-metered dwellings might not achieve its intended goal. When it revised the Landlord-Tenant Act the Arizona Legislature intended to establish a system for renters to pay their own water bills, rather than paying it as part of the rent. Direct, first-hand knowledge about water use and cost would be an incentive for renters to conserve water.

The law also allows all water used at the complex, including irrigation of common areas, refill of the pool and water for fountains, be included and apportioned to tenants.

Critics, including some people who initially supported the bill, now believe the law is flawed, that unintended consequences undermine its objectives. They say the main problem is that the law allows the landlord wide leeway in deciding methods of apportioning water costs to tenants.

Landlords could choose submetering, which accurately records renters' water use, although renters would be dependent on landlords to make repairs or retrofits to ensure water savings. Submetering and sub-meter reading, however, is expensive with a long payback on the initial installation.

Landlords would more likely choose what is known in the industry as a Ratio Utility Billing System (RUBS) as a method of water cost allocation. Various criteria could then be used to determine water cost including apportionment on square footage of the unit, number of residents, type of unit, number of water-using fixtures or "any other method that fairly allocates the charges and that is described in the tenant's rental agreement."

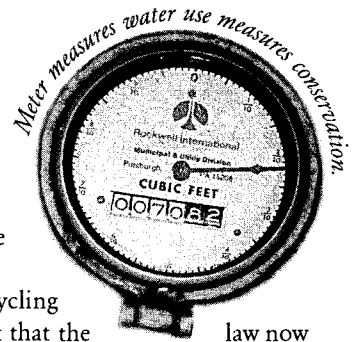
With a RUBS approach renters pay their own water use (and possibly also some of the water used by others). Renters also might be charged for water wasted on the property, with no recourse to enforce conservation, except civil action, since the law does not require the landlord to be water efficient. Instead of linking individual water use and costs, such systems merely pass such cost on to the renter, including the allocation and billing costs.

Critics fear the law may erode gains water providers have achieved in getting owners and managers of multifamily housing to improve water efficiency. They urge that the law be amended to better link a tenant's individual water use and its cost.

### New Regs for Reclaimed Water Reuse

Recently approved by the Governor's Regulatory Review Council, revised regulations relating to reclaimed water use are now in effect. Much of the revised regulations relate to reclaimed water from wastewater treatment plants. For example, the new reuse rules are linked to the Aquifer Protection Permit regulations, with wastewater treatment plants now solely responsible for the production of reclaimed water for reuse, including monitoring and reporting for compliance purposes.

Private citizens interested in residential graywater reuse also have reason to heed the new regulations. Those planning graywater systems now have established regulations and standards to meet. Those already recycling their graywater can take comfort that the law now condones their hitherto illegal activities. The new regulations became effective January 12.



For the purpose of the regulations, graywater is defined as water from washing machine, bath sinks, bathtubs and showers. It excludes kitchen sink water, dish washer water and water from toilets, which is black water. To be covered under the new regulations a residence must generate less than 400 gallons of graywater per day and must meet a simple set of performance standards. For the complete wording of the new performance standards, see A.R.S 49-203(A)(6), R18-9-714 or contact the Arizona Department of Environmental Quality at 1-800-234-5677.

### Final Washing Machine Efficiency Standards (Almost) Set

The U. S. Department of Energy has published final federal guidelines on washing machine energy and water use efficiency. The new standards were mandated by the Energy Policy and Conservation Act, as amended in 1992, the same law that adopted plumbing industry consent standards for toilet, showerhead, and faucet water use. As with the plumbing standards, the appliance industry assisted in writing the washing machine standards.

Published January 12 in the Federal Register, the guidelines emphasize energy savings, but also include provisions relating to water use. By 2030, the clothes washer standards are expected to cut water use by 10.5 trillion gallons.

Implementation of the standards will be in two stages. The first stage is effective January 1, 2004. Under stage one, machines meeting the standards will save 4 gallons per load compared to today's machines. Stage two is effective January 1, 2007. In stage two, water savings per load will average 18.1 gallons. Stage two savings are based on industry data on projected water use by horizontal axis machines, the only ones that can achieve such efficiencies.

Annual utility bill savings will offset average appliance cost increases. For year 2004 machines, average cost will increase by \$53 each, offset by a projected \$15 per year in utility bill savings. For the more efficient year 2007 machines, average cost per machine will be \$249 more than current prices, offset by an estimated \$48 per year in utility bill savings.

(Since the above was written the Bush administration has halted implementation of this and other environmental regulations issued during the final months of the Clinton administration pending additional review.)





