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WATER RESOURCE

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Managing Water Outside AMAs Gains Interest, Some Support

With most of the water management action in Arizona occurring within Active Management Areas, residents in non-AMA regions are wanting attention also paid to their water management concerns. The issue is not — or it should not be — AMA vs. non-AMA, urban vs. rural or them vs. us. The issue is statewide water management, to ensure protection of all Arizona's water resources.

Recent developments raise water management concerns in rural areas of the state. In some situations, rural residents are confronting the same or similar issues facing urban areas; e.g. population increase. People may choose between urban and rural amenities, but the net result is the same: more people, with still more likely to come. Rural areas, like urban regions, need to manage their water resources if they are to deal wisely with growth issues.

Further many rural areas are hurting economically and would welcome opportunities that promise an economic payoff, with additional jobs and tax payments. Development in rural areas made the news this past year when

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Above is a winning entry in the Metropolitan Water District of Southern California's Liquid Art contest. (See page 3 for discussion of MWD contest.) Sculptor Don Merkt calls his work, a 28-foot, 7-ton stainless steel pitcher tipping into Ballona Creek, "Cross Currents." Once a reason for settling Culver City, the creek now is essentially a stabilized drainage ditch. Merkt said, "I hope the piece encourages people to pay attention to the creek and to efforts to restore and enhance it." (Photo: Tom Bonner)

Is That My Groundwater or Your Surface Water?

Issue mixes law and hydrology, with mixed results.

The legal wheels continue to turn in efforts to settle the controversy about when a well is or is not pumping subflow, with a lot riding on the outcome in the Gila River adjudication.

Consider: Water use by a well owner pumping groundwater in areas outside Active Management Areas is subject to "reasonable and beneficial use." If a legal ruling then determines the well is in fact pumping subflow, water hydrologically connected to surface water, the water is then subject to the jurisdiction of the adjudication court. A well subject to adjudication will be involved in a court process to determine the nature, extent and relative priority of its water right.

Same well, same water, but a new legal designation means the water is subject to different regulations that affect its ownership and use.

Understanding the situation requires an understanding of the workings of Arizona's bifurcated water law; i.e. surface water and groundwater are considered

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Groundwater...continued from page 1

separate and distinct, with each regulated differently. That groundwater and surface water actually intermingle hydrologically therefore presents a legal problem, to define at what point groundwater and surface flow interact.

In 1988, Stanley Z. Goodfarb, the then presiding judge in the Gila River adjudication, made a stab at such a definition when he adopted a 50%/90-day rule. It said groundwater is appropriable if, over a 90 day period, its removal from the underlying aquifer reduces the flow of any nearby surface supply by 50 percent or more of the total volume pumped. The Arizona Supreme Court rejected this formula as arbitrary. In 1994, Goodfarb then came up with a definition of subflow as saturated Holocene floodplain alluvium that the state Supreme Court upheld.

(The state court's ruling eventually went to the U.S. Supreme Court when the Phelps Dodge Corp. asked the Court to review it. Attorney's for the mining company argued that the Arizona high court greatly expanded the definition of groundwater, with the result that huge deposits of groundwater would be reclassified as subflow and therefore be appropriable as surface water. The Court let the ruling stand, refusing to hear the dispute.)

The next order of business is to determine the lateral extent of the subflow or, in other words, the actual or jurisdictional subflow zone. Wells within that zone will be presumed to be pumping subflow subject to adjudication. Further, wells located outside the designated zone, if their cone of depression enters the subflow zone, also could be determined to be pumping subflow

This is critical determination, with much at stake. Arizona Department of Water Resources attorney Jan Ronald says. "This is a issue that will ultimately determine the boundaries of the entire Gila River adjudication and is an important concern among all major parties in the adjudication."

The essence of the issue is whether the jurisdictional subflow zone will be determined to be narrow or wide. Preferences of involved parties mostly depend upon the type of water right they now hold. For example, parties with water rights to the Verde River prefer a wide jurisdictional subflow zone. This will include a greater number of wells in the adjudication. The impact of groundwater pumping on the river flow would then likely be reduced.

On the other hand, those relying on groundwater pumping for their water supplies prefer a narrow subflow band to be drawn, with the result that many fewer wells would be brought into the adjudication. Thus the status quo would be generally maintained, with groundwater pumping still regulated according to "reasonable and beneficial use," a situation far less threatening to groundwater pumpers than being subject to the adjudication.

Even if a well is determined to be within a subflow zone however it does not necessarily mean the well is in fact pumping subflow. Ronald explains: "The action in effect determines the number of wells to be brought into the court's jurisdiction to be subject to further analysis as part of the court process. If your well is within the jurisdictional subflow zone there is a presumption that you are pumping subflow, not a determination."

Ronald says the burden is then on the well owners in the subflow zone to show that their wells are not in fact pumping appropriable subflow.

DWR is now embarked on a quest to define the jurisdictional subflow zone and otherwise do the legal work to apply the Court's subflow ruling. In a Jan. 8 hearing, Judge Ballinger chided DWR for a lack of progress and directed the agency to prepare a report on the San Pedro watershed, describing a methodology for determining the jurisdictional subflow zone as well as proposing a test for implementing the cone of depression analysis. The report is to be filed by March 29. Parties will then have 45 days to comment and provide any additional information for the court to consider.

Ronald considers this just the beginning. She says, "I think a lot more work will need to be done. The court asked DWR to use the San Pedro watershed as starting point for developing methods and procedures for implementing the test in the Arizona Supreme Court decision."

To some critics much of this legal wrangling is beside the point, the result of flawed state water law. University of Arizona hydrologist Thomas Maddock says, "The thing about subflow is that it is not a scientific fact. It is strictly a legal entity made up because of the bifurcated water law we have in Arizona; i.e., reasonable use for groundwater and prior appropriation for surface water."

He says, "Lots of money will be spent trying to define jurisdictional subflow zones in a high-powered, high-falutin manner, and the critical thing is the cone of depression. Whether a well is declared to be within a jurisdictional zone or not, if its cone of depression is affecting the river the well is pumping surface water. The judge should realize he does not have to spend a lot of effort defining the jurisdictional boundaries because the cone of depression will take care of that.

