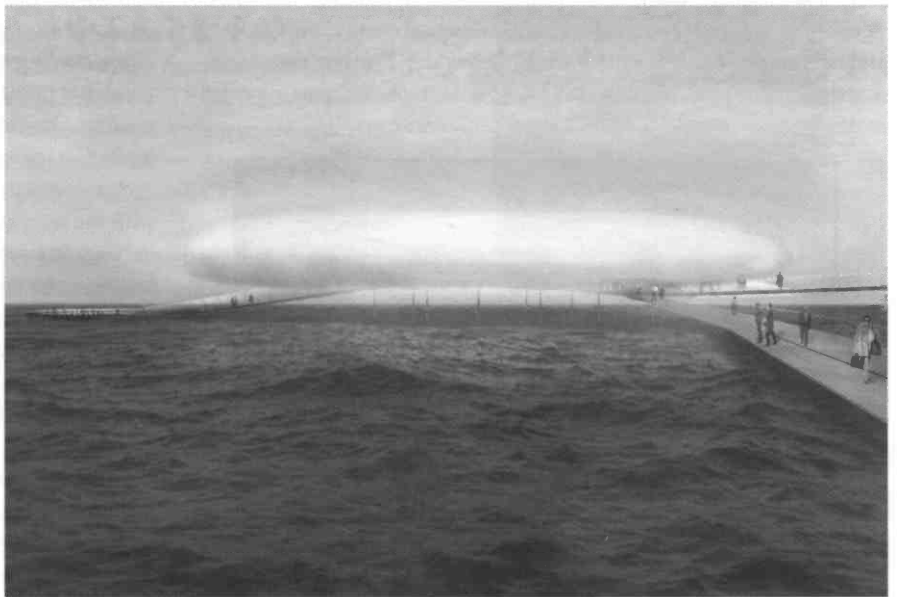


Ruling Fuels DWR Municipal Water Conservation Debate

A recent court decision prohibits the Arizona Department of Water Resources from enforcing gallons per capita per day standards, a key strategy for regulating municipal water use. A Superior Court ruling stated that the provision of Arizona's Groundwater Management Act's Second Management Plan by which DWR imposes maximum GPCD requirements "is vacated and set aside because it fails to address water utilization by end users." The judge also ordered DWR to pay plaintiff's attorneys' fees of \$137,900.

As DWR appeals the ruling, some water utility officials view the court decision as providing a good opportunity for the state agency to rethink its municipal water conservation program. Warren Tenney, assistant to the general manager of Metro Water District says, "The department might end up spending a lot of money fighting it through the courts, or it could use this as an opportunity to work with municipal providers to improve DWR municipal conservation requirements."

Continued on page 7



The Blur Building is an architectural project featured in Architecture + Water, a traveling art exhibit. The exhibit is made up of various projects that merge function and form when water is a major structural factor or, according to the brochure, projects in which "architecture and water play together." Under construction in Switzerland, the Blur Building is designed to appear as a cloud suspended above a lake. 12,500 high-pressure spray nozzles attached to a framework of steel cables and rods will spray mist that will envelope the framework. The Architecture + Water exhibit will be at the San Francisco Museum of Modern Art, Nov. 16 though March 23, 2003.

"Dry" Power Plants Produce Energy Using Less Water

Are air-cooled plants the future in arid areas?

The debate about building and operating power plants in the state has recently taken a new turn, with the merits of "dry" vs. wet cooling now an issue in the controversy. As might be inferred this is essentially a water use issue, with those advocating the use of dry cooling claiming the system uses about 90 percent less water to cool plants than wet systems. Meanwhile others argue that dry cooling technology, which uses air-cooled condensers instead of conventional cooling towers, has limitations that restrict its use.

Although in use for about 40 years, dry cooling technology for power plants has only recently emerged as an issue in Arizona. In the fall of 1999, when a surge in power plant applications hit the state, dry cooling was not a consideration. As a testimony to those times all plants now either under construction or permitted in the state are slated to be wet cooled. Although the surge in power plant applications has since abated, the few applications now submitted still designate wet cooling.

Reliant Energy's Signal Peak plant has been the only dry power generating facility to be actually proposed for Arizona. After announcing the project in August 2001, however, Reliant withdrew its application, and the project is now on hold.

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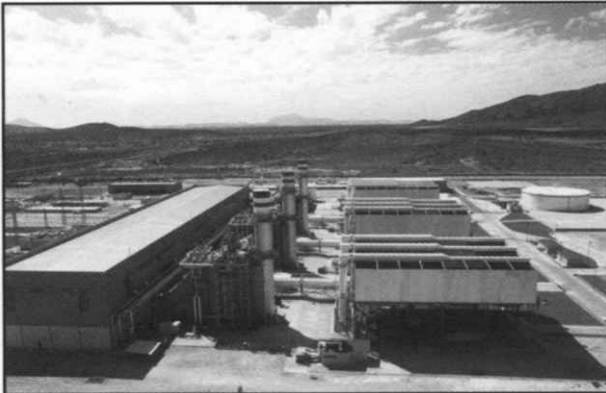


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"Dry" Power Plants...continued from page 1

In some ways, power plant developers' preference for wet cooling makes good economic sense, partly because water is relatively cheap and seemingly plentiful in the state. An ample supply appears available at reasonable cost, ensuring the maximum amount of megawatts for the number of dollars invested. In such circumstances, developers ask why take on the additional capital costs to construct and operate dry-cooled plants that use less water. Further, they argue that dry-cooled plants are less efficient than wet-cooled ones, especially in desert areas with periods of high air temperatures.



Air-cooled combined-cycle power plant just south of Ciudad Juarez, Mexico. Photo by GE Power Cooling Systems.

In response, advocates of dry cooling argue its use will promote Arizona's environmental and economic self-interest. To those people who believe that water conservation is a good unto itself, dry cooling has an obvious appeal, and they view its pursuit as good public policy.

Others supporting dry cooling take a more practical approach by agreeing that water used to generate power for Arizona citizens may be water well used, but they go on to say that enough plants are now in the works to meet the future energy needs of the state. Any additional plants should therefore be required to be dry-cooled to preserve Arizona's water resources for other uses. They question the presumption that water used as a cooling medium will find no better use over the next 40 years, the life expectancy of a power plant.

In further building their case, advocates of dry cooling point out that such plants are up and operating in various western states, including California and Nevada. Mexico has taken a lead among nations committed to dry cooling in arid regions.