## Guest View

# Now is Time to Preserve Rural Areas Along Upper Santa Cruz River

*Terry Sprouse contributed this Guest View. Terry was recently hired as a senior research specialist at the University of Arizona's Water Resources Research Center. Before coming to the WRRC, he was border coordinator for the Arizona Department of Water Resources and worked in Nogales at the Santa Cruz Active Management Area. Terry recently received a Ph.D. from the UA Office of Arid Lands Resource Sciences. His focus of study was water management on the U.S.-Mexico border.*

Future urbanization and industrialization of rural areas along the Santa Cruz River, throughout Sonora and up to Rio Rico, Arizona, could adversely affect water quality and reduce surface flows into ecologically important and increasingly endangered riparian habitat along the river. Presently, the land surrounding the Santa Cruz River in this region is primarily rural. However, the preservation of the quantity and quality of river water in the binational Santa Cruz River will depend upon to what uses land is put, in the area adjacent to the river.

Riparian ecosystems are declining throughout the southwestern United States and northern Mexico, and many have disappeared altogether. The health and sustainability of local communities are linked to riparian ecosystem health and to water quality. Riparian ecosystems moderate the effects of heavy rains by allowing soils to absorb, and later slowly release, the water. This process reduces erosion and increases groundwater recharge. Riparian ecosystems also improve water quality by filtering out non-point source pollutants. The Santa Cruz River is also a critically important binational corridor for migratory bird and mammal species in the Sonoran Desert region. In this region, it is one of only three major streams that cross the international boundary.

In addition to adversely impacting a fragile and rare natural ecosystem, urbanization and industrialization of this area could also greatly reduce potable water availability and water quality to the sister cities of Nogales, Sonora and Nogales, Arizona (Ambos Nogales). Both cities presently extract roughly 50 percent of their potable water supplies from the Santa Cruz River. Symptomatic of the demographic explosion in the U.S.-Mexican borderlands, Ambos Nogales has experienced rapid population growth on both sides of the border (the population has increased from 84,000 in 1980 to 152,000 in 1995). The consequence of population growth is more urban demand for water and urbanization of historically rural areas.

There are signs that the rural nature of the river area east of Ambos Nogales is changing, with the recent development of land for

a housing project next to the Santa Cruz River in Kino Springs, Arizona, and heavily populated *colonias* edging closer to the river corridor in Nogales, Sonora. However, these land use transformations are still relatively new, giving researchers and planners an excellent opportunity to understand, and possibly to moderate and guide the processes of change on both sides of the border in advance of further detrimental impacts to the watershed or human communities dependent upon its resources.



*Future urbanization and industrialization of rural areas along the upper Santa Cruz River could reduce water quality and pose a threat to riparian habitat. (Photo: Barbara Tellman)*

In Arizona, the water rights along the Upper Santa Cruz River may very shortly go through an adjudication process to determine who has a right to appropriate surface water. There is also a strong interest in establishing a water district for the area, to more carefully manage scarce waters. If these two processes take place, it could result in more concentration of water rights, since the municipalities of Rio Rico and Nogales hold some of the oldest water rights in the area. This points to more urban or suburban development along the Santa Cruz River.

In the Mexican section of the watershed, new policies that allow private ownership of former communally owned lands (called *ejidos*) are moving water rights allocation towards private, local interests. These actions indicate that water rights may become more concentrated in Mexico, increasing the probability of urban development in rural settings. The relatively low value of rural land along the Santa Cruz River could attract home developments, if not industry, to the area.

A positive step was taken to protect land use in the San Rafael Valley in 1998 when the state purchased development rights and imposed conservation restrictions (or easements) on the San Rafael Ranch, located near the headwaters of the Santa Cruz River. The plan prevents the land from being fragmented and subdivided for residential use. Local farmers have also met in Santa Cruz County to discuss how to protect their ranches and farms from being converted to urban uses. However, much still needs to be done to protect reaches of the river both in northern Sonora and in southern Arizona. In the near future demand for land and water will increase the pressure to convert this rural area to housing and industry.

Unless the respective federal governments take the unlikely action of establishing biosphere reserves in the threatened areas, it will be up to the initiative of local stakeholders to preserve the rural nature of the river. The window of opportunity is open, but perhaps not for long, to change the course of future urbanization of this vital area by providing long-term protection of drinking water sources and riparian areas.



## Legislation and Law

### EPA Sets New Arsenic Level for Drinking Water

EPA announced a new arsenic standard for drinking water that is five times more stringent than current regulations. According to the new rule allowable levels of arsenic in drinking water is 10 parts per billion (ppb), a significant reduction from the current 50 ppb level. The new U.S. standard now conforms to that recommended by the World Health Organization.