"But the problem is we are dealing with a non-hydrological issue that people are trying to make into a hydrological issue, and it does not work. There is no difference between water that is groundwater and surface water. And they are constantly interchanging — surface water becomes groundwater and groundwater becomes surface water"

Meanwhile the impatience of some of the major parties to the adjudication adds further pressure for working out a definition of subflow and may ultimately force the cone of depression issue. Indian tribes have been filing suits along the Gila River seeking injunctions against groundwater pumpers pumping surface flow. A political heavyweight, the Salt River Project also is an aggrieved party, its rights on the Verde River threatened. During the last six years over 3,000 wells have been installed in likely subflow zones along the Verde River. SRP is very concerned.

Also calling attention to the Arizona's groundwater-surface water dilemma is the issue of riparian protection, which has attracted increased notice lately. Groundwater pumping is generally recognized as a prime factor in disrupting surface water flow. A lawsuit recently filed against the state by the Arizona Center for Law in the Public Interest claims that existing state law does not adequately protect water courses.

Water Vapors

Water, Water Everywhere, But is it Art?

In an edition of Shoyer's Antiquarian Book catalogue William Mulholland, the engineer who masterminded the construction of the aqueduct from Owens Valley to Los Angeles, is quoted as saying, "Damn a man who doesn't read books. The test of a man is his knowledge of humanity, of the politics of human life, his comprehension of the things that move man." (See "Publication" section of this newsletter for information on the Shoyer's catalogue.)

Would it be remiss to interpret this heady, full-throttled statement from the man known — perhaps infamously known — for his water work in Southern California, as having to do with managing water? Is the master water builder himself suggesting that knowing human nature and what makes it tick, the myths, beliefs, and impulses that move and motivate the human animal, have a part in understanding water affairs?

Even granting that Mulholland was in fact acknowledging that the endeavors that broaden and widen human understanding also work to refine water management skills one wonders what the response of this bluff, hard-tacked engineer would be to the Metropolitan Water District of Southern California's project, "Liquid Art, A Celebration of Water in Public Spaces." Would he appreciate the project as adding to "his comprehension of the things that move man"? Would Mulholland be moved by "Spine," a sculpture of a skeletal creature with three pools by Venice artist Jud Fine, that pays tribute to the role water played in evolution and the development of human language?

The theme of the Liquid Art project is that water is a wonder, multifaceted and complex, its significance difficult to describe, whether in terms of law, public policy, hydrology, geology, economics, engineering, etc. The project seeks to creatively connect water and art, to transcend the usual definitions of water to better express its importance, in the natural world, human affairs and an individual's sensibilities.

A panel of judges chose 20 pieces that use water imaginatively to create a work of artistic appeal or, if you will, a work of art. Selected works include sculptures (see newsletter's front-page photo), paintings, fountains, gardens and even an overflow sewage pond. Liquid art does not hang in a gallery.

The Liquid Art works can be viewed in a special on-line edition of Aqueduct Magazine at www.mwdh20.com Artists' comments are included with the photos to explain their intent in creating the pieces. All the water works have been installed as permanent features throughout Metropolitan's six-county service area.

The web site also includes brief texts discussing the aesthetics of water, with essays devoted to its appeal to the sense of sound and taste. An essay begins with the question: What is water without sound? The sound of water can be alive and musical and said to be endowed with emotional and spiritual powers, all of which is discussed in the essay. The section, Sculpting with Water, is an interview with Mark Fuller, a designer or "water sculptor" whose water features are found throughout the world.

Web site www.mwdh20.com is worth visiting for several reasons. Most people would readily agree that understanding water in its broadest sense is an interdisciplinary pursuit, a topic to be viewed and understood from many and diverse perspectives. Along these lines, many people also believe that water has some sort of artistic interest, to be appreciated as something good and beautiful. This may be a belief or opinion, comforting in its way, but how is it applied? Liquid Art, both the images and the text, give substance to an aesthetic appreciation of water.

Also there is much a community can learn from Metropolitan Water's Liquid Art project. Wary as we are of accepting anything Southern Californian — and rightly so— Liquid Art nonetheless might give Arizona communities pause as they consider their own public art projects.

Sharon B. Megdal, new WRRC Associate Director

Sharon B. Megdal has been appointed associate director of the University of Arizona's Water Resources Research Center. Along with her position as WRRC associate director, Megdal also has been appointed professor in the UA Department of Agricultural Economics and specialist in the Cooperative Extension Service. Megdal's most recent position has been president of MegEcon, an economic and public policy consulting firm specializing in water resources policy and planning among other areas. She has served as a member of various local and statewide advisory boards and committees, most recently as a member of the Governor's Water Management Commission. She has an M.A. and a Ph.D. in economics from Princeton University.

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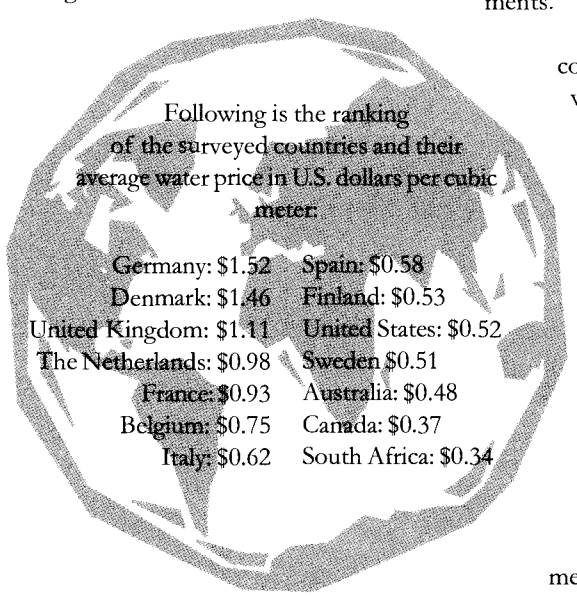
News Briefs

Water Prices Rise Worldwide

The average price of water increased last year by 3.8 percent worldwide according to a survey conducted by NUS Consulting Group, and an official of the firm says the survey also provides evidence to indicate even higher water price increases in the future.

