Texas Water Savers
News of Water Conservation and Reuse in Texas

Volume 1, Number 1, Spring 1994

Letter From the Editor

Welcome to the first issue of *Texas Water Savers* - a new quarterly newsletter dedicated to statewide water conservation issues.

The guiding force behind this newsletter is that water conservation is critically important in Texas. It is now clear that conservation will play a critical role in meeting Texas' short- and long-term future water needs. The importance of conservation can be seen in the actions of the Texas Legislature, which ruled in its last session that water-conserving "xeriscape" landscapes be installed when new buildings or parks are built or renovated, and that "water banks" be established throughout Texas to aid in the transfer of "new" waters that have been created by conservation. New regulatory changes by the Texas Natural Resources Conservation Commission and the Texas Water Development Board also emphasize the need to save water.

The major goal of this newsletter is to provide information about activities in Texas that are geared to municipal, industrial and landscape water conservation, recycling and water reuse. In each issue, we hope to include many case studies and research summaries that contain quantifiable data from throughout Texas. We will also inform people of upcoming meetings and networking opportunities. As a result, individuals wishing to implement conservation programs will have more rapid access to the types of "hands-on" information they need.

The Texas Water Development Board assisted us in producing the newsletter. We are now seeking financial sponsors to help fund the newsletter. We will print the business cards of sponsors in the newsletter and will publicly acknowledge their contributions. We will also actively solicit articles about conservation success stories from sponsors, and others playing a role in water conservation in Texas.

If you are interested in becoming a sponsor, or if you have other questions about the newsletter, please call us at (409) 845-8571.

Sincerely,
Ric Jensen
Editor, *Texas Water Savers*

New law requires xeriscapes near State buildings

The mix of flowers and other plants that people notice near Texas highways and State-owned buildings may be taking on a whole new appearance, due to a new bill that was passed by the Texas Legislature. Better yet, the new landscapes will likely result in significant water savings.

The Legislature recently passed a bill requiring xeriscape landscaping of State buildings and roadside parks (Senate Bill 814 and companion House Bill 1482). The legislation lays out guidelines for xeriscape landscaping and establishes a xeriscape assistance program that will be administered by the Texas Water Development Board (TWDB).

The bill took effect in September, 1993. It defines xeriscape as "a landscape method that maximizes the conservation of water by using site-appropriate plants and efficient water use techniques...including planning and design, appropriate choice of plants, soil analysis, soil improvement using compost, efficient and appropriate irrigation, practical use of turf, appropriate use of mulches, and proper maintenance."

This law will apply to new state-owned buildings, structures, and facilities, including new roadside parks. Existing state buildings and parks in which established landscaping is being renovated or replaced are also covered by the new rules.

The Texas Natural Resource Conservation Commission will develop guidelines to implement the program for State buildings, and the Texas Department of Transportation (TDOT) will do the same for roadside parks.

The guidelines must:

1. Establish standards for landscape design, installation, and maintenance that result in water conservation. This includes the use of appropriate plants, soil analysis, compost, efficient irrigation systems, and other water-conserving practices;

2. Identify desirable plant species;

3. Specify the maximum percentage of turf and impervious surface allowed in a xeriscaped area;

4. Establish standards for selecting and installing turf;

5. Establish standards for land clearing;

6. Require preservation of existing "desirable" native vegetation, and

7. Establish a monitoring program.

The TNRCC will be aided in the development of these guidelines by an appointed "Industry Advisory Committee." The committee will be comprised of nine members representing nursery product growers, turf producers, and landscape contractors.

The TDOT will implement xeriscape practices in new roadside parks, including picnic areas and welcome stations. The Bill requires the TDOT to develop a five-year program to phase in the use of xeriscape practices.

Senate Bill 814 also provides for the governing body of municipalities and counties to consider enacting orders or ordinances that require the use of xeriscapes to conserve water, when appropriate. The TWDB will develop a model xeriscape code and provide technical assistance to counties and municipalities. The TWDB will also promote the use of xeriscape practices through educational programs and publications.

For details, call J.D. Beffort of the TWDB at (512) 463-7989.

Automatic sprinklers may waste water, TAEX study shows

Automatic lawn sprinkling systems don't always save water, according to Joe Henggeler, an agricultural engineer with the Texas Agricultural Extension Service in Fort Stockton. Henggeler estimates that Texans waste at least as much as 10 billion gallons or 30,000 acre-feet each year because timers are not set correctly.

Despite the fact that automatic systems should be the ideal way to water home lawns, several studies suggest they are not performing as well as expected. Major problems include poor system design and inadequate system management. Henggeler recently evaluated the efficiency and uniformity of automatic sprinkler systems in West Texas.