Subject to the new standard are all 54,000 U.S. community water systems, serving 254 million people. Of that number, EPA estimates that roughly five percent or 3,000 community water systems, serving 13 million people, provide drinking water exceeding the new arsenic standard. These systems will need to take corrective action.

The standard also applies for the first time to 20,000 water systems serving people only part of the year. These include schools, churches and factories. EPA figures that about 1,100 of such systems, serving two million people, will need to take corrective action. The systems most affected by the new standards serve fewer than 10,000 people.

Water systems in western states and parts of the Midwest and New England that rely on underground sources are likely to have higher levels of arsenic in their drinking water and be more affected by the new standard. Arsenic occurs at higher levels in underground sources than in surface water from lakes, reservoirs, rivers, etc. For example, Tucson Water, relying heavily on groundwater, estimates that six or seven of its approximately 190 wells will require either treatment or closure to meet the new standard.

Studies have identified various hazards of long term exposure to arsenic in drinking water including cancer of the bladder, lungs, skin, kidney, nasal passages, liver and prostate. Other health problems associated with arsenic exposure include cardiovascular, pulmonary, immunological, neurological and endocrine effects.

EPA set the previous 50 ppb arsenic drinking water standard in 1975, based on a Public Health Service standard established in 1942. After reviewing updated scientific data on arsenic, the National Academy of Sciences recommended in March 1999 that EPA lower the standard. In response, on June 22, 2000, EPA proposed a preferred drinking water standard of five ppb for arsenic, but solicited comments for standards of three, 10 and 20 ppb. Evaluating over 6,500 pages of comments, EPA settled on the 10 ppb standard. The boost from 5 ppb to 10 ppb was due to pressure from industry groups and agencies within the Clinton administration.

Organizations wanting a lower standard include the Natural Resources Defense Council. Erik Olson, senior attorney for the conservation group, acknowledged that the new standard was a "significant

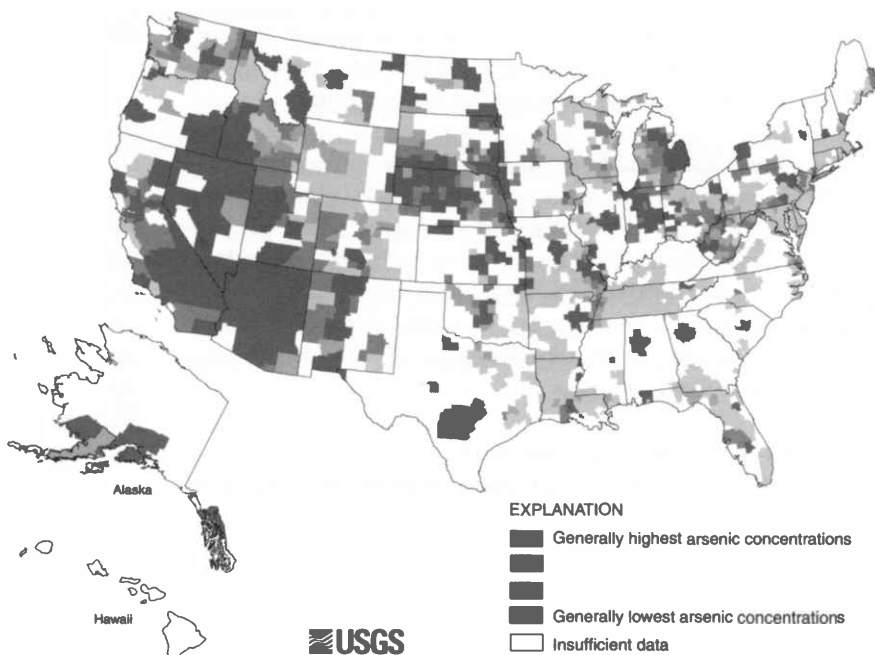
step forward for public health," but urged "the agency to lower the arsenic level in drinking water to a level of three ppb or less when it carried out its mandatory review of the standard sometime in the next six years."

The new standard is expected to challenge the technical, managerial and financial capabilities of small water systems — and many large systems as well. EPA estimates that 90 percent of households served by systems needing treatment will have increased annual costs of \$60 or less per household. Tucson Water estimates, however, that costs to its customers of meeting the new regulation will exceed \$60. Most water systems are allowed five years to comply with the new rule. Small systems needing financial assistance to comply can receive compliance extensions of up to nine years.

To retain primacy, state drinking water agencies must adopt the new rule or a more stringent rule within two years, with a time extension possible if needed. EPA will be releasing implementation guidance to assist agencies in preparing for arsenic rule implementation.