Advocates of dry cooling also dispute the power industry's cost comparison figures that favor wet cooling over dry. In questioning some of the assumptions used to compute costs, dry cooling proponents note that cost comparisons between wet and dry systems often are limited to the capital cost and energy demand of the two technologies. Dry cooling fan energy cost is compared to wet circulation pump plus fan energy costs. They say this formula fails to take into account that dry cooling eliminates costs associated with purchasing land for its water rights, well-digging, piping and pumping, water treatment systems, evaporation ponds and aquifer protection permitting costs.

Regardless of how costs are calculated, however, most agree that

the bottom line generally shows that dry plants are more expensive to build and operate than wet. It is the extent of the cost differential that is disputed. Advocates argue that the cost differential is not that significant to rule out dry cooling, with its water-saving advantages.

What is generally acknowledged among all interests is that dry cooling has decreased efficiency in high ambient temperatures, a serious limitation in desert areas. Dry cooling is capable of handling the entire cooling load up to an ambient temperature of 85-90 °F. Beyond that point, the air temperature becomes too high for effective cooling. Developers planning to locate a plant in hot climates cite this limitation for not adopting dry-cooled technology.

Some plants located in such an environment have learned to live with the situation. For example, dry-cooled power plants are located in Nevada, parts of Texas and Northern Mexico, in areas without access to water supplies for a cooling system. On a 110 °F day, these plants accept an energy production penalty of approximately five percent overall (including turbine and steam cycles), compared to a plant equipped with a wet-cooling system.

To offset this limitation, a parallel dry-wet system has been developed, with a wet-cooling component to augment dry-cooling to maintain power output on hot days. The parallel or hybrid system has the advantage of achieving essentially the same hot-day performance as a wet cooling system, with an evaporation lost of less than five percent on an annual basis when compared to a wet system. A further advantage is that the parallel system requires a much smaller water transport, treatment and cooling tower/condensing plant infrastructure.

If, as many of its proponents claim, dry-cooled power plants are an idea whose time has come, why have they been so slow in catching on in Arizona? Cost is the main factor. In a competitive market

Continued on page 9

Dry Cooling Symposium Scheduled

The San Diego Chapter of the Air & Waste Management Association (AWMA) will host a one-and-a-half day symposium on power plant dry-cooling applications May 31 - June 1 in San Diego. Titled "Dry Cooling for Power Plants - Is This the Future?" the symposium aims to provide a current assessment of the advantages and limitations of air-cooled condensers (ACC) in power plant applications. The speakers include experts in the field, including regulators, public officials, ACC manufacturers, consultants and professionals from industry and academia. Check the conference web page for additional information. <http://awmasdc.org>

Attendance will be limited to 200 to encourage maximum participation and interaction among attendees, speakers and exhibitors. Symposium fees vary (from \$215 to \$40) depending upon whether the attendee is an AWMA member, with discounts available to government employees and students. For additional registration information contact: Paul Weir, AWR Engineering, phone: 760-781-5732; fax: 760-781-4093; e-mail: paulweir@awreng.com



Water Vapors

New Newsletter Feature

Arizona Water Resource newsletter coverage broadens this issue with the addition of a new regular feature, Public Policy Review. Sharon Megdal, the new Water Resource Research Center's associate director, will discuss public policy issues in a column to appear in each edition. Her broad experience in the public policy field eminently qualifies her to write about such issues. In her column in this edition, for example, she draws on her experience as a member of the Governor's Water Management Commission to discuss the legislative response (or lack of response) to the commission's work. (See page 11)

Candidate promises no soggy sandwiches

The University of Arizona recently held an election to fill student government positions. A candidate for student body president promised, if elected, he would see that a misting system was installed in the student union patio area. His opponent said if such a system were installed it would be a "tragedy" because reclaimed water would have to be used and "If I'm sitting at the union eating my lunch, I don't want to be sitting under reclaimed water."

UA Water Centers Now Serve Maricopa County

University of Arizona water center expertise is now available in Maricopa County and surrounding areas. This represents a broad UA commitment when you consider that the university has various water centers, each with a distinctive focus. There is the Water Resources Research Center (publisher of this newsletter), Engineering Research Center, Sustainability of Semi-arid Hydrology and Riparian Areas, Water Quality Center and Cooperative Extension programs.

Dana Flowers, the UA Maricopa County representative, will be responsible for mar-

keting, coordinating and delivering UA water education programs to Phoenix Valley classroom teachers, educators and, on occasion, students. Ms. Flowers will be the Project Water Education for Teachers (WET) Co-coordinator. Project WET is a national program dedicated to providing water education to teachers and students. The Arizona Project WET is a Water Resources Research Center program.

Ms. Flowers, who has a degree in environmental education, will coordinate 20 new Project WET facilitators who will each offer four workshops in a two-year period to Phoenix Valley teachers and educators beginning in the fall. This represents a greatly increased UA outreach commitment to providing water education to educators in the most populous city in Arizona.

Ms. Flowers can be reached at Maricopa County Cooperative Extension, 4341 East Broadway Road, Phoenix, AZ 85040-8807; phone: 602-470-8086, X 822; email: dflowers@ag.arizona.edu

Jordanians to Visit WRRC

Water Casa will be sponsoring a delegation of officials from Jordan June 21 - 22. The delegation will include two officials of the Ministry of Public Works and two officials of the Ministry of Water. Also accompanying them will be two representatives of a non-governmental organization, Water Efficiency and Public Information for Action or WEPIA. The Jordanians will be coming to Tucson to learn about water conservation practices and public policies. They will be vis-

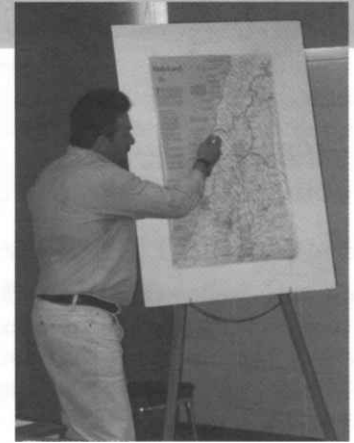


Photo by Joe Gelt

Ayman Mohammed Jarrar, Director of the Regulatory Directorate, Palestinian Water Authority, visited the University of Arizona and made a presentation at the Water Resources Research Center on April 11. He spoke on water resources in Palestine. Jarrar had been visiting Arizona from March 29 to April 20 to learn about water issues and regulatory methodologies. While in Arizona he met with the Arizona Corporation Committee as well as with officials of the Arizona Water Company, a private water company in the Phoenix area. He also participated in various activities with Tucson Water. Jarrar's visit was sponsored by the U.S. Agency for International Development and coordinated by the Santa Cruz Institute.

iting wetland projects, reclaimed water operations and talking with Pima County and Arizona Department of Water Resources officials. They will be invited to make a presentation at the WRRC about the water situation in Jordan. The Academy for Educational Development is sponsoring the Jordanians' visit to the United States.



