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Unabated use of groundwater threatens Arizona's future

*by **Shaun McKinnon** - Aug. 2, 2009 12:00 AM*
The Arizona Republic

Thirty years after Arizona tried to stop cities and towns from using up their groundwater, the state still can't shake its thirst for one of its most finite resources.

The steady drain on underground reserves grows out of two realities: Canals and pipelines don't reach far enough to deliver surface water to everyone, and laws don't reach far enough to stop people from drilling.

If the groundwater addiction continues unabated and under-regulated, the effects will be broad and potentially disastrous: Scarcer supplies could push rates higher and create uncertainty about water availability, discouraging new business and slowing economic growth. If wells start to run dry and aquifers collapse, the landscape could be dotted with fissures and sinkholes.

Lawmakers adopted some of the nation's most progressive water-protection laws to avert such crises, but the laws excluded rural areas and allowed changes that let cities and subdivisions resume well-drilling, further depleting exhaustible aquifers.

Meanwhile, the renewable resource intended to replace groundwater - surface water fed by the annual runoff of mountain snow - can't meet the demand of urban areas too far from the delivery canals.

The result is holes in the state's water bucket that are spreading as fast as the holes in the ground.

Rural communities, some of them hurting for water now, are drilling new wells with limited knowledge of how much water is needed or how much remains. A water source intended to serve a few isolated areas is now so widely tapped that it has become an unsustainable drain on the aquifers that hold the groundwater. Cities and towns are even preparing to tap underground reserves set aside as a hedge against future shortages.

And looming over it all are the separate threats of drought and climate change, which could strain surface-water supplies at the same time that groundwater resources are shrinking.

Water providers are scrambling to find more-reliable sources of water, but with no hard deadline, the Legislature has provided little help, rejecting proposals to better link growth with the availability of water and shunting aside measures to aid regional planning.

Yet in a crisis, the needed changes may not occur in time.

The water world moves like a lazy brook, slowly and meanderingly. An effort to allocate water rights and sift through competing claims for water on the Gila River system has been locked up in court for more than 30 years. The Central Arizona Project lumbered through the approval and construction process of the 336-mile Colorado River canal for decades. New conflicts over shrinking resources could mire cities in red tape and legal briefs.

"What we have to do is get out of denial," said Herb Guenther, director of the Arizona Department of Water Resources. "We're spoiled by cheap, easily available water and

have been for a long time. We have a lot of water compared to other Western states. But we need to use it in a sustainable way."

Best intentions

For a state so defined by its deserts, Arizona boasts a surprisingly robust water supply. The 7 million acre-feet (about 2.3 trillion gallons) drawn from rivers and wells each year could serve a population four times larger if water went mostly to homes and businesses.

Farmers still use about three-quarters of the surface-water supply, and access to the rest is limited by geography or legal rights. Groundwater supplies are spread thinner, especially in higher elevations. Flagstaff and Williams must drill hundreds of feet deeper than Phoenix or Tucson. And small towns such as Jerome, Mayer, Strawberry and Pine struggle to keep wells from drying up.

In 1980, faced with a federal ultimatum to stop overusing groundwater, the Legislature imposed new rules on five areas of the state: parts of Maricopa, Pinal, Pima and Santa Cruz counties, along with the Prescott area. In general, groundwater use is restricted in those areas, and new homes must come with a provable 100-year supply of renewable water.

The risk to the aquifers at the time was dire. The U.S. Geological Survey estimated that groundwater levels in some parts of metropolitan Phoenix had dropped 220 feet over about 40 years. As the aquifers compacted, the ground sunk, sometimes slowly, sometimes abruptly in the form of gaping sinkholes. The damage cannot be repaired.

"It wasn't the answer to all the problems, but it was intended to reduce reliance on groundwater. And it's doing that," said Sandra Fabritz, assistant director of the state Water Resources Department. "You can't live forever on one resource."

Cities in those five areas rely on water from in-state rivers, such as the Salt and Verde that supply Maricopa County; the Colorado River, delivered through the Central Arizona Project canal; and a smaller mix of groundwater and treated effluent.

The 100-year water-supply rule forced cities to develop long-term water portfolios, but it also erected an obstacle for communities that lacked access to renewable supplies, mostly growing towns on the edge of urban areas.

The paths around the obstacle led to a familiar solution.

Back to the ground

Verrado, the master-planned community built on the far western edge of metropolitan Phoenix, would never have sprouted from the desert under the original groundwater laws.

The location is too far from any renewable water source to serve so many new homes, at least not without a costly delivery and treatment system. The developers of Anthem, almost as far north of Phoenix as Verrado is west, built such a system after leasing Colorado River water from the Ak-Chin Indian Community.

But by the time Verrado came along, the Legislature had smoothed the way with a detour of sorts around renewable-water requirements. The result is a new drain on aquifers.

The Central Arizona Groundwater Replenishment District was meant to help a few outlying communities and subdivisions meet the 100-year water-supply rule until infrastructure, such as pipelines or smaller canals, reached far enough to deliver renewable supplies to them.

Homes in the district use local groundwater as they would have before the 1980 laws were adopted. The homeowners pay monthly water-use charges to a water utility. Then once a year, the homeowners also pay a replenishment fee to the district, which buys surface water equal to the groundwater used. That water goes into recharge basins.

"The GRD has put (water) providers in the driver's seat," said Terri Sue Rossi, a Central Arizona Project analyst who has studied the district's workings. "The district responds to a real need as it's coming to the door. It is a mechanism for infrastructure and water to

be paid for by users, and to figure out how to do that is a major success story."