According to the Safe Drinking Water Act stakeholders disagreeing with the agency can file for judicial review of a final rule in the U.S. Court of Appeals for the D.C. Circuit. Such a petition must be filed within 45 days of the date of promulgation (the date of Federal Register publication).

Information about the new arsenic standard is available at [www.epa.gov/safewater/arsenic.html](http://www.epa.gov/safewater/arsenic.html) For information about public water supplies in U.S. communities check [www.epa.gov/safewater/dwinfo.htm](http://www.epa.gov/safewater/dwinfo.htm)



The above map and related information are available at <http://co.water.usgs.gov/trace/arsenic/>



## Publications

### United Geological Survey Reports

The following USGS reports dealing with water in Arizona were recently published:

"Hydrogeology of the regional aquifer near Flagstaff, Arizona 1994-1997" U.S. Geological Survey Water-resources Investigations Report 00-4122, by D.J. Bills, Margot Truini, M.E. Flynn, H.A. Pierce, R.D. Catchings and M.J. Rymer;

"Occurrence and quality of surface water and ground water within the Yavapai-Prescott Indian Reservation, central Arizona, 1994-1998" U.S. Geological Survey Water-Resources Report 00-4144 by G.R. Littin, Margot Truini, H.A. Pierce and B.M. Baum;

"Ground-water, surface-water and water-chemistry data, Black Mesa area, northeastern Arizona – 1999" U.S. Geological Survey Open-File Report 00-453, by B.E. Thomas and Margot Truini.

For more information about the USGS reports, write District Chief, U.S. Geological Survey, Water Resources Division, 520 N. Park Avenue, Suite 221, Tucson, AZ 85719-5035. Report copies may be purchased from: U.S. Geological Survey, Information Services, Box 25286, Denver Federal Center, Denver, CO 80225-0046.

### Report to Congress: EPA Studies on Sensitive Subpopulations and Drinking Water Contaminants

*Environmental Protection Agency*

This is an initial report of the ongoing effort by the EPA to identify and characterize subpopulations which may be more sensitive to and at greater risk from exposure to drinking water contaminants and water borne pathogens. The report confirms that most studies show certain subpopulations, such as infants, children and those with weakened immune systems are more sensitive to contaminants. The report may be obtained at [http://www.epa.gov/safewater/standard/rtc\\_sensubpops.pdf](http://www.epa.gov/safewater/standard/rtc_sensubpops.pdf)

## Everything You Wanted to Know About State Government...

*In its travels from source to user, water flows through various courses, including river beds, canals and pipes. The following resources are for those tracking its political course, through the legislative and regulatory process.*

The Capitol Times publishes various publications to help those seeking information about the workings of Arizona state government. The publications help answer the basic question: What individuals and/or committees are involved in what areas of state government? The publications are invaluable when researching state government's involvement with water issues.

### 2001 Government Resource Directory

This is a directory of Arizona's elected and administrative officials and includes telephone numbers and addresses for executive offices, courts, the Legislature, the major state agencies and the Arizona congressional delegation. \$8.95 (\$5.50 for Capitol Times subscribers), plus \$3 per copy postage and handling.

### The Green Book Guide to the 45<sup>th</sup> Legislative Session

The Green Book provides biographical sketches, photographs and phone numbers for all legislators along with detailed information on caucuses and committees and full directories to legislative staff. It is advertised as "Everything you need to know about the Arizona Legislature, right at your fingertips!" \$5.75 (\$4.75 for Capitol Times subscribers), plus \$1.50 per copy for postage and handling.

### Citizen Government, October 2000

Published twice-yearly, this directory list individuals serving in appointed position on Arizona's licensing and regulatory boards and committees, with address and phone number of each board, the names of the members and the expiration dates of their terms. A brief description of the boards's regulatory activities is included. \$4.95 (\$3.95 for Capitol Times subscribers), plus \$2.50 per copy for postage and handling.

To order the preceding publications contact: Original Source, Arizona Capitol Times, P.O. Box 2260, Phoenix, AZ 85002

### LOLA, Legislation On Line Arizona

Designed for the professional lobbyist, this on-line service provides password-protected access to comprehensive bill information, including current status, committee action, floor actions, bill and amendment texts and fact sheets, as well as exclusive news notes, bill summaries, striker-amendment lists and veto messages. For more information contact: Arizona News Service, Inc., 1835 W. Adams, Phoenix, AZ 85007; 602-258-7026; FAX 602-258-2504; email: [lola@aznewsservice.com](mailto:lola@aznewsservice.com)

Information about the Arizona Legislature and its activities also is available at the **Arizona State Legislature website** – <http://www.azleg.state.az.us/> The site is divided into House of Representative and Senate websites. Various website subheadings include members, bills, proceedings, posting sheets, floor calendar, budget and online resources.