Arizona Water Resource is published 6 times per year by the University of Arizona's Water Resources Research Center. AWR accepts news, announcements and other information from all organizations

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News Briefs

Las Vegas Reduces Perchlorate in Colorado River

The Nevada Division of Environmental Protection (NDEP) recently installed a new remediation system to intercept perchlorate contaminated groundwater now entering the Colorado River. Perchlorate is an oxygen rich salt that in high concentrations can affect the thyroid gland.

Trace levels of perchlorate detected in the Colorado River and Lake Mead in 1997 were traced to the Las Vegas Wash, a tributary that carries runoff from Southern Nevada's urban areas. Las Vegas Wash empties into Lake Mead, a major water reservoir for Nevada, Arizona and California.

The chemical was found to be seeping into the Las Vegas wash from nearby manufacturing sites through the shallow groundwater aquifer. Preliminary estimates indicate that the system will remove a large portion of the perchlorate now entering the wash.

Perchlorate levels in Lake Mead averaged 10 parts per billion during 2001, with levels downstream in Arizona and California at about half that level. 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."

The Environment Protection Agency has only recently begun the process of determining whether a drinking water standard should be set for perchlorate. With the adoption of any official standards likely years away, Las Vegas is taking a proactive stance on the issue.

"We began aggressively addressing this issue as soon as perchlorate was discovered in the Colorado River," says Patricia Mulroy, general manager of the Southern Nevada Water Authority. "Removing perchlorate from Lake Mead is among our top priorities. However, we recognize that this problem

isn't going to disappear overnight. That's why we decided to become actively involved in remediation efforts, rather than waiting for regulations to be developed."

Texaco Penalized for Navajo Oil Spills

Texaco Inc. has agreed to pay penalties for alleged violations of the U.S. Clean Water Act on the Navajo Reservation in Utah. The company admitted no fault in the settlement.

The settlement includes nearly \$850,000 for 88 oil spills and other environmental violations at an oil-and-gas field. As part of the settlement Texaco Exploration and Production, Inc will pay a \$369,922 penalty. In addition, Texaco agreed to spend about \$1.2 mil-

lion over three years to ensure that spills are less likely to happen at the oil field

Texaco will pay another \$478,700 to provide drinking water systems and sanitation facilities for some reservation areas. The Navajo Nation Environmental Protection Agency recommended projects for funding. NNEPA says some local residents now drive 50 miles to get drinking water.

EPA faulted Texaco for oil spills occurring between Dec. 1991 and January 1998 that reached the Montezuma Creek and other tributaries of the San Juan River. The agency also charged that Texaco failed to have an adequate prevention or response plan and did not notify EPA of the spills.

"Companies not in compliance with environmental regulations not only pollute the

Will Solar Panels Replace Windmills on Western Lands?

The windmill, the stalwart symbol of arid lands and the American West, confronts competition from solar powered submersible pumps. An Amarillo company has established field test sites for the solar pumps on ranches near Clarendon and Pecos, Texas and in Santa Fe, New Mexico where it provides water for a house.

(About 6 million windmills churn on the plains and pastures of America, with another 2,000 added yearly.)

Grundfos, a Danish manufacturer, chose SunBelt Pump & Supply Ltd. in Amarillo as one of its marketing test sites for its pump, called the SQ Flex. Other sites are located in Australia and South Africa. Grundfos sells more than 10 million pumps worldwide each year.

Mathew Beasley, head of SunBelt Pump, says the new solar system will likely be slow in catching on. He says previous efforts at solar pumping were not notably successful, although he believes the SQ Flex has improved technology beyond previous efforts.

Beasley said the SQ system's stainless steel construction is an improvement over previous alternative energy water pumps. The BP solar panels put out 43 watts of electricity at 123 volts instead of the usual 12 or 24 volts, he said, and is designed to withstand a 125-mph wind

A four-panel solar system, which is the minimum for a solar-powered well, is capable of providing 10 gallons a minute at 80 feet or 4 gallons a minute at 200 feet. Flow restrictors can limit flow to 2 gallons a minute.

Beasley says the new system, capable of drawing power from a solar panel, wind turbines or diesel-powered generators, promises savings at isolated locations since electric lines are not needed. Beasley says the number of solar panels will depend upon the depth of the well. The matching calculations mean that the SQ system is less likely to overpump groundwater than a traditional windmill.



environment, but gain an unfair competitive advantage," said Wayne Nastro, an EPA regional administrator in San Francisco. "This settlement levels the playing field, ensures that Texaco will operate its field in an environmentally responsible manner, and also provides clean, accessible drinking water for families who have gone for much too long without," he said.

The EPA and NNEPA began investigating the spills in 1995, and the EPA took administrative enforcement in 1996. The EPA sued Texaco in March 1998.

Texaco leases reservation land for its oil fields. The oil production fields are in the vicinity of the San Juan River in southeast Utah. Montezuma Creek, a tributary to the San Juan River, flows through Texaco's oil fields.

BuRec Says System OK Despite Dryness

U.S. Bureau of Reclamation only confirmed what is evident to many people when it recently stated that spring and summer snowmelt runoffs will be below average in most areas of the West.

The information was included in a recently released BuRec report that also stated that reservoir storage levels are generally near to below average. Most projects' storage levels, however, are expected to be adequate to meet this year's water supply needs. Precipitation in March was generally below normal throughout the West. Most of Arizona, California, Nevada, Utah, New Mexico, and Colorado reported less than 50 percent of normal precipitation.

"While we are very concerned about some areas that remain in critical drought, in general we believe there will be adequate supplies for agriculture and municipal water users, wildlife, boaters and anglers, and all who rely on the hydropower power produced by the Bureau of Reclamation," said John Keys, commissioner of reclamation.

"We are closely monitoring the drought situation in the West," Keys continued. "Even though we have some areas that are in better shape than last year, we still see heavy demands continuing to be applied on our reservoir systems throughout the West."