Fourteen countries throughout North America, Europe, Africa and Australia were included in the survey which examined local water prices in these nations. The average price for a cubic meter of water (264 gallons) was found to be 76.4 cents (US), with Germany having the highest water prices ($1.52) and South Africa the lowest average price (.52). The only country surveyed not showing an increased cost of water was the Netherlands which reported a decrease of 0.8 percent in water pricing over the past year. The United States ranked tenth on the list, with an average price of .52 per cubic meter

Soultanian says, " We are finding that water pricing around the world is increasing at a steady rate and all indications are that even larger increases are on the horizon. Issues such as scarcity of supply and improving water quality are coming to the forefront in most countries, and as such, prices are bound to dramatically increase to meet these challenges



Following is the ranking of the surveyed countries and their average water price in U.S. dollars per cubic meter:

Germany: $1.52	Spain: $0.58
Denmark: $1.46	Finland: $0.53
United Kingdom: $1.11	United States: $0.52
The Netherlands: $0.98	Sweden $0.51
France: $0.93	Australia: $0.48
Belgium: $0.75	Canada: $0.37
Italy: $0.62	South Africa: $0.34

Major factors influencing the increasing price of water include the scarcity of supply and the need to improve water quality.

EPA Rule Limits Crypto in Small Drinking Water Systems

A recent U.S. Environmental Protection Agency's rule limits the amount of cryptosporidium and other disease vectors allowed in drinking water provided by small drinking water systems. The intent of the new regulation is to set standards for small drinking water systems that are already in force for large systems. The rule applies to systems using surface water or groundwater under the direct influence of surface water

The new standards will affect 11,000 small drinking water systems serving fewer than 10,000 people. In total, this represents 18.5 million Americans.

The new rules require that small systems use the best available technology to remove 99 percent of cryptosporidium through enhanced filtration. Common disinfectants such as chlorine are not effective in eliminating cryptosporidium spores that must be captured through enhanced filtration techniques. Small systems have three years to comply with the enhanced filtration requirements.

EPA estimates that the annual cost of the rule will be $39.5 million, with the average increase to annual household drinking water costs estimated at $6.24. About 90 percent of households will experience costs of less than $15 a year.

Approximately 84 percent of the rule's total annual costs are imposed on drinking water utilities, with states incurring the remaining 16 percent of total annual cost. Technical and financial assistance will be available to the states and utilities to implement the ruling.

EPA estimates that implementation of the rule will result in between 12,000 and 41,000 fewer cases per year of crypto-sporidiosis illness and between one and five fewer deaths per year.

Cryptosporidium is found in animal wastes and can cause intestinal problems and sometimes death in some vulnerable populations.

In 1990, the Science Advisory Board cited drinking water contamination as one of the most important environmental risks and indicated that disease-causing microbiological contaminants (i.e., pathogens such as bacteria, protozoa, and viruses) are probably the greatest remaining health risk management challenge for drinking water suppliers.

AZ Archives Building (Again) Falls to Budget Cuts

After last year's legislative session many felt optimistic about the construction of a state archive building, to house state documents including a wealth of water documentation and records. Hopes were dashed, however, when the Legislature meeting in special session repealed all 2003 funding bills. This not only repealed funding for the archive building, but also its authorization.

"We are back to square one," says Doug Kupel, treasurer of the Friends of Arizona Archives. Kupel says a bill will be introduced this session to again authorize the archive building, with Senator Darden Hamilton of Glendale introducing the legislation. The provisions of the bill will be the same as the previous legislation except this time the building will be referred to as an archive and history building, to broaden its appeal. Additional funds also are being sought for environmental remediation needed at the site.

The present economic outlook, however, may not be favorable for the approval of such a project. With the Legislature discussing the need of further cuts in the 2002 budget, it is unlikely that it will want to commit at this time to additional expenditures in 2003.

The experience this year was a case of déjà view all over again. An archive building was in the works in 1987, with a complete set

of plans drawn up. The building was within about three months of breaking ground when the economy soured, and the project was cancelled.

People interested in Arizona's water affairs have long supported the construction of a state archives building. The current, woefully inadequate facilities store about 500 to 600 cubic feet of water records. Materials include many unpublished, one-of-a-kind documents, the sole source of some state water records. Archival collections concerning water span many years, from early territorial times to statehood, with historical records from both organizations and individuals.

EPA Assesses Perchlorate Drinking Water Risks

In its ongoing effort to assess the human health and ecotoxicological risks posed by perchlorate in drinking water, the U.S. Environmental Protection Agency recently released a revised draft risk assessment of ammonium perchlorate, a component of solid rocket fuel.

Although emphasizing that the draft risk estimate level is not a drinking water standard for the contaminant, but only step one in the lengthy process of determining if the agency should set a federal drinking water standard, EPA officials say the agency action will probably prod water districts to re-examine strategies for removing perchlorate from their supplies.

Utilities that use Colorado River water are likely to be among those prodded. In July, an Environmental Working Group report on perchlorate, based on its own study of EPA data, showed that perchlorate is found in water or soil in 17 states downstream of the Colorado River. Arizona is among those states identified by the environmental organization.

Jeff Stuck of the Arizona Department of Environmental Quality Drinking Water Program says, "We found through a couple of different monitoring efforts perchlorate ranging from non- detection up to 9 parts per billion along the Colorado River stem stretching along the Arizona border. And we also found some low levels of perchlorate in the CAP canal."

No official standards exist for perchlorate in drinking water. Water agencies relying on unofficial federal guidelines have generally used levels ranging from 4 ppb to 32 ppb. In response to the EPA document, the California Department of Health Services posted on its web site a reduction in the Action Level for perchlorate from 18 ppb to 4 ppb. The federal government began assessing the health risks of the rocket fuel ingredient in the mid-1990s.

Stuck says the Arizona Department of Health Services has issued a health based guidance level for perchlorate that is 14 ppb. This is in effect a non-enforceable advisory level.

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Tucson Water Supply Studied for Vulnerability

Tucson Water's participation in an EPA-funded study to determine the vulnerability of municipal water supplies will benefit the utility's own security as well as provide information to utilities throughout the country to protect them from possible terrorists' activities. Two water utilities were chosen to participate in the national study: Tucson Water because it delivers groundwater and a Milwaukee utility because it is a surface water system.

Tucson Water spokesperson Mitch Basefsky says Tucson was an ideal choice to serve as a representative system because, "We are not only entirely dependent on groundwater, but we have a distributive system with multiple sources of groundwater, from well fields within and outside the city and a wide variety of different facilities to transport groundwater."

Sandia National Laboratories was contracted to do the study. SNL has done vulnerability studies for the nuclear power industry, the electric industry and most recently studies of dams and other water infrastructure components.

SNL personnel consulted with a Tucson Water internal team to examine facilities and determine their vulnerability. The process included Tucson Water considering various types of security systems to determine one for its needs, whether a system that deterred or delayed access, triggered an immediate response, etc. Tucson Water also identified its critical security goals.