*Arizona State Library,  
Archives and Public Records,  
Archives Division, Phoenix  
#97-1543*





## Special Projects

### Urban Effects on Waterways Studied

Urbanization results in fluvial systems that contrast sharply with more pristine streams. The cycling and retention of important nutrients like nitrogen and phosphorus, which have been shown to limit rates of photosynthesis in other systems, as well as biotic variables are expected to be markedly different in urban watercourses.

Urbanization creates a patchwork of land uses resulting in an extremely heterogeneous landscape. These patches create barriers and pathways for the flow of water, materials and energy. Thus, urban systems provide ideal environments for studying how spatial heterogeneity and patch configuration affect ecosystem processes (like nutrient retention and primary production) and, in turn, how ecosystem processes affect these spatial patterns.

Lisa Dent and Nancy Grimm, Arizona State University ecologists, working in Sycamore Creek, a comparatively pristine Sonoran desert stream, have demonstrated that the concentrations of nutrients in stream water can be extremely variable in space and time. They argued that the observed spatial variation in nitrogen concentrations was produced when nutrient-rich subsurface waters enter the surface stream as a result of fine-scale changes in the stream channel morphology (e.g. water exiting sandbars) or coarse-scale changes in the landscape (e.g. upwellings produced by the narrowing of the valley floor). On the surface, algal uptake of nutrients causes downstream declines in nutrient concentrations. Because nitrogen is limiting in Sycamore Creek and because phosphorus tends to be controlled by physical factors, nitrate shows greater spatial variation than in Salt River Project canals.

Urban fluvial systems have often been profoundly modified. They may have channel morphologies that constrain flow paths, limit interactions between surface and subsurface flows, and alter the relative proportion of runs, riffles and pools along a stream. Additionally, they may receive elevated nutrient inputs from the surrounding landscape, especially during storms. Nancy Grimms and John Roach, professor and graduate student respectively in ASU's Department of Biology, are investigating how these changes affect nutrient dynamics in two contrasting systems: the Tempe-Southern Canal and Indian Bend Wash, a flood-control project in Scottsdale, Arizona. The research is supported by the ASU's Central Arizona-Phoenix Long-Term Ecological Research project.

The Salt River Project delivers water from the Salt River's Granite Reef Reservoir and from the Colorado River (via the Central Arizona Project Canal) to the Phoenix metropolitan area. The Salt River Project relies on series of nine main canals stretching over 131 miles to distribute the water. Approximately ten miles west of the dam, the Southern Canal, which originates at the dam, splits into the Tempe and Consolidated Canals. Like many water supply canals in the region, the Tempe-Southern Canal is cement lined, limiting the interactions between surface and subsurface waters.

Water samples were collected every 50 m over a 20-km stretch of the South-Tempe Canal and analyzed for nitrogen, phosphorus and

chloride. Preliminary results suggest that the canal may be phosphorus limited as the concentration of SRP remained at or below the detection limit. Nitrogen concentrations (specifically, nitrate-nitrogen) were high and increased by an order of magnitude over the study reach.

Most of the increase in nitrate concentration appears to result from the addition of groundwater from a series of wells along the canal's length. Although nitrogen concentrations declines between wells, whether or not this decline can be ascribed to uptake by algae or is simply a result of the mixing of the groundwater with the canal-water remains unclear. Nevertheless, these inter-well stretches appear to be relatively distinct patches with unique water chemistry.

Designed to provide both flood control and recreational opportunities, Indian Bend Wash drains the McDowell Mountains and feeds the Salt River. Flood control was achieved by protecting the floodplain and constructing a series of parks. In addition, a greenbelt was constructed that runs from just north of the Arizona Canal, through Scottsdale, and empties into the Salt River bed. Several permanent lakes were constructed along this section. During floods, the entire floodplain may be inundated. The channel is designed to accommodate the 100-year flood of 40,000 CFS. The modifications have resulted in a spatially heterogeneous system that is ideal to investigate how human-modified pattern affects process.

When the system is not flooding, the lake levels are maintained with water taken from a variety of sources. With the exception of the McKellips road lake, the majority of the lakes south of the Arizona Canal are fed water from the canal itself, sometimes as often as every third day. Historically, groundwater was used to fill McKellips, but contamination from the Motorola Superfund site currently precludes the use of groundwater. Consequently, the City of Scottsdale currently relies on potable water to fill this lake. The McCormik Ranch Lakes directly north of the Arizona Canal rely on groundwater wells for their water. These lakes do not release water into the lower wash except during floods.