Keys said the Southwest has received less than 50 percent of normal precipitation

since October 2001. Current Colorado River reservoir storage levels are adequate to provide a full water supply. Lake Mead is 74 percent full.

Throughout the Lower Colorado region, seasonal precipitation is well below normal. Current Colorado Basin snowpack is only 51 percent of average. Although the forecast for April-July inflow to Lake Powell is only 38 percent of average, Lake Powell remains at 70 percent of capacity.

ADEQ Requests NPDES Authority

The Arizona Department of Environmental Quality is seeking authority to administer a stormwater runoff permit program currently under the control of the U.S. Environmental Protection Agency.

ADEQ submitted a request to the regional EPA office to allow the state agency to issue permits and manage compliance with the National Pollutant Discharge Elimination System program.

The Arizona Legislature provided legal groundwork for the request when it passed H2426 that established the Arizona Pollutant Discharge Elimination System. The bill, which was passed during the 2001 regular session, required ADEQ to seek regulatory authority to replace NPDES with AZPDES.

Arizona was within a small minority of six states without this authority when the bill was passed. ADEQ needed statutory authority before submitted a request to EPA to administer the storm-runoff permit program. H2426 provided the state agency with this authority.

The stormwater runoff permit process evaluates compliance with federal Clean Water Act rules.

Some environmentalists perceive an ulterior motive in the request. They say federal control of the program ensures better protection of endangered species. In Pima County, the federal program resulted in building delays in pygmy owl habitat, and they say this level of protection will not be provided by the state. State officials deny that the application is any way an intent to skirt species protection.

EPA is currently reviewing the state's application. Once the agency makes its determination it will publish a notice in the Federal

Register and the public will have 45 days to comment. ADEQ expects an EPA decision in early July.

In Arizona, the Navajo Tribe also has submitted an application to EPA requesting tribal authority to administer the reservation NPDES program

New IBWC Citizen Forums to Discuss Border Issues

Often criticized as unresponsive to public interest, the United States Section of the International Boundary and Water Commission is forming a Southeast Arizona Citizens Forum. The intent of the forum is to better inform citizens of Santa Cruz and Cochise counties about commission activities in their areas. A two-way exchange of information is sought, with the commission providing timely information and receiving input about ongoing and future commission projects in the area.

The Southeast Arizona organization will be part of a series of citizen forums IBWC is establishing along the U.S.-Mexican border at locations where commission projects operate. Forums have been organized in the Los Cruces-El Paso area and in San Diego, with another scheduled later for the Lower Rio Grande region.

Sally Spener of IWBC says, "We also expect to be establishing a citizen forum for our Colorado River project in Yuma. We don't know yet if it will be a combined Yuma-Imperial County forum or two separate ones."

IBWC Commissioner Carlos M. Ramirez, who was appointed to the position last summer, has made public outreach a priority of his administration.

The Southeast Arizona forum is expected to be made up of about ten members representing various interests including the general public, environmentalists, officials from various levels of government and other interested parties. Meetings will be conducted about four times per year, alternating between Santa Cruz and Cochise counties, with all meetings open to the public.

Plans call for the members to be appointed in time to participate in a June meeting. Persons interested in serving on the board should contact Sally Spener. 915-832-4175; email: sallyspener@ibwc.state.gov



Guest View

Learning About Tribe is First Task of Researchers on Indian Land

Ask not what the tribe can do for you...

The author of this Guest View is Dr. Laurel J. Lacher, Senior Hydrologist, White Mountain Apache Tribe

When I told my husband that I had been asked to write this column of approximately 1,000 words, he quipped, "You only need nine: Ask not what the tribe can do for you," Actually, he's just about right. Borrowing from Kennedy's famous phrase eloquently sums up the essence of doing research on Indian lands.

During my first month working for the White Mountain Apache Tribe in 1996, I attended a meeting where representatives from the University of Arizona proposed a research project involving some data collection on the Fort Apache Indian Reservation. Fresh out of graduate school myself, I thought their cause noble and interesting and could see no harm in the Tribe's participation.

After nearly an hour of courteous academic banter among white folks, a Tribal elder finally spoke up. As I recall, his first question was: "How will this help my people?" Baffled, the academics blinked and stuttered. Before they could come up with a meaningful reply, the elder went on to explain some of the history of abuses done to Indian people in the name of "research." He raised the specter of archaeology, where sacred remains are exhumed and displayed for public humiliation. He described scientific watershed experiments in the 1950's and 60's that legitimized the destruction of majestic cottonwoods along pristine riparian areas for the purpose of salvaging wasted water for downstream users in Phoenix.

Suddenly, my academic alliances and my stomach felt queasy. I can only hope that my ashen face did not reveal my quiet step across the line from UA graduate to Tribal employee. Sitting there in the wings of Tribal advocacy, I felt an uneasy balance trying to take hold. How could I support research in the face of this kind of history? How could I betray my fellow academics by not availing them of the abundant resources of this rich land for the benefit of science?

More than five years later, I still work for the Tribe, and I still hear that elder's words as clearly as if he had said them yesterday. I remember him saying, "Anything done on our lands should benefit the Tribe 51 percent or more and anyone else, less." Today, I take a cautiously proactive approach to academic research on the Reservation. A few central tenets help keep me in line with my employers' wishes: 1) Any project done on the Reservation must have a clear benefit, outweighing any risks, to the Tribe; 2) If possible, Tribal members should be employed to do or assist in the research; 3) Data collected on the Reservation belongs to the Tribe. The Tribe will decide whether or not the rest of the world reads about it in a journal or on the web. Many people are shocked by this list, but they shouldn't be. Is it unusual for private ranchers to refuse to allow hydrologic or endangered species studies on their lands? Would you want your property controlled by outside interests because a rare speckled salamander

lived in one of your streams? Researchers' primary strength — intense focus — is also a potentially fatal flaw in the non-academic "real world." The ability to put a research project in perspective and to instill in it societal value distinguishes those researchers who are destined to succeed with tribes from those who are not. Tribal leaders and elders have *very* long memories, and to them, one researcher is essentially the same as the rest until proved otherwise.

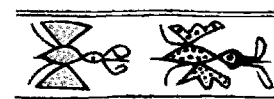
As academics, our challenge is to do something truly great by using research to benefit the land or resources we desire to study and the people who own them. This ideal presents a problem for some researchers who know little about those people or what they want. The answer is simple but not easy: *go visit and spend some time learning.*

A Tribal elder finally spoke up...

