U-T San Diego

Special report: Water supplies pass tipping point

By Mike Lee

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Miles upstream from where the Colorado River once delivered Rocky Mountain snowmelt to the Gulf of California, a string of empty pipes marks its end in the sands of northern Mexico.

The concrete tubes — each big enough for a grade-schooler to walk through — are a testament to the unquenchable thirst of 30 million people and nearly 4 million acres of farmland in the Southwest.

Similar scenes are repeated in smaller streams that cross the arid region, but nowhere is it more stark: Below the ghostly pipes, a fetid pool of green water slowly evaporates in the glaring sun of what once was one of North America's great river deltas. Today, most people in the dusty floodplain towns have little notion of what once was there.

"They call it the river, but they see that there is no water," said Edith Santiago, who works in Mexicali for the Sonoran Institute, a binational conservation group.

Just beyond the line of sight for most San Diegans, the Colorado's premature demise serves as a warning of what many say is among the world's most pressing problems. The Southwest has passed a tipping point with regard to its most precious natural resource; water is being withdrawn from key sources such as the Colorado faster than it's being replenished as drought strengthens its grip across the country.

"It's like our bank account," said Taylor Hawes, Colorado River program director for The Nature Conservancy. "We are into deficit spending."

Federal research shows a sharp increase in demand for Colorado River water over recent decades and a continued rise into the distant future as the number of residents swells. At the same time, the Southwest is expected to become drier and hotter.

To date, the imbalance between supply and demand has been masked by massive reservoirs, but the gap is expected to grow so that by 2060 the disparity could equal the amount it takes to serve 7 million homes for a year, according to recent projections by the U.S. Bureau of Reclamation.

Even though there's been little talk of drought in San Diego in recent months, runoff into the Colorado's Lake Powell this year is about 46 percent of average — the third lowest since 1963. Deliveries to cities and farms aren't immediately threatened because abundant snow two winters ago provided a respite from dry conditions that have dominated the basin since 1999.

But on every inhabited continent, clean water is getting harder to find and threats to civilization grow more stark as the global population zooms past 7 billion. The combination is having physical repercussions, such as shrinking seas, dying rivers and sinking land. They are reminders that money and ingenuity can't defy the laws of nature forever.

"Water quality and quantity are our most challenging environmental issues in this century," said Kathy Robb, a New York attorney who helped organize a water law conference in San Diego this year. "The thing that drives this for all of us is population growth. Use of water is just growing, growing, growing."

Most Americans never think about their water supply because of 20th century investments in dams, pipes and treatment plants that seemed to solve one of humanity's fundamental problems. The resulting bounty allowed the nation's appetite for water to balloon so that by one measure U.S. residents consume about twice as much water as the world average.

Continued pressure on supplies likely will mean fewer lawns and fewer crops in the United States, where residents will be forced to keep paying more for less. At least 36 states are anticipating local, regional or statewide water shortages by 2013, even under non-drought conditions, according to the U.S. Environmental Protection Agency.

It also says world water consumption has tripled in the past 50 years. Drought-induced migrations and violence over water supplies are common in regions of the globe where daily survival depends on each drop.

Christopher Scott, a professor of natural resources at the University of Arizona, doesn't predict that water shortfalls will create a doomsday scenario for modern America, but he says they have produced a new dynamic that will ripple through society.

"It used to be that our agreements were to share the water," Scott said. "Now we are trying to figure out how we are going to share the shortage."

World view

Water scarcity is popping up almost everywhere in obvious ways.

"There are many places where we have drained rivers dry, causing lakes to shrink," said Sandra Postel, director of the Global Water Policy Project in New Mexico. "Absolutely, it is a warning that the current path we are on is not a sustainable one."

Her concerns are supported by academic studies that slice the numbers every which way but generally say the same thing: Lack of water already is severe in many of the world's poorer countries and it's threatening people and ecosystems everywhere.

Localized shortages of clean water haunted ancient civilizations from the Southwest to Mesopotamia, but it wasn't until 1900 that water shortages began in earnest, according to researchers in Finland and The Netherlands. The number of water-short people grew rapidly between 1960 and the mid-2000s, when about one-third of the world's population lived in areas of chronic shortage.

The physical manifestations are acute. The Dead Sea in the Middle East has shriveled and massive sinkholes have opened along its edges as the water table dropped due to withdrawals from the Jordan River. Asia's Aral Sea is just a shadow of its former size because of oversized irrigation diversions, and the people who remain suffer from severe dust storms. In the Himalayas and the Andes, villagers watch glaciers shrink as scientists worry about the critical water sources disappearing due to climate change.

Closer to home, the parched Texas landscape has drawn comparisons to the Dust Bowl days of the 1930s that forced a mass migration to California.

“There’s a big old bull’s eye on Texas,” said Barney Austin, an engineer for Intera in the state’s capital. “The severity of the drought really just caught a lot people off guard. We were not expecting it to be so extreme and it’s really got a lot of people scrambling.”

In 2011, rivers and lakes in parts of Texas reached their lowest levels on record and the situation remains dire in large swathes of the state.

“We should have been planning for this eventuality when times were better,” Austin said. “The way planning is done in Texas is that we’ll look at the last 50 or 60 years’ hydrology and assume the next 50 to 60 years will be similar, or no worse. When you get a situation like the one we have right now, that assumption kind of breaks down.”