The Sandia team also reviewed Tucson Water's electronic system. Basefsky says "We rely on microwave and other types of remote control systems, and so they examined security to determine if someone could interfere with signals. They also examined the vulnerability of our database, to determine if someone could access it to change information or actually take control of the system."

Basefsky says, "We went through this process over a couple of months. The Sandia team examined the facilities, to identify vulnerabilities and provide information about where we should be focusing our efforts; what we do well now; and what we need to improve."

The SNL team is now reviewing the information from Tucson Water and will provide the utility a confidential report with specific recommendations about its vulnerability and will identify steps to be taken to improve security. The report is expected in the spring.

Information from that report and the report done for the Milwaukee utility will then be used to prepare a document for use by water utilities throughout the country. Information derived from Tucson Water will assist other utilities that rely on groundwater to identify areas of concern and possible solutions to problems. The report is expected this summer.

Researching Anthrax in Water Supplies

The University of Arizona is providing support to university water researchers to investigate a threat terrorism might pose to water supplies. A $10,000 Homeland Security Grant was awarded to Chuck Gerba, professor of soil, water and environmental sciences, and Christopher Choi, associate professor of agricultural and biosystems engineering, to study ways anthrax would disperse in a community's water supply. The researchers will add spores of a non-disease-causing agent to a small canal and then map the spores and create models of dispersal, to calculate the risk of getting anthrax or other biological agent from a water supply. They will also consider water treatment. Their work will serve to improve security for preventing such an event.

Guest View

Options Offered for Meeting Safe-Yield Challenge

The author of this Guest View is Arizona State Senator John Mawhinney (retired). He served as Co-chair of the Governor's Water Management Commission.

Arizona's 1980 Groundwater Management Act declared groundwater a critical state resource and that "in the interest of protecting and stabilizing the general economy and welfare of this state and its citizens it is necessary to conserve, protect and allocate the use of groundwater." (This was pretty heady stuff for a "private property rights" western state.)

The GMA established a plan to reach, in most critical water areas, "safe yield," the balance between annual groundwater withdrawal and annual natural and artificial recharge. Excess water demands would be met with renewable supplies. Management plans and schedules were to be adopted. The law stated, "The plans shall include a continuing mandatory conservation program for all persons withdrawing, distributing or receiving groundwater designed to achieve reductions in withdrawals of groundwater."

While the recent Governor's Water Management Commission unanimously agreed to support GMA management goals and objectives, agreement was considerably less about the best means of reaching those goals. Since 1980, changes have been made to the mechanics of the plans, but none to the goals and objectives themselves, and important progress is being made. Most new development is now occurring with renewable supplies, with cities shifting from groundwater mining to Central Arizona Project water and, where available, other surface supplies. Temporarily excess CAP water is being recharged or banked for future needs and also provided to farms at reduced costs to reduce agriculture's reliance on groundwater. Far too much groundwater however is still pumped, with some farmers, cities and industries finding it the "cheapest" available supply.

The Active Management Areas face a number of problems between now and 2025 if the safe-yield goal is to be achieved. If the political will doesn't now exist to take appropriate action, it may develop as the designated date draws nearer.

Future success will depend on accommodating a number of conflicting needs, predominately of the two major water users, the municipalities and the agricultural sectors. The ag sector views restrictions on pumping as limiting its ability to adjust to changing market needs and impacting its profits. Stuck with allocations based on ancient history, it watches as surrounding municipalities grow using valuable water supplies. Since this growth is denied the agricultural sector, it resists moves to further limit its rights to water.

Municipalities face different challenges. Pressure to switch to renewable supplies meets resistance because of the enormous infrastructure cost. The infrastructure necessary to capture, process and deliver renewable resources is an expensive proposition, for the large municipalities but especially for the small municipalities. In time, cooperative efforts of smaller municipalities may allow construction of infrastructure improvements, subject, of course, to ratepayer agreement to pay increased water bills and the political will to impose them.

The Phoenix AMA is making major progress in reducing groundwater pumping even as it grows and develops. Thousand of acres of farmland have been retired, and new development water needs are met with renewable supplies. Much of the remaining agricultural operations use a combination of surface water, groundwater and CAP water. In the Tucson AMA, retirement of agricultural acreage moves much more slowly, a trend likely to continue to 2025. Agricultural pumping is almost exclusively groundwater, with no surface water available and CAP deemed too expensive for use.

There are potential solutions to the overdraft, some permanent, and some more temporary, none easy. Following are suggestions:

Reduction of agricultural groundwater use through use of excess CAP and surface water. Excess CAP water is a limited resource, limited in both time and quantity, representing that portion of Arizona's allotment the municipal sector cannot **yet** use. A portion of that excess is currently provided to agriculture at a fraction of its cost. In time, the municipal use of its CAP allotment is destined to increase, drying up any excess and leaving agriculture to return to groundwater pumping. So the reduction is beneficial but temporary. The overdraft will return.

Agriculture groundwater pumping should be shifted, whenever possible, to renewable supplies such as the CAP while they last. Whatever obstacles currently exist need to be examined and swept away. Farms within a stone's throw from the CAP canal need to be cajoled, coerced or convinced to use that water while the excess lasts. The cost differential to the farmers need to be reduced or eliminated.

Retirement of irrigated acreage. As urban and suburban populations encroach on the rural parts of the AMAs, farms are purchased for development. Not only does that result in reduction in water use, but also because of the GMA, that water use shifts to a renewable resource. Not all agricultural acreage lends itself to development but the further retirement of agriculture remains the only real avenue for permanent reduction in important amounts of groundwater mining. The most potentially successful tool to facilitate that retirement is the Groundwater Withdrawal Fee. As part of the original GMA Code, this fee, if imposed, is collected on each acre-foot of groundwater pumped and is to be used specifically to purchase and retire irrigated acreage. The fee makes groundwater more expensive to pump, causing economic conservation, and it funds a pool of available dollars to allow voluntary purchase and retirement of some agricultural acreage. Since the fee is charged on groundwater pumping only, any users who have converted to CAP use will reduce or eliminate the costs.

We have a situation with two major water users struggling to accommodate their current and future needs. A sustained rational policy of incremental changes by all sectors working cooperatively such as anticipated by the GMA is a more desirable goal than a last minute, destructive rush.