"How will this help my people?"

Here are some tips to help get you started: 1) Call the Inter-tribal Council of Arizona in Phoenix (or other similar organization if outside Arizona) to ask for a good contact with the Tribe; 2) Check the Internet, particularly the Tribe's web site, to learn anything you can about the tribal people, land and resources; 3) Call your contact and schedule a visit. Offer to send some background materials on you and your proposed project in advance of your meeting; 4) Explain your project in **plain English**. Unless your audience is unusually scientific and well-educated, academic jargon will get you less than nowhere; 5) Put yourself in your host's place. Try to find an angle that would be beneficial for him/her so that he/she can become your advocate; 6) Offer to present your proposal to the Tribal Council or elders group. Be ready for tough questions like, "How is this going to help us?" 7) Consider potential pit-falls and find ways to preempt them. For example, a) offer to hire a tribal member to assist in data collection and provide guidance on acceptable data collection sites, b) be sure to request a tribal permit for working on tribal lands; c) always ask before taking photographs; d) be very up-front about your desire to publish and offer to have all materials reviewed by tribal legal and/or technical staff before publication.

If these steps all seem viable, then take one more deep breath and ask yourself whether you honestly believe that your work will bring some measurable benefit to the tribe. If so, then carry on and you should have no trouble.





Legislation and Law

Court Ruling...continued from page 1

The Arizona Water Company filed suit in 1990 when DWR adopted its Second Management Plan, challenging the plan's municipal water conservation program on several grounds. For one, AWC claimed it was improper to impose GPCD requirements on municipal providers without directly regulating their customers or end users by imposing limits on their water use.

AWC Vice President Bill Garfield says the utility objected to regulations placing the entire burden of meeting the GPCD on the water providers themselves. He says, "We have an obligation to serve our customers. We don't have the option of serving Customer A because we believe he puts water to good use and then not serve Customer B because we say his use will put us over our GPCD requirement."

AWC also objected to DWR's method of establishing GPCD standards for water providers, alleging that the agency's use of historical water use records to set standards was to the disadvantage of developing communities. AWC also objected to DWR including Central Arizona Project water within GPCD calculations.

Further, the water company claimed to be caught in a regulatory bind, in attempting to be in compliance with both DWR and Arizona Corporation Commission regulations. DWR regulations mandate limiting water use while ACC regulations require that a utility meets customers' demand.

Although the case involved an array of possible issues, the judge's recent ruling focused on the management plan's failure to regulate the end user. In effect, the decision puts DWR's enforcement of GPCD requirements on hold during the period of appeal. It may be a year before the Court of Appeals decides the case.

DWR attorney Ken Slowinski says, "If we ultimately lose the appeal we will then have to go back and make changes in the management plan." He is unsure, however, what kind of changes would be called for. "It depends upon how significant the judge feel the management plan needs to be changed to overcome the deficiency he sees in it. It is difficult to assess that just by the wording of his order. It is a short statement about what he felt is wrong with it, and could be

open to interpretation as to how far he wants to go to address water use by end users."

Slowinski says, "The judge did not say that GPCD is illegal, just that it is defective because it does not address water utilization by end users." He added that DWR believes the management plan is legal and that the decision will be reversed.

The case strikes a chord with a number of utility officials who are dissatisfied with the GPCD standard, and they question the wisdom of pursuing a lengthy and expensive court case. They say DWR took a different tack when it had a dispute with the agricultural sector over its base conservation program. After the dispute continued for several years and in the face of probable legal action, DWR worked out a compromise with agricultural interests that resolved many of the problems. Some municipal utility officials say such a strategy is appropriate in working out municipal conservation requirements.

They further claim that DWR has been remiss in not already having seriously considered municipal water conservation options. They say such opportunities existed during the course of the ongoing legal proceedings. They also say the Governor's Water Management Commission did not adequately consider the issue of municipal water conservation when it reviewed the working of the GMA.

Tenney says, "Water conservation has evolved in Arizona in the last 22 years since the passage of the Groundwater Management Act. DWR's approach should have changed to recognize that regulations alone are not the most effective approach to conservation."

Some utility officials believe the state agency needs to work more with municipal providers to identify strategies to influence end users. Two such suggested strategies are cooperating to develop ordinances to promote water savings (e.g. ordinances requiring low-flow plumbing fixtures) or working together to determine ways of influencing the water-using behavior of end users. They argue a regulatory approach will not work when dealing with end users.

Tenney says Metro Water's commitment to water conservation will not be affected by the court decision. He says, "Water conservation is important to Metro Water, as it is to other water utilities, whether the state has an effective regulation in place or not."

Bills to Change Arizona Groundwater Law On Hold

Any expectations that legislation would be enacted this year in response to recommendations of the Governor's Water Management Commission were dashed when two legislators withdrew their bills proposing commission-recommended changes.

Sen. Herb Guenther, chairman of the Senate Natural Resources Committee, and Rep. Tom O'Halleran decided the times were not ripe for legislative consideration of the their bills. Guenther said the Legislature was operating under a time constraint that left insufficient time to ad-

equately consider the complex proposals for groundwater law changes. O'Halleran said that the many other issues occupying lawmakers would distract them from devoting to the bills the attention they deserve.

The Legislature's focus on budget priorities has been its main item of business this session, to the exclusion of many other matters. O'Halleran said that the water bills would again be introduced early in next year's regular session

The decision to pull the legislation

disappointed some members of the commission. The 49-member GWMC worked for a year and a half to review the workings of the GMA and to identify areas of concern. Recommendation were then drawn up identifying needed legislative action to remedy shortcomings of the laws. One of the recommendations already provoking some controversy is for half-mile buffer zones banning new wells from designated riparian areas.

(See Page 11 for a discussion of the postponed action on GWMC recommendations.)



Publications & On-Line Resources

Reader-Friendly Publications Reach Wide Audience

Central to the screen-or-sheet controversy is whether information is better provided via a website or a paper publication such as this or other newsletters. Because of the abundance of available information, for distribution to a wide-ranging and diverse audience, it need not be an either-or situation. There is enough information to go around for websites and newsletters. Both have their advantages.

Some government agencies in Arizona are going the publication route, producing noteworthy, newsletter-type publications that are not your typical government report. An effort is being made to communicate information to a broad audience, beyond just water professionals to include interested citizens. The U.S. Geological Survey issues various fact sheets on water-related topics; the Arizona Department of Environmental Quality publishes an ambient groundwater quality series; and the Arizona Geological Survey publishes a quarterly newsletter, "Arizona Geology."

