



BEFORE THE TAP RUNS DRY

Municipal water users urged to conserve to help declining supplies

Photo from Crestock.com.

The future of water in Texas consists of “what ifs.” What if Texas doesn’t do anything to conserve water in the next 50 years? What if the drought continues? What if one day you turn on your kitchen faucet and nothing comes out? What then? Then it is too late.

The “what if” and “what then” scenarios don’t have to happen. If there is anything positive about the state’s continuing drought, it is that it has motivated legislators, state agencies and local municipalities to take action. Many agree that something has to be done. And, in the area of saving municipal water, the to-do list is long.

According to the Texas Water Development Board (TWDB) 2012 state water plan, Texas’ population is expected to increase 82 percent from 2010 to 2060, mostly in urban areas. Reflecting that growth, demand for municipal water over the same time is expected to increase 71.4 percent. The plan also projects that municipal water demand will increase from 27 percent to 38 percent of the total demand, while water demand for agriculture — the state’s biggest water user — will decline.

Regional water plans, which are part of the state plan, project that municipal water conservation strategies will provide 647,361 acre-feet — or 7.2 percent of the identified strategies — toward the additional water supplies needed in 2060.

Finding ways to save municipal water

Although building new reservoirs and developing “new” water, such as desalinated brackish water, may fulfill some of the additional demand, water conservation will play an essential part.

Water Conservation and Technology Center (WCTC) Director Dr. Calvin Finch was previously director of conservation for the San Antonio Water System and worked diligently to promote water conservation in the city. Finch said he remembers that while San Antonio organized and funded an extensive water conservation program, other cities did not, thinking they didn’t need to.

“Now, all the cities have sobered up,” he said. “And we have seen conservation programs increase available water supplies. Programs that use incentives and ordinances with education have the best results, but even cities that have just relied on water education are recording results that show their citizens are doing a better job of using water.”

Finch said while the state water plan does recognize the importance of water conservation, he believes the examples of San Antonio and El Paso show that the state can do more. “The potential for water conservation is huge, and we have to treat water conservation as essential,” he said. “It doesn’t make any sense to spend billions of dollars on new water resources when we haven’t eliminated water waste.”

John Sutton, team leader of TWDB’s municipal water conservation program, said conservation is typically the most economical water management strategy for providers to meet future needs.

“If you are able to lower overall demand, you may be able, if you are a growing system, to meet that growth without additional capacity,” he said. For a water utility, it makes economic sense to put off capital construction of new treatment plants.

Conserving this water can come from many different strategies, according to experts.

It starts at home

Raising awareness and educating homeowners is foundational, experts say.

Sutton said many residents are not aware of exactly where their water comes from. “Past studies have shown that the more people are aware of their water source, the more likely and willing they are to participate in water conservation activities,” he said.

Residents should be able to look at their water bill and understand how many gallons they used and for what activity. “Once people have that realization, they can better decide for themselves on what they may want to do to reduce use or at least be aware of their use,” Sutton said.

In-home water conservation has traditionally centered on easy, practical steps such as installing low-flow toilets and showers, and on behavioral changes such as turning off the faucet when brushing teeth or running the washing machine or dishwasher only when full.

According to TWDB’s projections provided for regional water planning, changes in efficiency standards for water-use appliances and fixtures will save an estimated 26 gallons per person per day over the 50-year planning period. ⇨

Lawn and landscape irrigation

A big portion of urban water is used for lawn and landscape irrigation.

A recent TWDB study analyzing metered water use in more than 250 Texas cities found that 31 percent of annual single-family residential water use in Texas is dedicated to outdoor purposes, such as car washing and pool, lawn and garden maintenance, with the rest used indoors.

Drs. Raul Cabrera, Kevin Wagner and Ben Wherley of Texas A&M AgriLife recently published a paper in the *Texas Water Journal* on urban landscape water use in Texas. The researchers found that water use by residential, municipal, business and educational landscapes and golf courses represented roughly 46 percent of total urban/municipal water use during 2010. Even without factoring in golf course water use, they estimate that the total annual water use for lawns and landscapes ranges from 1.9 million acre-feet to 4 million acre-feet.

“This effectively positions urban irrigation as the state’s third largest water user, after agricultural irrigation and other urban uses, such as in-home and municipal use,” Cabrera said.

Finch said some Texas cities still use 50 percent or more of their water for landscapes, a prime target for water conservation. “That has to be addressed,” he said. “As a horticulturist, I can reasonably say that one half of that water use is unnecessary. In most of Texas, you can have attractive landscapes if your

irrigation technology is good, you have no leaks and you are using the right amount of water and the right kind of plants.”

According to Wagner, a number of strategies, tools and management practices can significantly reduce water usage in urban landscape irrigation.