Legislation and Law

AZ Court Sets New Indian Water Rights Standard

The Arizona Supreme Court recently ruled that the quantification of Indian water rights can be based on other criteria than the practicably irrigable acreage (PIA) standard that has thus far prevailed. In its groundbreaking ruling, the Court stated that water rights allocations must respond to each reservation's specific needs and not necessarily to a PIA formula that determines water allocation based on a reservations's irrigation potential.

The PIA standard was cited by the U.S. Supreme Court in a 1963 water rights case involving tribes in Arizona, California and Nevada, and other courts subsequently adopted it. A Maricopa County Superior Court judge applied it in a 1988 ruling stating that each Indian reservation is entitled to water necessary to irrigate all acres practicable. The Arizona Supreme Court's decision unanimously overturned that ruling.

The Arizona high court acknowledged that PIA appears reasonable on its surface, but its deficiencies become evident when considered as an across-the-board application to all reservations. For example, the standard overlooks geographic differences among reservations. Further, tribes take on the PIA-bestowed role and "pretend to be farmers," and the standard "creates a temptation" for tribes to "concoct inflated, unrealistic irrigation projects," Chief Justice Thomas A. Zlaket wrote for the court

Quantification must still be based on the "minimal need" of a reservation the court stated, but minimal need "must satisfy both present and future needs of the reservation as a livable homeland."

Courts considering water-rights cases must analyze each situation, with quantification based on "fact-intensive inquiry." Factors to be considered include: actual water needs, tribal economic base, actual and proposed land uses, reservation topography and resources, tribal history and culture, historical use of water and projected population.

In some situations PIA may be an appropriate standard. Other options however may need to be examined to enable a tribe to pursue development possibilities other than agriculture. Such projects must be economically sound and "achievable from a practical standpoint — they must not be pie-in-the-sky ideas that will likely never reach fruition," Zlaket wrote. "When water, a scarce resource, is put to efficient uses on the reservation, tribal economies and members are the beneficiaries."

The court acknowledged the difficulty of applying its ruling. "We wish it were possible to dispose of this matter by establishing a bright line standard, easily applied, in order to relieve the lower court and the parties of having to engage in the difficult, time-consuming process that certainly lies ahead," Zlaket wrote. "Unfortunately we cannot."

John Thorson, former Special Master of the Gila River Adjudication, says of the Court's action, "I think it is a major decision mainly because it furthers the discussion and debate about quantification of reserved rights ... I think the value of the Court's decision is that it sets forth many of the problems with PIA and suggests a new approach, a more multifaceted approach to quantifying Indian water rights."

Thorson says the Court is treading where no court has tread before, and he thinks its decision might act as a prod to other states in dealing with the PIA standard.

Thorson is uncertain about the decision's likely effect on Indian water right settlements in the state. He says, "It may influence the dynamics of some of the negotiations. Depending upon the circumstances, tribal claims may be stronger or possibly weaker with this decision." He thinks however that most of the state's cases will probably settle without applying the new standard. As a result the standard may be applied rarely if at all in actual litigation.

The Court's ruling came in deciding a decades-old water rights case in the Gila River Basin. Joining Zlaket in the ruling was fellow Justice Stanley G. Feldman and three Court of Appeal judges.

Covering their arsenic

Shortly after taking office the Bush Administration suspended the Clinton Administration's decision to reduce the federal standard for arsenic levels in drinking water from 50 parts per billion to10 parts per billion. The EPA then later backed off and decided the Clinton standard would be retained after all. Unimpressed with what she viewed as political maneuvering, Sen. Barbara Boxer (D-Calif) said, "They ordered a new study as a delaying tactic, and it came back and bit them in the arsenic."

Perchlorate...continued from page 5

Stuck says the question to first settle is what will be the results from the final version of the draft risk assessment and then how will that be translated into a drinking water regulation. "It could then become a concern for the drinking water program, but it is premature right now."

Down-the-line implications of the EPA risk assessment especially concern Southern Nevada. Perchlorate has been found in the Las Vegas Wash and Lake Mead, the region's main drinking water source. Two companies that produced ammonium perchlorate were located in the valley.

In mid-December Southern Nevada Water Authority found perchlorate levels of 14 ppb near intake valves at Lake Meade. Weekly measurements in 2001 averaged 10 ppb.

Comments will be accepted on the draft risk assessment until March 6. On March 5 and 6, EPA will conduct an external scientific peer review workshop in Sacramento to review the assessment and to accept additional comments. A final assessment is expected in late summer. EPA officials estimate it may take three to five years before the agency proposes federal limits on perchlorate exposure.

Publications & On-Line Resources

Water & the American West

Perusing the "Water & the American West" book catalogue published by Schoyer's Antiquarian Books is the next best thing to visiting a used bookstore and browsing shelves with books devoted to water. With none of the sense of predictability that prevails in new bookstores, this catalogue lists old and sometimes unusual publications that tell of western water issues of yesteryear by people around at the time. The Arizona section lists the 1897 publication, "Irrigation Near Phoenix, Arizona," by Arthur Powell Davis and a 1930 promotional brochure with large three-panel folded illustration, advertising a trip to Roosevelt Dam and surrounding landscape. The catalogue is available by contacting Marc Selvaggio at Schoyer's Antiquarian Books, P.O. Box 9471, Berkeley, CA 94709; phone: 1-800-356-2199; email: dsbooks@home.com The $5 charged for the catalogue will be deducted from any book orders.

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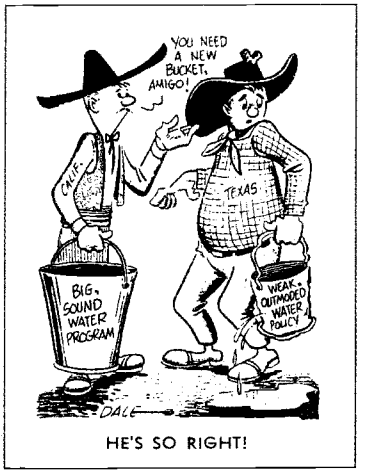
WATER & THE AMERICAN WEST



Editorial cartoon first published in San Antonio (TX) Express and republished in Western Water News, July, 1956.