Each of these publications is attractively formatted, printed in color with various graphics, including maps and photographs. The text is written to be understandable to the non-specialist but is not so basic as to be off putting to the water professional.



USGS Fact Sheets

Steve Longworth of the USGS Arizona District describes the rationale of the fact sheets: "We recognized the need for providing information about our programs to the public in a timely manner using an effective format and nontechnical language."

The fact sheet series attracted sufficient interest that, in good government fashion, official guidelines were issued to define the types of information to be released through them. Three broad categories were established and seven informal categories.

The most recent USGS fact sheet reports on a study looking at the errors in measuring discharge along the Lower Colorado River. Previous fact sheets include information about monitoring surface water quality in the state; the geology and hydrology of the Monollon Highlands; and Southwest desert basins.

USGS fact sheets are listed on its website and can be downloaded. (<http://az.water.usgs.gov/>)

Free copies of many of the issues also are available from the USGS Arizona district offices in Tucson.



DEQ's Ambient Groundwater Quality Series

DEQ's ambient groundwater quality series is a publication of the agency's ambient groundwater monitoring program. DEQ hydrologist Douglas Towne says, "What we typically published in the past were pretty lengthy open-file reports, from 50 to 100 pages oriented to hydrologists. These provided a

lot of good background data, but we found that because of the length and other facets these were not getting much use."

Towne says they examined the USGS fact sheets and found a possible option to DEQ's open-file reports. He says, "USGS had popularized fact sheets as a method of publication, and we thought it might get the word out for us too."

Towne says the resulting groundwater quality series "...is still oriented toward hydrologists but we use enough common language so that the individual well owner, the public water system operator and the local government official would get some use out of them."

Open-file reports are done first, with the more significant groundwater quality information then summarized into a four-page newsletter. Those seeking additional information have access to the lengthier, more detailed reports.

The series summarizes DEQ groundwater quality studies of the state's groundwater basins. Four-page fact sheets are available on the following basins: Prescott Active Management Area; Douglas Basin; Sierra Vista Basin; Sacramento Valley Groundwater Basin; Virgin River Basin; Yuma Basin and the Wilcox Basin. A report on the Lower San Pedro is in draft form. The reports are available at <http://www.adeq.state.az.us/environ/water/assess/ambient.html> For information about the series contact Douglas Towne, phone: 602-207-4412; email: towne.doug@ev.state.az.us



AGS's "Arizona Geology"

The Arizona Geological Survey publishes a quarterly newsletter, "Arizona Geology." The AGS areas of interest include not just water but also the land, mineral and energy resources of the state, and its newsletter deals with these interests. (The spring 2002 edition of "Arizona Geology" is titled, "Arizona Has Salt.")

AGS Director Larry Fellows says, "The agency newsletter was once called "Field Notes" and was for a technical audience, for people who might read 'Scientific American.' It later evolved into 'Arizona Geology,' directed to non-technical readers."

Fellows says that "Arizona Geology" was originally 16 pages but budget cuts reduced it to a six-page format. Check the AGS website (www.azgs.gov) for the current and previous editions of "Arizona Geology" or to sign up to receive the newsletter.

The above publishing ventures are interesting exercises in public outreach. There are various programs, organizations and agencies throughout the state involved in water affairs, and many confront the question: What information should be made available and to whom? Just as it takes a specialized effort to collect and analyze water-related facts and information it also takes a special knack to communicate the results of that work. These publications are good models to examine when answering the above question.

"Dry" Power Plants...continued from page 2

place, dry cooling is not likely to be a first choice, unless the cost of water is high or water is simply not available. Nevada has a number of dry plants because developers confront high water costs. Developers in California have turned to dry cooling since state water policy ranks beneficial uses of potable water, and water for plant cooling is very low priority.

The issue would seem ripe for public policy discussion in Arizona, and some discussion is in fact occurring as two state regulatory bodies review power plant applications. An Arizona Power Plant and Transmission Line Siting Committee evaluates power plant applications to decide whether to issue a certificate of environmental compatibility (CEC). The committee examines a broad range of environmental issues, including present and future availability of water. The application then goes to the Arizona Corporation Commission for formal approval.

The Siting Committee has the authority to impose conditions on power plant applications to minimize environmental impact. The topic of dry cooling has come up during committee deliberations and was addressed at some length during a recent consideration of an application submitted by Allegheny Energy and Supply Company to build a power plant in La Paz County. The committee, however, granted Allegheny a CEC without imposing dry-cooling requirements. The application then went to the ACC for its review and approval.

In an effort to encourage the ACC to impose dry-cooling requirements at La Paz, the Arizona Unions for Reliable Energy (AZURE) requested that the commission review the issuance of the CEC and accept briefs and oral arguments from interested parties. AZURE ar-

gued that the ACC "should modify the CEC to require the impacts of this project to be fully mitigated." Among the mitigation measures proposed by AZURE is the requirement that the La Paz plant install dry cooling.

On one other occasion the ACC had required that a plant adopt dry cooling. It had imposed the requirement on Duke Energy when it sought approval of its Arlington Valley I plant, although the Siting Committee had already granted the project a CEC. Duke Energy appealed the ACC decision, and the commission rescinded its dry-cooling requirement when the contractors agreed to recharge a quantity of CAP water equal to the amount the plant used for cooling. Now the La Paz application was again raising the issue of dry cooling before the ACC.

"We are working to have La Paz be the first project for the commission to actually bite the bullet and require dry cooling," says Mark R. Wolfe, an attorney for AZURE. On April 8, the ACC heard oral arguments on the La Paz plant before voting on the issue.

The ACC voted not to require that the La Paz plant install dry cooling. ACC Chairman Bill Mundell had made several motions that the plant include some aspect of dry-cooling technology but the motions died for lack of a second. The plant was approved with a recharge provision instead.

Although not a victory for dry-cooling supporters the experience did not leave them completely discouraged either. The dry-cool issue is on the table and getting attention from both the Siting Committee and the ACC. As an AZURE member noted after the hearing, "Even if a power company does not want to commit to dry cooling, they now feel they have to explain why not. It is an advance over where we were a couple years ago."