The Colorado

When the waters of the Colorado River were divided in 1922, officials could hardly have known they were dealing with a bounty. Today, it’s clear that the decade before the landmark compact was one of the wettest periods in the historical record, and tree-ring investigations have shown the past century was soggy by prehistoric standards.

“The decline starts to occur almost right away,” said Carly Jerla, Colorado-based manager of a recent supply-demand study for the Bureau of Reclamation. Her agency operates the river to supply some 30 million people across seven states — up from 12 million people in 1960.

Mayors and military brass celebrated when water piped from the river gushed into San Diego’s San Vicente Reservoir for the first time. In those heady days just after Thanksgiving 1947, wagons stocked with barrels fanned out across the county to promote the new abundance. Along with boastful speeches, onlookers were treated to free paper cups of water labeled “Agua del Rio Colorado.”

“This means our survival,” a Chula Vista water official declared during one toast.

At the time, much of the area was so parched that its drinking water supply was estimated to last just 21 days.

“The Colorado was the decisive turning point of our history,” said Steven Erie, a water historian at UC San Diego.

San Diego County relies on the Colorado River for roughly half its water, though agencies have been working for the past two decades to decrease that number by tapping groundwater, recycled wastewater and other sources.

Diversification strategies are driven by necessity: Jerla said river flows between 2000 and 2009 were the lowest for a 10-year period in the past 100.

“If that type of hydrology continues, we might be in this new era when the river doesn’t flow at that average that we once thought it would,” she said. “The discussion becomes how to make do with less.”

Climate models predict droughts will dominate the Southwest in coming decades. Projections also suggest river flows will shrink by roughly 9 percent compared with the long-term average.

Higher temperatures will boost evaporation, which already takes a huge bite out of Colorado River reservoirs. By 2050, Southwest soils could be drier than any time in the past century, according to the U.S. Geological Survey.

New studies by researchers in Oregon said persistent dryness and pine beetles already have killed pinyon pines and juniper trees across more than 2.5 million acres of the Southwest over the past 15 years, setting up the potential for a dangerous cascade of problems.

“Pinyon pine and juniper are naturally drought-resistant, so when these tree species die from lack of water, it means something pretty serious is happening,” said Wendy Peterman, a soil scientist and study author with the nonprofit Conservation Biology Institute. “They are the last bastion, the last trees standing and in some cases the only thing still holding soils in place.”

Without trees, dust blowing from eroded hills can cover snowpacks, cause them to absorb heat from the sun and melt more quickly. That makes it difficult for river managers to capture the runoff, and it leaves soils bare for longer, increasing evaporation.

“Anything that further reduces flows in the Colorado River is … a significant concern,” Peterman said.

The future

By the time the Colorado River reaches Morelos Dam near Yuma, Ariz., the workhorse waterway is on its last legs. At that point, Mexico diverts its share — about

10 percent of the annual flow — leaving the lower stretch to the Gulf of California reliant on discharges of partly treated sewage and runoff from farms.

In some places, that creates a brackish liquid in the main channel. In other spots — remember the tombstone pipes — the river has disappeared beneath the powdery sand so that off-road vehicle courses and dirt roads have been established over the top of it with impunity.

To the north, more than 30,000 acres of farmland in the Imperial Valley have been fallowed this summer so urbanites can use water that would have gone to alfalfa and other crops. It's part of a landmark deal San Diego water leaders struck a decade ago to secure supplies for county residents.

Every so often along the valley's dusty roads, locks on irrigation turnouts are painted red to make it clear that no water can be delivered to those fields. Instead, the water is split between homes in San Diego and the Salton Sea, which otherwise could shrivel and expose mud flats to valley winds.

The program is managed to minimize financial and ecological damage in the Imperial Valley, for instance, by limiting the amount of fallowed acres so that the valley doesn't become a dust bowl.

Across the mountains, piles of dead trees and hundreds of acres of shriveling orange and avocado groves dot San Diego County's northern tier, one of the most valuable farming zones in the nation.

Water rates have skyrocketed in Valley Center and other local districts over the past decade partly because of shortages that drove up wholesale prices.

When the drought hit in 2008, growers "stumped" their trees by the thousands, cutting off the tops to force an immediate reduction in water demand. Drought conditions continued into 2010 and "what we started seeing was growers just shutting their meters off and letting their trees die," said Gary Arant, general manager at the Valley Center Municipal Water District.

The results are visible two years later. "You drive around and you see a lot of dead groves," Arant said. "That means the property is worth less money. Combined with the fact that the housing market is in the tank, there is really not a lot going on in Valley Center. You start to wonder about the long-term viability of our water district and the community."

The water district, like many in the region, has slashed staff, and Arant worries about failures in the aging water system as he keeps a wary eye on water supplies around the West.

“We will roll into the next water year with very little runoff in the reservoirs,” Arant said. “If we have another critically dry year, we will be right back into asking people to conserve and cut back. We

are in this up-and-down cycle, where we have plenty of water today but if next year is critically dry, our reservoir level will drop down and we will be on water watch again.”

The unease is almost palpable in Las Vegas, where the Southern Nevada Water Authority is about two years away from completing a third intake from Lake Mead as a hedge against falling water levels. “We could be in danger if things keep going the way they have been going,” said J.C. Davis, an agency spokesman.

The new $800 million intake is essentially a drain in the bottom of the lake nearly 200 feet below the initial intake.

Said Davis: “When you are responsible for providing water to 70 percent of the state’s population, you can’t afford to be wrong.”

U-T staff writer Michael Gardner contributed to this report.