The following U.S. Geological Reports were recently published:

"Statistical Summary of Selected Physical, Chemical and Toxicity Characteristics and Estimates of Annual Constituent Loads in Urban Stormwater, Maricopa County, Arizona," by K.D. Fossum, et al. Water-Resources Investigations Report 01-4088

"Structural Controls on Ground-Water Conditions and Estimated Aquifer Properties near Bill Williams Mountain, Williams, Arizona," by H. A. Pierce. Water-Resources Investigations Report 01-4058

"Quality of Water and Estimates of Water Inflow, Northern Boundary Area, Fort McDowell Indian Reservation, Maricopa County, Arizona," by J.P. Hoffmann and C.M. O'Day.Water-Resources Investigations Report 01-4151

"Trichloroethylene and 1,1-Dichloroethylene Concentrations in Ground Water After Temporary Shutdown of the Reclamation Well Field at Air Force Plant 44, Tucson, Arizona," by D.D. Graham, et al. Water-Resources Investigations Report 01-4177.

For information about the above USGS publications contact U.S. Geological Survey Information Services, Box 25286, M25286, DFC, Denver, CO 80225-0286; or phone: 1-888-ASK-USGS.

Additional information on USGS water resources studies in Arizona may be obtained by emailing, GS-W-AZ_webmaser@usgs.gov or by visiting the website, http://az.water.usgs.gov

Guide to Health Risk Assessment

California's Office of Environmental Health Hazard Assessment

Although not specifically addressing drinking water this publication may be a useful tool for water suppliers to communicate health risk information to the general public. The purpose of this booklet is to provide a basic explanation of risk assessment for laypeople involved in environmental health issues, including policymakers, businesspeople, members of community groups, news reporters, and others with an interest in the potential health effects of toxic chemicals .A copy of the report is available as a pdf file at http://www.oehha.ca.gov and then hitting "Risk Assessment."

EPA web site has watershed information

The Environmental Protection Agency has released recommendations from the National Watershed Forum. The forum was designed to give voice to geographically, politically and culturally diverse organizations interested in protecting and restoring aquatic resources through geographically based partnerships. Key issues addressed in the recommendation report include: managing monitoring data and other information; protecting source water; implementing total maximum daily loads; protecting endangered species and habitat; planning for watershed protection; funding watershed projects; and education and outreach. For a copy of the report see: http://www.epa.gov/owow/forum/

Riparian Areas Generate Property Value Premium for Landowners

Dr. Bonnie Colby and Steven Wishart

Property owners receive a premium when selling homes and land near riparian areas throughout the arid western United States. Statistical analyses of actual property sales can show the size of this property value premium and how far this premium extends from the riparian area. This report documents the effects of riparian corridors (proposed for protection by the Governor's Water Management Commission) on property values in the northeast Tucson metropolitan area.

An analysis of thousands of residential home sales identifies a property value premium of three to six percent for homes located within half a mile of riparian areas proposed for protection, after accounting for the effects of lot size, home size and other factors. This premium adds up to over $103 million dollars for the 25,560 homeowners located within one and one-half miles of the riparian corridors, and most of this premium ($77 million) is for homes in the first half mile.

This document is published by Agricultural & Resource Economics, College of Agriculture and Life Sciences, University of Arizona. Free copies are available by contacting: arecweb@ag.arizona.edu The report can also be obtained from the web site: http://ag.arizona.edu/arec/pubs/pubs.html

Special Projects

Harvested Rainwater in Nogales, Sonora Can Augment Supplies

School project installed but more could be done

by Terry Sprouse

To provide water to a revegetation project in Nogales, Sonora, a University of Arizona research specialist worked with teachers and parents to plan and install a demonstration rainwater catchment system at an elementary school. This was thought to be the first such system to be installed in the Mexican city.

(Rainwater runoff is routinely captured in colonias in Nogales since such areas are not connected to city services, but is usually arranged in a makeshift manner, often without sanitary safeguards. For example, contaminated barrels have been used to store water.)

Rainwater collection system at Covarrubias Elementary School, Nogalas, Sonora

Terry Sprouse of the UA Water Resources Research Center began by conducting a water catchment orientation session for teachers and parents of the Covarrubias Elementary School in Nogales, with both theory and practical application covered. Parents and teachers were invited to participate in the construction of the system. Along with watering a revegetated area, the school's catchment system also demonstrates a strategy for conserving traditionally "lost" water. The catchment system is part of the Nogales Revegetation Project coordinated by the UA Bureau of Applied Research in Anthropology.

Lee Anderson, a Tucson rainwater and greywater re-use expert, designed the system and supervised its construction, with help from school parents. The catchment system is designed to capture water from the roof of the school's administration/classroom building and store it in barrels, for later use on plants located on the school grounds. With runoff collected from a 1,080 square-foot section of roof, a one-inch rainfall could result in 1,000 gallons of water captured and stored.

The approximately 20,000 square feet of roof at the school could potentially yield 20,000 gallons of water for each one-inch rainfall. The average annual rainfall in Nogales, Sonora is 18 inches. If that rainfall were captured, the result would be 360,000 gallons of water for use at the school.

When viewed in the larger, community-wide picture the water-saving potential becomes more evident. Most of the runoff from the school drains into the Nogales Wash, along with runoff from the city's downtown area, with the accumulated flow crossing the border into Arizona. Approximately 200,000 people live in Nogales, Sonora. Only 39 percent of the population receive water 24 hours a day, while 36 percent of the population are not connected to the water system. A concerted city water catchment effort could save enough lost water to increase daily water supplies to those already receiving water or extend service to the 36 percent not receiving water.

If only ten percent of the population captured and stored the rainfall on their roofs approximately 600 million gallons (2,000 acre-feet) per year of water would be saved. This is over 11 percent of the total annual potable water-use for Nogales, Sonora.

Sprouse's work, however, demonstrates some problems with achieving this potential. For example, the materials needed for rainwater catchment systems are not readily available in Nogales, Sonora, and Mexican participants in the project said they would need to get them in Arizona. Also conservation is not a high water priority in Nogales, Sonora. Looking to basins south of the city to satisfy water needs officials may not provide the leadership needed to encourage water catchment.

The City of Nogales, Sonora presently consumes 18,500 acre-feet of water for municipal use per year, while its sister city in Arizona consumes 4,300 acre-feet for the same purpose. Both cities pump water from Upper Santa Cruz River aquifer, which is shallow near the border and sensitive to drought. The water supplies in both cities are vulnerable to water shortages during times of even short-term drought. Recent studies show that long-term drought would greatly exacerbate existing water management problems in the border communities.