“Using water-conserving landscape plants and suitable designs for each region in the state is foundational to landscape water conservation,” he said. The Texas A&M AgriLife Extension Service has published and posted online listings of resource-efficient plants such as Earth-Kind® plants, native and adapted trees, and turfgrasses for specific parts of the state.

“Although there is limited information on actual water use or requirements by most of the recommended resource-efficient plants and grasses, the use of properly adapted species to each region should ensure their survival and ornamental performance within the limits of the expected average precipitation, with little to no supplemental irrigation,” Wherley said.

“Ultimately, homeowners must be willing to adjust expectations and accept the occasional brown lawn during the summer months,” Wherley said. “When established on good soil, most of our warm-season turfgrasses can persist under dormant conditions for prolonged periods in the absence of irrigation, bouncing back once rainfall returns in the fall.”



The development of irrigation systems run by smart controllers based on evapotranspiration data or on soil moisture sensors can potentially save significant amounts of water.

Ongoing research by Dr. Guy Fipps and Charles Swanson of AgriLife Extension indicates that most smart controllers using weather data to apply the right amount of water are improving each year, but some still apply too much water.

Swanson said in their 2013 tests, all the controllers supplied adequate amounts of water. “However, we continue to see some controllers that have tendencies to over-irrigate or apply excessive amounts,” he said.

Rainwater harvesting, another conservation measure for urban areas, has seen increased popularity and increased incentives from utilities and municipalities in recent years. Sutton said TWDB is receiving more inquiries about rainwater harvesting from not just the Hill Country, where the movement started, but also increasingly from other areas of the state, including the Dallas-Fort Worth Metroplex. “Even East Texas, which is one of the wettest areas of the state, seems to be experiencing an increase in the number of rainwater harvesting systems being installed,” he said.

Dotty Woodson, water resource program specialist at the Texas A&M AgriLife Research and Extension Center at Dallas, agreed, adding that the Metroplex has seen a large increase in businesses

installing rainwater harvesting systems in the last two to three years. “Commercial businesses, office buildings, car dealerships — we are seeing a huge increase,” she said.

“Many of the commercial businesses we are working with are putting in much larger systems than homeowners would, so the impact on municipal water irrigation is huge for a commercial location as compared to an average home,” she said.

Woodson said that many cities in the Metroplex are looking at spending millions of dollars to build water and wastewater treatment plants because of population growth. “If many people would harvest rainwater and use that for irrigation, that would be a huge savings, so cities might be able to put off how they are going to spend those dollars,” she said.

Some water conservation advocates are pushing graywater use for landscape irrigation as another way to save urban water.

“One of the ‘low-hanging fruits’ for saving water, but often overlooked, is using graywater from households,” Finch said. Graywater is the untreated water from washing machines, bathroom sinks, and showers or bathtubs. Studies verify that it does not contain serious contaminants.

“With minimum precautions, water from our showers, bathroom sinks and clothes washers could be used to meet up to 10 percent to 25 percent of our overall landscape water needs,” Finch said. ⇨

Urban/municipal use is the second largest category of water use in Texas, and landscape irrigation is its largest component. Photo from Crestock.com.



Cabrera is researching the potential use of graywater for home landscape irrigation in Uvalde. While it is difficult to estimate precisely the statewide potential for water savings from using graywater, he said the practice might reduce household landscape water use by up to 50 percent when coupled with water-conserving turfgrasses, plants and trees adapted to each region.

“Considering that the average family of four produces about 90 gallons of graywater per day, if this was used to irrigate a landscape, it could represent a significant water savings,” he said.

Recognizing that retrofitting an entire house for graywater capture might be too expensive for homeowners, WCTC and the Texas Center for Applied Technology (TCAT) are demonstrating economical graywater use at the Mitchell Lake Audubon Center in San Antonio.

Mike Martin, interim director of TCAT’s energy and environmental sustainability group and project director for the Mitchell Lake demonstration, said the project’s goals are to show homeowners how to plan and construct an easy and affordable graywater system for irrigating native species garden plots. “We wanted to capture the graywater that was easily available to most homeowners,” he said. “The most accessible graywater in many homes comes from the washing machine.”

Martin said a simple graywater system can be relatively inexpensive, depending on factors such as the size of the landscape the homeowner wants to irrigate, the distance from the washing machine to the irrigated area and whether that area is uphill or downhill from the house. For the Audubon center, the cost of implementing graywater irrigation was about \$285, which included a booster pump, a solar panel to power the pump, a surge tank and a drip irrigation system. He used mesh-stocking material as a simple filter to trap debris from the wash water. He estimates that a medium load from the washing machine generates 30 to 40 gallons of graywater, more than enough for a native plant garden.