Hopis Consider Dry-Cooled Power Plant

The Hopi Tribe recently announced that it has signed a joint development agreement with a subsidiary of Reliant Resources Inc. of Houston, Texas, to look into building a 1,200-megawatt coal-fired, dry-cooled generating station on the reservation in northern Arizona. In an area of very limited water resources, the plant would be utilizing air-cooled condensers instead of conventional cooling towers, with the result that it would use about 90 percent less water than a traditional water-cooled plant.

Hopi Chairman Wayne Taylor Jr. said discussions between the tribe and Reliant began about a year ago. He views the plant as providing a boost to tribal efforts to achieve economic self-sufficiency and reduce its 50 percent unemployment rate.

Taylor says that the two guiding criteria of the project are clean air and low-water use. He says, "We are the custodians

of our ancient homeland. As good stewards of the land, only a facility with a minimum impact to the environment will be acceptable to us."

Some view the Hopi's consideration of a power plant to be related to its dispute with Peabody Western Coal Co. Peabody is currently strip mining coal at Black Mesa. To get the coal to the Mohave Generating Station in Laughlin, Nev., Peabody pumps up to 5 million gallons of water a day from the aquifer. The water is mixed with crushed coal, with the slurry then pumped to Nevada via a pipe line.

The Hopis claim that the groundwater pumping is causing springs and wells on the reservation to dry up and have indicated they will refuse to sign a new coal mine lease with Peabody when the current lease expires in 2005.

In response to the threat, Peabody has already filed a lease extension applica-

tion with the federal Office of Surface Mining. Peabody says it will work with the tribe to locate an alternative water source for the slurry pipeline.

The Hopi agreement with Reliant stands as a contrast to the tribe's relationship to Peabody Coal. A jointly owned power plant with Reliant would provide economic benefits to the tribe without consuming large quantities of limited water resources.

The tribe now receives \$3.5 million annually from Peabody for its water rights. Another \$45 million per year goes to the Hopis and Navajos for coal royalties. Coal royalties provide about 80 percent of the Hopis annual revenues.

With the signing of the joint development agreement with Reliant, detailed studies and negotiations will be undertaken along with the development of contractual agreements.



Announcements

AZ Hydrology Society Hosts Symposium

The Arizona Hydrological Society announces its First Biennial Symposium on "Scientific Issues Related to Management of Landfills In Arid and Semi-Arid Regions" to be held June 7 in Tucson. The symposium includes two plenary presentations, eleven technical presentations and a concurrent poster session. For more information, check the web site www.AzHydroSoc.org

NSF Funds Available to Study Water Cycle

The National Science Foundation will support innovative basic research into the science of the water cycle. The selected priority science issues for this initial announcement are for understanding and quantifying: pathways and fluxes of water among hydrologic reservoirs; causes of water cycle variability; prediction of water cycle variations; and linkages between the water cycle and geochemical constituents. \$5 million is expected to be available for this program for FY2003, with ten to twenty awards anticipated. Deadline is June 18. For more information contact: Douglas James, Hydrologic Sciences, Earth Sciences, Rm. 785, NSF, 4201 Wilson Blvd., Arlington, VA 22230. Telephone: 703-292-8549; email: ldjames@nsf.gov Web: <http://www.nsf.gov/pubs/2002/nsf02101/nsf02101.htm>

Conference on Sustainable Water Future

The conference, *Allocating and Managing Water for a Sustainable Future: Lessons From Around the World* will be held June 11-14, in Boulder, Colorado. Its purpose is to examine innovative water allocation laws, policies and institutions from around the world that provide lessons for sustainable water management. Sessions will focus on innovative legal and institutional developments and lessons that can be transferred across different regions, countries, cultures, economies and water systems. International speakers and case studies will be drawn from world regions that share the American West's challenges of managing uncertain and variable water supplies. For more information, contact the Natural Resources Law Center, University of Colorado Law School, Boulder, CO 80309-0401; phone: 303-492-1286; email: nrlc@spot.colorado.edu; web site: www.colorado.edu/Law/NRLC/

EPA Invites Arsenic Treatment Demonstration Interest

The U.S. Environmental Protection Agency plans to conduct a demonstration program on the treatment of arsenic in drinking water, with the intent of identifying and evaluating the cost effectiveness of commercially available technologies and engineering or other approaches to meet new arsenic standards in small water systems (10,000 customers). The EPA is inviting the public at large, governmental and regulatory agencies, and drinking water utilities to identify

small water utilities that may be interested in hosting a demonstration at their facility. More information about the study can be found at www.epa.gov/ORD/NRMRL/arsenic or contact: Robert Thurnau, National Risk Management Research Laboratory, U.S. Environmental Protection Agency, 26 West Martin Luther King Drive, Cincinnati, Ohio, 45268; 513-569-7504. Requested information must be submitted by June 28.

Groundwater Forum Scheduled

The Ground Water Protection Council and the U.S. Environmental Protection Agency, in cooperation with state and federal agencies, tribal and local governments, citizen groups and industry will cosponsor the 2002 GWPC Annual Forum, *Water Resources for the Future: "Ground Water Protection and Conservation,"* September 22-25 in San Francisco. This year's conference will focus on the importance of conservation and protection of ground water as they relate to overall water resource management; the integration of the Safe Drinking Water Act and the Clean Water Act programs; as well as a focus on what is being done to meet ground water/source water protection goals. For more information, check: <http://www.gwpc.org>

AWRA Summer Specialty Conference

The American Water Resources Association is hosting the conference "Ground Water/Surface Water Interactions" at Keystone, Colorado, July 1-3. The conferences will be an opportunity to discuss a wide range of interdisciplinary concerns and technical advancements in the arena of interactions between surface water and groundwater and will bring together a broad range of disciplines to focus on the issue. Surface water and ground water resources are all too often considered separately and distinctly from one another, and the interface and interaction between the two is frequently ignored. For information about the conference check the web site: www.awra.com

Pilot Tribal Wastewater Training, Technical Assistance Center Established

The Office of Wastewater Management's Municipal Assistance Branch and Northern Arizona University have established a pilot Tribal Wastewater Training and Technical Assistance Center. The primary objective of the center is to provide information and no-cost, direct on-site training and technical assistance to Indian tribes on their wastewater treatment facilities. It will function as a resource center or clearinghouse for tribes to access information via publications, databases and newsletters and as a contact point for other organizations able to provide other tribal services and assistance. The center is a joint project of EPA and Northern Arizona University and will be located at NAU. For further information on the project, contact Virgil Masayeva at NAU 928-523-9651 or Curt Baranowski of EPA at 202-260-5806.