Four initial surveys conducted in early 2000 have shown that surface water chemistry in Indian Bend Wash is highly variable in space and time. Although the mechanisms behind this variation are unknown, some patterns are apparent. For example, nutrient concentrations appear less spatially variable during floods than at other times. During a flood on March 7, 2000 phosphorus concentrations at most sampling points were elevated over other sampling dates whereas nitrogen (nitrate-nitrogen) concentrations in flood water were of intermediate values. In fact,  $\text{NO}_3\text{-N}$  was generally more variable both spatially and temporally than SRP. Our current efforts are focused on how variations in lake morphometry and differences in water sources are affecting the functioning of the lakes within Indian Bend Wash.

*For additional information about the research contact Nancy Grimm (nbgrimm@asu.edu) or John Roach (john.roach@asu.edu)*



## Announcements

### Symposium to Walk, Talk the Santa Cruz

A special event, "Walking and Talking the River: A Symposium to Explore the Future of the Santa Cruz River in the Tucson Urban Corridor" is scheduled for the weekend of March 30-April 1. Friday's program, 5-8 p.m., features a roundtable of Tucson old-timers reminiscing about the river's past and its legends. Festive activities also are scheduled. The all-day Saturday session will feature speakers discussing river developments, including river rehabilitation and Rio Nuevo options. Poster sessions will be conducted during both days. The events will be conducted at Manning House, 450 West Paseo Redondo, Tucson, AZ. On Sunday field trips will be conducted along the river to sites of planned projects. The free event has multiple sponsors including the Santa Cruz River Alliance, U.S. Corps of Engineers, Pima County, City of Tucson, U.S. Bureau of Reclamation, ADWR, Sonoran Institute, Arizona-Sonoran Desert Museum, Friends of the Santa Cruz River. For information or to register, contact Rillito Consulting Group 622-1933.

### AHS Call for Abstracts

The Arizona Hydrological Society has issued a call for abstracts of papers and posters to be presented at its 2001 symposium to be conducted in Tucson Sept. 13-15. Abstracts should be one page typed entries that include the title, author(s), subject, and content of the proposed talk or poster presentation. Oral presentations will be limited to 20 minutes. Potential topics include groundwater, contaminants, subsidence, wetlands, and riparian restoration. The deadline for abstract submission is April 3. For more information, visit [www.AZHydroSoc.com](http://www.AZHydroSoc.com) or contact Steve Brooks, phone: 520-888-8818; email: [sbrooks@golder.com](mailto:sbrooks@golder.com) or Dawn Garcia, phone: 520-792-2800; email: [dgarcia@theitgroup.com](mailto:dgarcia@theitgroup.com).

### UA El Dia de Agua & Kisiel Lecture

The University of Arizona's Department of Hydrology and Water Resources' Kisiel Lecture will feature Dr. Daniel Loucks, the renowned water resource scientist from Cornell University. The lecture is scheduled for April 4 at 11:00-12:30 at the UA Center for Creative Photography Auditorium. The El Dia de Agua student presentations will take place from 3:30-6:00 in room 110 of the UA Economics Building. For more information, contact Joy Rogers, phone: 520-621-7120; email: [joy@hwr.arizona.edu](mailto:joy@hwr.arizona.edu)

### 10<sup>th</sup> Annual National River Cleanup

Each year, National River Cleanup Week encourages cleanup of local waterways and promotes the importance of keeping rivers and streams clean. This year's event is May 12-19. Civic clubs, businesses, fishing groups and conservation groups join together across the country to organize and execute cleanups. In Arizona last year



*The San Pedro River was the site of a National River Cleanup Week project last year. (Photo: Barbara Tellman)*

groups worked along the San Juan and San Pedro rivers. National River Cleanup Week assists local groups with information on how to conduct a successful river cleanup, how to promote the event, and provide safety tips. Groups that register their cleanup may receive free National River Cleanup trash bags. For information about the event check: [www.americaoutdoors.org/nrcw/natao10.htm](http://www.americaoutdoors.org/nrcw/natao10.htm) or call 865-558-3595 or email, [rivercleanup@aol.com](mailto:rivercleanup@aol.com)

### Conference on Decision Support Systems

The AWRA/ UCOWR summer specialty conference, Decision Support Systems for Water Resource Management, will take place June 27-30, 2001 in Snowbird, Utah. This conference will provide a forum for addressing the latest advancements in data collection, information processing, decision support tools, and remote data collection for water resources management, and for discussing the educational and institutional infrastructure needed to make the use of these tools more effective in the water sector. Conference information is available at [www.awra.org/meetings/Utah2001](http://www.awra.org/meetings/Utah2001)