WRRC Announces Grant Awards

The University of Arizona's Water Resources Research Center recently selected research grants for funding under the Water Resources Research Act, Section 4. Administered by the U.S. Geological Survey, Section 4 provides funding for small research projects, through the national water research institute program. Only faculty at Arizona's state universities may submit proposals to the WRRC. WRRC funded the following projects: Regional Aquifers Characterization Through Spring Discharge Analysis, $11,865, Abe Springer, Stephen Flora, Northern Arizona University; Microbial Mediated Mobilization from Drinking Water Treatment Residuals in Landfills, $11,996, James A. Field, A. Jay Gandolfi, Reyes Sierra, University of Arizona; The Effect of Mycorrhizae on Competitive Ability and Drought Tolerance of Cottonwood and Saltcedar, $9,017; Julie Stomberg, Jean Stutz, Arizona State University; The Impacts on Ungulates on Vegetation Associated with Water Catchments, $11,324, Paul Krausman, UA; Evaluating the Irrigation Efficiencies and Turf/Landscape Maintenance Practices on the Campus of Northern Arizona Univ., $12,000, Donald Slack, Peter Waller, UA, Richard Bowen, NAU, and Abigail Roanhorse, Tri-University. The total of the awards was $56,202.

Announcements

Tucson AHS Offers Groundwater Flow Modeling Workshop

The Tucson Chapter of the Arizona Hydrological Society is offering a 3-day groundwater flow modeling workshop in Tucson, April 17-19. Each day is a stand-alone workshop; people can register for 1, 2, or 3 days. The course will be taught using Groundwater Vistas software. The intended audience is people with ground-water flow modeling experience who seek additional instruction or a refresher in specialized topics. Topics are: Day 1: Using ArcView GIS with Groundwater Vistas; Day 2: Optimization and Variably-saturated flow modeling with MODFLOW-Surfact; Day 3: MODFLOW2000 and Calibration topics. To register or for more information check www.azhydrosoc.org and follow links to Workshops. Payment and registration form must be received by April 3.

AWPF Changes Grant Application Schedule

Due to recent Legislative actions, the Arizona Water Protection Fund Commission is developing a new schedule for its current grant application to replace the previously announced deadline of March 6. A new schedule will be listed by March 1 at www.awpf.state.az.us For more information, contact Mr. Rodney Held, AWPF Program Manager at (602) 417-2400 ext. 7012.

Call for Papers

Arizona Riparian Council issued a call for papers for its sixteenth annual meeting, to take place April 26-27 in Wickenburg. This year's theme is "Water Resources and Sustaining Riparian Areas." Abstracts must be submitted by March 22 and can be submitted online at: http://aztec.asu.edu/ARC/2002call.htm or sent to Cindy D. Zisner, ARC, Center for Environmental Studies, Arizona State University, PO Box 873211, Tempe AZ 85287-3211; 480-965-2490; FAX 480-965-8087; email: Cindy.Zisner@asu.edu.

Call for Papers

The Arizona Hydrological Society issued a call for papers for its's First Biennial Symposium on "Scientific Issues Related to Management of Landfills in Arid and Semi-Arid Regions," to take place June 7. Submit one-page abstract and contact information by March 15 to Michael Geddis, Hydro Geo Chem, Inc., 51 W. Wetmore Rd., Suite 101, Tucson AZ 85705-1678 or to mikeg@hgcinc.com. For more information check www.azhydrosoc.org

Join National River Cleanup Week, May 11-18

National River Cleanup Week, May 11-18, is an opportunity for communities to join other communities nationwide in cleaning trash and other debris from their rivers and at the same time raise awareness about river conditions. The 2001 river clean up campaign attracted 49,920 volunteers conducting 354 cleanups along 8,030 miles of the nation's waterways. Groups supporting the event include American Outdoors, American Rivers, U.S. Bureau of Reclamation, U.S. Bureau of Reclamation and the U.S. Forest Service. For information about the event either call 864-558-3595 or check the web site: www.americanoutdoors.org.nrcw

"Moving Waters" Tells Story of Colorado River

"Moving Waters: The Colorado River and the West" is a multi-faceted presentation — actually a series of varied presentations — telling the complex story of the Colorado River. The citizens of the seven states within the Colorado River watershed are the designated audience. Project organizers have developed a number of approaches to present information including a traveling exhibit, lectures, book discussions, tours and fairs. Activities are scheduled for Yuma, Parker, Page and Phoenix before moving upriver to the other six states in the project. More than 100 activities will take place in Arizona from January through April. The project's grand finale will be a Sept. 25 - 28 conference at Northern Arizona University with the theme rights, rituals and realities and will cover, history, politics and science. Consult the web site www.movingwaters.org for a complete calendar of events.

Query: What Hydrology Data to Include in New AZ Electronic Atlas?

A University of Arizona Library project team invites comments and suggestions about the most useful and appropriate hydrology data to include in an Arizona Electronic Atlas. The Institute of Museum and Library Services has awarded the UA library $123,672 to create an Arizona Electronic Atlas. The two-year project, ending in December 2003, will result in a unique interactive web-based resource that will utilize spatially referenced data and allow users of various skill levels to create basic and thematic maps of Arizona.

Jeanne Pfander, member of the "E-Atlas" project team, will be working with other librarians, faculty and researchers to identify relevant science data sets to be included. The Atlas will integrate data from multiple disciplines, ranging from agriculture, business, health, natural resources, political science, sociology, etc. Water, an ongoing state concern, will get due coverage.

Suggestions, questions or comments regarding data sets or the project as a whole, should be addressed to either Chris Kollen, email: kollenc@u.library.arizona.edu; phone: 520-621-4869 or Jeanne Pfander, email: pfanderj@u.library.arizona.edu; phone: 520-621-6375.

Outside Readings

Social Science Research is Water Management Tool

"Outside Readings" includes reprints or abstracts of editorials, features, articles or other published materials that appeared in various publications. Following is an excerpt from "Envisioning the Agenda for Water Resources Research in the Twenty-First Century," a publication of the National Research Council (National Academy Press, Washington, D.C.)

There are several important social science research issues that are not clearly of legal or economic bearing but will need renewed emphasis and attention in the twenty-first century. Anthropologists, geographers, political scientists, psychologists, and sociologists have not been constantly involved in water resources research, although the importance of broader perspectives in the study of human institutions has been recognized. The effective management of many of our water problems will require contributions from all these disciplines. Differing value structures and cultural norms, the importance of perception, and the role of politics and political institutions are but examples of areas where contributions from the social sciences are needed.