As of March 31, nearly 265,000 homes - about one-third of them built so far - were eligible to use groundwater through the district, homes that, before 1995, could not have been built because they would have lacked a renewable water source.

Those homes represent a steady new demand on aquifers. Although the builders were required to prove the groundwater reserves would last at least 100 years, the wells could lower water tables enough to result in sinkholes or subsidence.

And while the district must offset the groundwater used with surface water, there is no requirement to replenish the water near the wells. Most of the recharge basins sit far from any development.

Meanwhile, the cost to acquire renewable water will continue to rise as the supply shrinks. The district has all but exhausted the cheapest water, excess flow from the Central Arizona Project canal, and will have to buy water on the market to meet future obligations, no matter how much the water costs.

As a result, a homeowner who pays the $100 replenishment fee to live in the district could pay $1,000 a year as water becomes more expensive.

The district "has taken the wind out of the sails of the groundwater management act," said Robert Glennon, a law professor at the University of Arizona and author of two books on water management. "It's clear it was a way to help satellite communities develop, but it really is a bastardization of the law."

Back to the ground II

Groundwater removed from within the district is expected to be replenished. A larger stream of water stored in aquifers is on temporary deposit.

The Arizona Water Banking Authority was established by the Legislature in 1996, in part to help the state use its full allocation of the Colorado River. Water is diverted to recharge basins and left to percolate into aquifers. It can be withdrawn later.

So far, the bank holds deposits of nearly 2.7 million acre-feet of water, about 880 billion gallons. A growing amount of the water belongs not to the state or the banking authority but to cities, which are allowed to store excess water for use later, during a drought or when supplies run short.

The storage program has raised groundwater levels near the recharge basins and refilled aquifers that had been pumped dry. But, like the replenishment district, the bank has spawned unintended consequences.

• The water bank operates like a network of ATMs. A bank customer can deposit water at the main recharge basin and then withdraw it, or pump it out, closer to home, where it's convenient to drill a well and distribute the water.

Unlike an ATM network, the water bank isn't connected, which means when water is taken out at a remote site, the user is simply pumping groundwater. Legally, it is counted as a renewable resource, but the withdrawals will drain the local aquifers.

• The banked water was once considered mostly an emergency supply to help cover shortages during a drought or other unexpected event. But cities straining to meet growing demands have begun counting stored water as part of their 100-year supplies, in effect borrowing against the future.

State officials acknowledge they need to address the issue of where banked water can be pumped out. If wells are drilled miles from a recharge basin, the aquifers suffer just like they did before the groundwater act was adopted, shrinking, failing, collapsing and leaving no water for the future.

"The cities have done the right thing, storing water for future use, and we have to make sure they can get it," said Fabritz, the assistant state water director. "We may need a regional solution, some very specific regional cooperation."

Is there enough?

The demand on the state's aquifers runs as wide as it does deep.

Groundwater is typically treated as a property right. If property owners can put the water to beneficial use, it's theirs. In rural Arizona, wells have proliferated, especially small wells that can operate with no metering or reporting requirements.

Certain kinds of wells can operate freely in the five areas regulated by the state. The Legislature carved out a series of exemptions, including some large industrial users, mining operations and utilities. A solar-power plant could spring up and pump all the water it needs out from under other users.

Cities are all too aware of the risk. Mesa has worked for years to bank water it can recover for future homes. But just over its border, wells supplying homes in Apache Junction and Queen Creek, and others operated by private users, are steadily drawing water out of the same regional aquifer.

"That really scares us," said Kathryn Sorensen, water-resources director for the city. "We have recharged water, and we hope it's still there when we need it. But we don't have control over the water pumping to the east."

The problem, some say, is that Arizona has no comprehensive state water plan. The five areas regulated by the state operate with something close to it, but rural Arizona receives little help in resource planning or regional cooperation.

"We should know what we have in the way of groundwater and the rate at which it's being depleted, but we don't," said Sharon Megdal, director of the University of Arizona's Water Resources Research Center. "Communities say they need water to accommodate future growth, but they're all eyeing the same sources. Shouldn't we know the supply and the needs?"

Others say the law needs to expand its view beyond planning for a defined period, such as 100 years.

"The rule was very important to protect our groundwater supply. If we hadn't had the 100 years, we probably wouldn't be able to have a sustainable plan," said Ray Quay, Phoenix's assistant water director. "But if you really want to be sustainable, you can't plan just for that. You'll fail."

Unanswered is what happens in the 101st year or the year an aquifer runs dry. Once towns pump an aquifer too deeply, it can't recover. That water supply is gone.

State officials acknowledge that cities will fail to meet the most quantifiable goal of the 1980 laws, that the amount of water pumped from the ground is replenished with an equal amount.

" 'How much water is there?' is the wrong question," said Patricia Gober, co-director of Arizona State University's Decision Center for a Desert City. "We don't know. More important for us, how do we restructure this place so we don't have a crisis? Our institutions for managing water are so fragmented, we can't cooperate in shortages."

Arizona has avoided the water crises of neighboring states because it acted early to manage its existing resources. But many water experts fear that success could become Arizona's downfall if nothing is done to address long-term sustainability.

"The sky is falling," Mesa's Sorensen said. "It's just falling very, very slowly."

Mark Henle/The Arizona Republic

Rick Herther of the Department of Water Resources measures the water level of a well in the San Pedro watershed. In many places in Arizona, wells must be drilled hundreds of feet to hit water.

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