### Salinity Conference Scheduled

The Center for Water Resources and the International Union of Soil Sciences are holding a salinity conference in Riverside California, June 25-27. The symposium goal is to present research and management approaches for environmentally responsible, cost effective, sustainable agricultural production on salt and toxic element affected soils. For more information visit [www.waterresources.ucr.edu](http://www.waterresources.ucr.edu)

### AWWA Call for Papers

The American Water Works Association has issued a call for papers for this conference to be held January 27-30, 2002 in Las Vegas, Nevada. The AWWA is soliciting abstracts covering all aspects of water reuse, conservation and resource management. Presentation formats will include pre-conference workshops, oral and poster sessions. The deadline for abstracts is April 27, 2001. For more information visit [www.awwa.org/02wrcrm/call/](http://www.awwa.org/02wrcrm/call/)



## Calendar of Events



### RECURRING



**Arizona Hydrological Society (Flagstaff).** 2nd Tuesday of the month (during the school year). Meeting times and locations may vary, NAU, Southwest Forest and Science Complex, 2500 S. Pine Knoll Dr., Room 136, Flagstaff. Contact: Abe Springer 520-523-7198, email: [abe.springer@nau.edu](mailto:abe.springer@nau.edu)

**Arizona Hydrological Society (Phoenix).** Usually 2nd Tuesday of the month, locations vary. Contact: Christie O'Day 602-379-3087, ext 224. [cmoday@usgs.gov](mailto:cmoday@usgs.gov) or [beth.proffitt@worldnet.att.net](mailto:beth.proffitt@worldnet.att.net)

**Arizona Hydrological Society (Tucson).** Usually 2nd Tuesday of the month. Contact: Mike Block 520-575-8100 or [mblock@metrowater.com](mailto:mblock@metrowater.com)

**Arizona Water Banking Authority (Phoenix).** Next quarterly meeting will be held on Sept. 13 at the ADWR in Phoenix. Contact: Nan Flores 602-417-2418.

**Arizona Water for People Committee.** Phoenix, meets on the 2nd Thursday of even-numbered months at City of Phoenix Squaw Peak Facilities, 6202 N. 24th St., Phoenix at 6 p.m. Contact Dave Christiana 602-417-2400, ext 7339; Tucson, meets the 3rd Thursday of even-numbered months. Time and place varies. Contact Sheila Bowen, 520-625-8409 or [sbowen@communitywater.com](mailto:sbowen@communitywater.com)

**Arizona Water Protection Fund Commission.** Contact: Irma Lisa Horton 602-417-2400 ext. 7016.

**Arizona Water Resources Advisory Board.** Phoenix, meets at the ADWR 10am to 12 noon. quarterly meetings aug 4 and nov 3. Contact: Bobbie Wood 602-417-2410. [bjwood@adwr.state.az.us](mailto:bjwood@adwr.state.az.us)

**Central Arizona Water Conservation District.** Usually 1st and 3rd Thursdays of the month, time to be determined one week in advance. CAP Board Room, 23636 N. 7th St., Phoenix. Contact: Ardis McBee 623-869-2210. [amcbee@cap-az.com](mailto:amcbee@cap-az.com)

**City of Tucson Citizens Water Advisory Committee.** Usually 1st Tuesday of the month, 7:00-9:00 a.m., 310 W. Alameda, Tucson. Contact: John O'Hara 520-791-5080 ext. 1446.

**Maricopa Association of Governments/Water Quality Advisory Committee.** Contact: Lindy Bauer 602-254-6300.

**Maricopa County Flood Control Advisory Board.** Usually 4th Wednesday of the month, 2:00 p.m., 2801 W. Durango, Phoenix. Contact: Kathy Smith 602-506-1501 or [kks@mail.maricopa.gov](mailto:kks@mail.maricopa.gov)

**Phoenix AMA, GUAC.** Scheduled monthly, please call. Conference Room A, 500 N. 3rd St. Phoenix. Contact: Mark Frank 602-417-2465.

**Pima Assoc. of Governments Environmental Planning Advisory Committee** meets first Friday of every month at 9:30am-1:30pm., 177 N. Church St., Suite 405, Tucson. Contact: Claire Zucker 792-1903 [czucker@pagnet.org](mailto:czucker@pagnet.org).

**Pima Assoc. of Governments Water Quality Subcommittee.** Usually 3rd Thursday of the month, 1:30pm., 177 N. Church St., Suite 405, Tucson. Contact: Claire Zucker 792-1903 [czucker@pagnet.org](mailto:czucker@pagnet.org).