Over the past 25 years, there has been a growing awareness that individual perceptions and social values greatly influence public decisions. Perceptions of experts, stakeholders, and the public about the risks, benefits, and mitigation options affect risk management processes. Each party's knowledge, beliefs, and overall perception of the decision process can significantly change the results of that process. However, management strategies are only infrequently based on a systematic assessment of the knowledge, perceptions, and beliefs of differing parties. Science-based methods such as mental modeling and value integration have received little recognition to date by the water management community as valuable approaches. Applied research utilizing these and other science-based methods is needed to determine the key factors that affect water-related risk perceptions, communications, and decision processes. New knowledge about stakeholders' concerns and priorities will provide a sound foundation for designing and implementing effective, responsive water risk management and communication strategies. The new knowledge created by this research will be crucial to designing comprehensive risk communication strategies, creating effective stakeholder dialogues, and ensuring that water research findings are disseminated appropriately to support personal and public decision-making processes.

In the last decade or so of the twentieth century, stakeholder input became very important in the formulation of water policies and water plans. A substantial amount of experience was gained from different methods for obtaining stakeholder input. Experience was also gained from situations in which stakeholder interests were relatively easy to reconcile and where the plurality of interests and intensities of interest virtually denied the possibility of achieving a consensus. There have been few systematic efforts to analyze and distill these experiences. Such research is badly needed because water managers must account for stakeholder preferences in a way that is efficient and that honors those preferences.

In many instances, user-organized institutions such as cooperatives, special districts, and mutual companies have been employed widely and successfully to develop and distribute water. Studies that identify the circumstances in which different kinds of organizations are likely to be successful and effective are needed, as well as research on new and innovative organizational arrangements for developing and distributing water. It will also be important to elucidate the links between user-organized institutions and the legal and policy environments in which they thrive.

Only limited attention has been devoted to the cultural, religious, and ethical facets associated with water and its use. Additional research is needed to identify the special attributes that will have to be accounted for as the population of the United States becomes more culturally diverse and as water scarcity intensifies. These factors critically influence the ways in which different groups have organized historically to manage their water resources. Comparative institutional studies that focus on the cultural and ethical determinants of water management organizations will be useful not only in defining the needs of different groups, but also in helping to design optimal institutions for managing water resources.

Finally, the need for studies to inform and enlighten the making of water policy will be more critical than ever. Too often, policy analysis and the development of scientific conclusions related to policy have been stymied because they have been confused with the actual making of policy. The Water Science and Technology Board believes that good water policy is based on good science and good analysis and urges that people not confuse efforts to develop information to support the policy-making process with policy-making itself. The specific research questions and the kinds of analysis needed will be specifically dependent on the policy issues under consideration.

The nation has accumulated over a century of experience with a variety of water policies and management modes, yet we have not learned as much as we might have from that experience. Too often water policies, experiments, and projects have been abandoned or completed without any *ex post facto* assessments as to whether they have worked well or not. Many observers have noted that current policies and policy-making efforts appear uninformed by what has gone on before. *Ex post* evaluations of completed water projects, of water policies, and of experience with water management regimes should be high on the research agenda of the future.

The water resources research agenda for the twenty-first century should give priority to: 1) determining the key factors that affect water-related risk communication and decision processes; 2) assessing the effectiveness of user-organized institutions for water distribution and identifying the legal and policy environments in which they succeed; 3) analyzing the range of experience with different processes for obtaining stakeholder input in the making of water policies and water plans; 4) elucidating the cultural and ethical factors associated with water use, and comparing institutions having different cultural and ethical bases; 5) informing the policy-making process; and 6) evaluating the strengths and weaknesses of past water policies and projects.

Managing...continued from page 1

power plants were proposed in various areas. This became a contentious issue, with the availability of water supplies central to the debate. Water supplies also will likely be an important consideration when other economic opportunities arise.

Also some rural areas will be considering water resource planning and management options in response to Growing Smarter Legislation. This law requires many rural communities outside AMAs to add water elements to their general plans.

With population growth and economic development on the horizon rural communities confront various water resource questions: Are available water supplies adequate to support growth and development? How can water be used more efficiently? Is importing water into an area a possibility? Is growth management an option for allowing some new growth without compromising rural amenities and values and threatening water supplies?

Clearly rural areas have water management chores to do.

If Arizona could be said to have an official water management blueprint it would be the AMA. To many rural residents, however, an AMA, a legislatively established entity with centralized authority, isn't the solution to their management concerns. In rural Arizona, which tends to be more conservative than urban areas, an AMA might be viewed as an opportunity for government to interfere in local affairs.

What hitherto defined water management in the state needed to be rethought, to better identify a strategy tailored to effectively address the water concerns of rural areas of the state.

Initially mostly occupied with AMA affairs, the Arizona Department of Water Resources needed to shift gears to work with non-AMA regions. The agency took a stewardship approach. Instead of top-down, an approach increasingly in disfavor in the natural resources field, a stewardship approach relies on local input and focuses on relatively small geographic areas.

DWR set to work by encouraging rural, non-AMA regions of the state to form regional watershed groups or organizations, to function as management units outside the AMA mold. Whereas AMAs were established to fulfill the mandates of the Groundwater Management Act the watershed groups were formed to develop their own management plans suitable for their own watershed areas.

DWR provides technical assistance, with agency staff assigned to work in the field and help organize rural watershed groups. Seventeen watershed groups now participate in the program. DWR also administers the Rural Watershed Initiative, a funding source established in 1999 to support water resource studies for rural watershed groups.

Meanwhile the different watershed groups themselves have organized to promote their common interests. The Arizona Rural Watershed Alliance seats rural water interest from different areas of the state at the same table, to pursue matters of mutual concern.

At this stage of its development rural water management in the state would not likely qualify as a political movement. The initial organizational efforts taken thus far are a beginning; whither they go depends upon continued and increased support. Present resources devoted to the cause are slim. DWR staff assigned to work with rural communities is limited, with only two members working in the field. Many believe that Rural Watershed Initiative funding is insufficient.

The work of the Governor's Water Management Commission has been the premier water event of the season. Although concerned mainly with AMAs the GWMC also recognized water management needs in non-AMA regions. Its summary of recommendations called for establishing a forum to address statewide water planning and recommended increased support for the Rural Watershed Initiative.

The GWMC recommendations may be a tentative bridge between water management work being done within AMAs and the work needing to done in other areas of state.

Rural, non-AMA water management in Arizona is the topic of an "Arroyo" publication soon to be published. People on the WRRC mailing list will be sent a copy of the upcoming "Arroyo."

Arizona Water Resource

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