AgriLife scientists such as Cabrera have conducted research on irrigating ornamental plants with graywater and, to date, have found no significant negative impact on any of the plants from graywater that contains either detergent or detergent and fabric softener.

For Martin, using graywater makes sense. “You have already paid for the water once to come into your house to wash your clothes,” he said. “Why send it down the drain if you can use it to irrigate your plants?”

“I believe there will come a time when all newly constructed homes will be piped for graywater use.

And then it gives homeowners the opportunity to irrigate their lawns and landscapes with graywater.”

Better reporting, accountability from water providers

Recognizing that providers’ accurate reporting of water use and conservation is paramount to planning for long-term water needs, the Texas Legislature has passed numerous bills through the years to direct state agencies, municipalities and water utilities in reporting.

TWDB’s Sutton said water providers with 3,300 or more connections or those that receive more than \$500,000 in financial assistance from TWDB must submit water conservation plans to the board. An entity with certain water rights must submit a water conservation plan to the Texas Commission on Environmental Quality.

These plans include five-year and 10-year targets for water savings in gallons per capita per day for total water use, residential water use and water loss. The plans also include best management practices needed to meet those targets, a utility profile, a leak detection program and a water conservation education program among other requirements. All entities that submit a water conservation plan must also submit annual progress reports on implementing these targets.

“There are about 600 entities in the state, out of about 3,500, that are required to have conservation plans,” Sutton said. “That represents about 80 percent of the water use in the state.”

Sutton said the annual reports show a downward trend in gallons of water used per person per day. “I think it is going to take at least another two or three years to really see where that trend is going and what we can determine.”

Detecting and repairing leaky pipes

For municipalities and other water providers, preventing water loss from aging and leaking infrastructure or inaccurate meters could potentially save billions of gallons of water. A recent news article reported that Austin lost 3 billion gallons of water from leaky or broken pipes in 2012 and 4 billion gallons in 2011.

State law requires annual water loss audits for water providers with 3,300 or more connections or those receiving financial assistance from TWDB. All other retail providers must perform audits and file the report every five years. Recent legislation also requires that utilities filing annual water audits notify customers of any water loss.

Sutton said 2010 was the most recent year in which all water providers were required to submit a water loss audit, and the average water loss for

the reporting utilities was 843,857 acre-feet, or 16.7 percent, of those utilities' total volume.

This water loss can happen in two different ways, real and apparent, Sutton said. "Real water loss is your leaks, your breaks, your storage overflows," he said. "Your apparent loss is on the metering side. It's not necessarily a true loss, but it's an area where you can't account for all the water loss."

He explained that old meters often under-register water use, resulting in lost revenue for the utility.

He said a water loss audit would identify potential problems and possible solutions. "Utilities should be able to use information from those audits to identify activities that should be included in their water conservation plans."

The TWDB is developing an online tool to consolidate and publish the annual water use surveys, water loss audits and water conservation reports.

If voters approve the constitutional amendment establishing funds to finance water projects in the state water plan, some of those funds must be used for water conservation projects and could be used for municipal infrastructure improvements.

Does it cost enough?

While all these measures will result in water savings for urban use, meeting water needs also requires matching the cost of water to its worth.

As part of utilities' water conservation plan requirements, they must have nonpromotional

water rate structures, Sutton said, which means the rate structures must be cost-based and must not encourage excessive use of water. For example, the more water customers use, the more they are charged per unit.

An achievable goal?

"It's really important that all of us at the personal level and water-supply level take a good look at how we use water and how we can use it more efficiently," Sutton said. "Water is going to continue to get more expensive for its treatment and source development. I think we will see technology evolve and additional opportunities for savings.

"Are we going to run out of water?" he asked. "We may not always have the amount of water we wish we had, we may not always have the quality of water we wish we had, we may not always have a source of water that's as affordable as we wish it was." 💧

For more information and resources, visit [txH2O](http://txH2O.twri.tamu.edu) online at twri.tamu.edu/txH2O.

Some information used for this story is from Texas A&M AgriLife Today news releases.

Who is doing what

0 = percent increase between 1984 and today in the number of gallons the San Antonio Water System uses, despite a 67 percent increase in population

81 = number of water suppliers and organizations who are cooperating with the Water IQ statewide public awareness water conservation program

278 = number of rebate or incentive programs, such as clothes washer incentives, toilet replacements and water-wise landscaping, that water providers in Texas offered in 2012

200 million = gallons per day the North Texas Municipal Water District has saved during peak summer months, decreasing its annual use by 12-15 percent

637 million = additional gallons of water El Paso saved in 2012, compared to 2011

75.7 billion = gallons of water saved by conservation programs of 395 municipal water providers in 2011, amounting to 6.4 percent of the total volume of water the utilities provided