**Pinal AMA, GUAC.** Usually 3rd Thursday of the month, 2:00 pm. Pinal AMA Conference Room, 1000 E. Racine, Casa Grande. Contact: Randy Edmond 520-836-4857.

**Prescott AMA, GUAC.** 2200 E. Hillsdale Rd., Prescott. Contact: Phil Foster 520-778-7202.

**Santa Cruz AMA, GUAC.** Usually 3rd Wednesday of the month, 9:00 am, Santa Cruz AMA Conference Room, 857 W. Bell Rd, Suite 3, Nogales. Contact: Kay Garrett 520-761-1814.

**Tucson AMA, GUAC.** Usually 3rd or 4th Friday of the month, 9:00 a.m., Tucson AMA Conference Room, 400 W. Congress, Suite 518, Tucson. Contact: Kathy Jacobs 520-770-3800.

**Tucson AMA, Safe Yield Task Force.** Every Wednesday. Contact Kathy Jacobs 520-770-3800.

**Verde Watershed Association.** VWA general meeting 3rd Tuesday of every month at various locations. Contact: VWA Newsletter Editor, Verde Watershed Association, 827 N. Main St., Cottonwood, AZ 86326; phone: 520-634-5526; message phone: 520-649-9978, email: [verdewatershed@yahoo.com](mailto:verdewatershed@yahoo.com); website <http://vwa.southwest-water.org>

**Water Users Association of Arizona.** 2nd Friday of the month at noon (except in September). Call for reservations and exact location. Contact: Paul Gardner, 480-987-3240.

**Yavapai County Flood Control District Board of Directors.** Contact: Ken Spedding, 520-771-3197.

The *Arizona Water Resource* is financed in part by the following agencies:

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 Water Utility

Their contributions help make continued publication of this newsletter possible.

*Power Plants...continued from page 5*

gists are involved in evaluating the application.

The degree of official water scrutiny bestowed upon a proposed power plant depends upon its location, whether within or outside an AMA. An operation outside an AMA must satisfy the LSC that a long-range, 40-year water supply is available. (Forty years is the expected life span of the plants.) Various kinds of modeling are done to determine suitable water supplies and possible effects on groundwater. The Big Sandy plant located outside an AMA confronts a more vigorous review. Since gas lines supplying the plant cross BLM land a formal Environmental Impact Statement is required. The building of the Griffith Plant also requires an EIS. Located on an Indian reservation, the South Point Power Plant does not need a Certificate of Environmental Compatibility.

Plants located within an AMA not only deal with the LSC but also must meet Groundwater Management Act regulations. Extra effort is required to demonstrate that a power plant's proposed use of groundwater is compatible with AMA management plans.

The LSC and AMA regulations are the primary tools for reviewing and evaluating power plant water use. Are these tools adequate for the job? Some critics question whether the LSC has the appropriate authority to ensure adequate regulation of water supplies. They say the statute establishing the committee was passed in 1972 when the Palo Verde Nuclear Generating Station was being built and never upgraded, even after the state deregulated the power industry. Many agree that concerns are indeed justified not only about the committee's authority to restrict water use, but also DWR's power in non-AMA areas.

Some people say that within an AMA a General Industrial Per-

mit would enable power plant operators to avoid various GMA water restrictions. A GIP would allow a new use of groundwater without requiring that an applicant buy an existing right or retire farmlands for water rights. Critics of GIPs view it as a loophole within the GMA, and the Governor's Water Management Commission is reviewing its use to ensure a more restricted right to withdraw groundwater.

The Arizona Center for Law in the Public Interest has taken an interest in power plant siting in the state, with the intent of limiting their numbers. Executive Director Tim Hogan says the concern is that power generated through the use of Arizona's water will for the most part be going somewhere else. He says, "It is an equity issue. The states in this region should share the burdens of power production."

Hogan builds his case on Arizona law that he says requires the need for such plants to be balanced against their environmental impacts, including effects on water supplies and air quality. He defines need as serving Arizona.

Hogan says, "Little thought was given during the approval process about whether these plants were needed. I see an endless line of approvals unless we start taking a look at whether we need these things. My effort is to get the Arizona Corporation Commission to quantify the need for these plants so that we at least know there is an end somewhere in sight."

The three suits he filed regarding early plant approvals were resolved by quantifying need and including a provision that reserves power for Arizona during times of peak demand. He says, "There was the perverse possibility we could have all these plants in place with power committed elsewhere in July and August, and we would have blackouts here."



(Photo: Ellen Endebruck)



Arizona Water  
Resource

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