Public Policy Review

by Sharon Megdal

Was the GWMC's Conversation Comprehensive Enough?



In early 2000, I contributed a Guest View to the *Arizona Water Resource* providing a rationale for a "comprehensive conversation" on the Groundwater Management Act 20 years after its adoption. My commentary anticipated the formation of the Governor's Water Management Commission. As the reader may know, the commission was established in June 2000 and completed its work in December 2001. It was an arduous task, with volumes of materials reviewed and analyzed, and countless hours spent at meetings.

The 49-member commission's *Final Report & Recommendations* was a succinct document, including approximately 50 recommendations to improve water management in the state's five Active Management Areas. To implement the recommendations requiring statutory change, two bills were drafted. The large bill was 141 pages long and included many statutory changes. In contrast, the bill introducing, in certain circumstances, a groundwater withdrawal assessment was five pages.

The stiff opposition the bills met early on did not bode well for their passage. Concern about the situation prompted Senator Herb Guenther and Representative Tom O'Halleran, the bills' primary sponsors, to consult with various members of the commission. On March 6, Guenther and O'Halleran issued a joint press release announcing withdrawal of the bills. Senator Guenther stated, "The time necessary to review the Groundwater Code ... just isn't there." Representative O'Halleran added that review of the proposals "will require a lot of time and focus by the members who, frankly, have other, more immediate problems facing them."

Balancing the state budget has been the main concern of the Legislature and Governor this legislative session. In the wake of the Alternative Fuels debacle, complex bills will require considerable debate. Finally, in this year of redistricting and reelection, legislators are likely to be extra cautious in their votes. The press of various matters did not leave sufficient time to fully debate the bills' provisions. Expectations are that the recommendations will be reintroduced next year.

Various other factors also worked against the bills. Due to their complexity and the broad review of the drafts by commission members and other interested parties, the bills were introduced late. It may have been a miscalculation to expect the Legislature to "trust" the 49 members of the commission. Their diverse interests led to compromises on many issues, with recommendations adopted as a package. Further, without a water crisis to add a sense of urgency, support was lacking for some of the proposed reforms. Those who did support the recommendations were not sufficiently organized to actively advocate for passage of the bills. Although the commission process may have educated participants, the educational outreach effort was not broad enough, only benefitting a handful of legislators. So, seeking additional time was indeed justified.

We now have some breathing space. Is it reasonable to expect a different outcome next year? What needs to be done differently?

Several have argued for the need to go back to basics and educate policy makers – and others – on the groundwater code. Why was it established? How has it been changed? Why are further changes necessary? Some understanding of the commission's process or water management issues in general would be helpful in answering such questions.

About one-third of legislators were elected, however, for the first time in 2001. That was a quiet, uneventful year for groundwater code amendments, with the water community awaiting the recommendations of the commission. Not many current legislators were participants in the creation of the Central Arizona Groundwater Replenishment District (CAGRDR). With many members not well grounded in groundwater issues, it is understandable that legislators want to ask many questions and have time for debate.

In the piece I wrote in early 2000, I noted that we have made great strides in managing groundwater in the AMAs. I stated, "Twenty years later, we should both congratulate ourselves on our successes and ask the question: Can we manage our state's precious water resources even better?" I provided the following observations on the need for a look at the code: "While many know that water is an essential resource for a rapidly growing desert state, I would suggest few understand just how we are attempting to ensure sufficient water supplies to sustain our current and growing population and economic activities. Therefore, education of the public as to why we regulate our groundwater use as we do and why some changes may be needed is an important reason to engage in a comprehensive conversation."

Some have suggested we are the victims of our own success. Because we have been successful at managing our groundwater, no crises exist nor loom on the horizon. As a result, there is no strong sense we should do anything differently. And while the commission and its onlookers engaged in a comprehensive conversation, for the most part the general public and public officials did not. Further education, discussion and debate, therefore is needed, especially with legislators and likely participants in future legislative debates.

I look forward to participating in this educational process. I am hopeful that, after some additional conversation, we will introduce some riparian protection to state water policy, a concern that never made it in the code in 1980, as well as improve the CAGRDR statutes, just to single out a few important commission recommendations.

I also look forward to other follow-on work to the commission process. Not all recommendations required legislative action. Some recommendations acknowledged the inability of the commission, due to time or other limitations, to address some key matters. The latter include the long-term role of the CAGRDR, planning for recovery of stored CAP water, and developing a planning process for addressing the state's future water needs.

I think of the commission process as having begun a conservation that is to be continued and broadened as its recommendations receive further deliberations.

U.N. Warns of State of World's Water

The United Nations marked World Water Day, March 22, by calling attention to some of the world's most critical water problems. In its World Water Day statement the United Nations warned of dire consequences if the world continues to consume water at its present rate. This will result in more than 2.7 billion people facing severe shortages of fresh water by 2025. Efforts were urged to conserve supplies and develop new ones.

The World Health Organization used the occasion to note that waterborne diseases kill at least 3.4 million people every year. Collectively these diseases are more lethal than AIDS. WHO called for a greater international effort to improve the water hygiene and sanitation conditions of the world's poor.

The UN report said about 5 billion people around the globe will be living in areas with conditions making it difficult or impossible to meet all fresh water needs. This looming crisis could touch nearly two-thirds of the Earth's population the report warned.

Further contributing to the report's bleak outlook is its estimate that even now 1.1 billion people have no access to safe drinking water, 2.5 billion lack proper sanitation and more than 5 million people die from waterborne diseases each year — ten times the number of casualties killed in wars around the globe.

“Water is in the top rank of hazards to human health,” said Jamie Bartram, coordinator of the WHO's Water, Sanitation and Health Program. “This is a big health problem and the people who are really suffering are the poor in developing countries, especially children.”

Even if not termed waterborne diseases, certain disabilities and incapacitating illnesses that are in part caused by contaminated water ruin the lives of many in the developing world, WHO said. With better water management and sanitation the transmission of diseases like schistosomiasis and malaria can be reduced.

Bartram said many other threats exist such as excessive fluoride in the water supply in China, India and the Rift Valley in Africa. In China alone, 30 million people suffer crippling skeletal fluorosis. Trachoma, an eye infection caused by dirty water and poor hygiene conditions, has inflicted irreversible blindness on six million of the world's population.

“Without adequate clean water, there can be no escape from poverty,” said Klaus Toepfer, director of the UN Environment Program. “Water is the basis for good health and food production. Mankind is always at its mercy.”



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