Henggeler says the paradox is that automatic systems have many advantages that *should* let them operate with maximum efficiency. First, they can be pre-set to come on at night when evaporative losses are lowest (up to 50% less than daytime values). Second, timers can act as a fail-safe device that eliminates overwatering when homeowners forget to turn off conventional sprinklers. Third, sprinklers properly arrayed along grids ensure good coverage and proper overlap. Fourth, multiple sprinklers watering at once can create a "microclimate" of high humidity and lower temperatures, which reduces overall evaporation. Finally, since most automatic sprinkler heads are buried on the perimeter and throw water to the inside, they are more efficient for watering edges and corners.

Despite these advantages, Henggeler's studies suggest that automatic sprinkling systems use up to 54% more water than conventional systems. Why do automatic sprinklers perform so poorly? Henggeler says that behavior plays a role. People make a large investment when they buy and install an automatic sprinkler system. To justify that expense, they may over-irrigate in an attempt to produce a showcase lawn. Another reason is that owners and managers of automatic sprinkler systems are often not setting their timers correctly. Sprinklers also need to be adjusted so that all parts of the landscape receive the appropriate amount of water.

Henggeler's studies of sprinkler systems used by single family residences in Pecos, Andrews, and Fort Worth, reveal more details about the effectiveness of automatic sprinklers. He found that parts of a landscape (zones) with the highest application rates often received 400% more water than zones with the lowest rates. In one case, the rate in the highest water use zone was 20 times greater than the rate in lowest water use area. Adusting run times for individual zones, could solve the problem, but homeowners inevitably ran each zone for the same length of time. Since zones that receive low amounts of water show stress earlier, homeowners overwatered other parts of the yard. Application amounts to the low zone were right on target.

Fortunately, the problem is relatively easy to fix. Henggeler suggests that homeowners perform a simple test to determine how evenly their systems apply water. Turn on each zone of the system separately while timing the flow meter. Then divide the area of each zone by this value. Sum the results of all the zones and then divide this back into each individual zone's result. This will give the percentage of time that zone should be run, in relation to the total timer run time. Adjust run times to visual signs of the turf, keeping the relative times of the zones the same.

NOTE: Henggeler can be reached at (915) 336-7541.

Irrigation Audit Program Trains Landscape Managers

A new training program has been developed by the Texas Agricultural Extension Service (TAEX) to help train landscape managers and designers that could result in substantial water savings.

Determining how uniformly sprinkler systems apply water throughout a landscape is one of the methods taught in the LIA course. In this photo, Rose Mary Seymour estimates how much water is in this beaker.

The Landscape Irrigation Auditor (LIA) training program is a joint venture of TAEX, the Lower Colorado River Authority (LCRA), and the Texas Water Development Board. The program teaches professionals how to evaluate and audit new and existing systems, and how to determine application rates and distribution efficiencies. The two-day course costs $250 per participant and includes classroom and hands-on training. Participants are instructed in how to use a computer

software program developed by TAEX. The course serves as a prerequisite for individuals that want to take the LIA certification test. So far, classes have been offered in Austin, LaGrange and Fort Worth.

Extension specialists involved in the LIA program include Doug Welsh of the Texas A&M University Horticulture Department, Guy Fipps, Bruce Lesikar, and David Smith of the Texas A&M Agricultural Engineering Department, Rose Mary Seymour, a TAEX agricultural engineer in Lubbock, and Joe Henggeler, a TAEX agricultural engineer in Fort Stockton.

The LCRA provides an example of how regional water managers are utilizing the LIA program. For example, LCRA sponsored training sessions for 50 statewide landscape professionals, golf course managers, irrigation specialists that work for state and local agencies, and other large water users. LCRA also plans to conduct audits on its landscaped sites.

Studies suggest that significant water savings result when the practices taught in the LIA program are implemented. Golf course water use dropped by 40% and a city water district cut its consumption by 11%.

Nora Mullarkey, LCRA's senior water conservation coordinator, says that the major benefits of the program are that it helps people assess how much water they are using and identifies opportunities where conservation could be achieved.

"We often experience hot, dry Texas summer and it's stretching the water supply throughout our service area," she said. "By making irrigation use more efficient, we can free up additional water supplies for drinking and other essential purposes."

For details, call Smith at (409) 845-5614.

TNRCC adopts new conservation rules

The Texas Natural Resources Conservation Commission (TNRCC) has adopted new regulations that affect water conservation. The rules were developed in response to goals that were set out in the 1993-1998 TNRCC Strategic Plan.

The major conservation-related goal is to reduce current municipal per capita water use by 10%. To achieve this, the TNRCC has developed a policy of integrating water conservation into its regulatory functions, when appropriate. For example, the TNRCC plans to evaluate conservation plans to help determine if new water rights permits should be approved, or could require conservation to renew existing permits. The TNRCC also hopes to incorporate conservation into water quality and water utilities administration.

The new regulations took effect in May 1993. They include Chapter 288 (which lists guidelines and requirements for water conservation plans); Chapter 295 (which requires that water conservation plans be submitted when water rights are granted or amended), and Chapter 297 (which clarifies the responsibility of water rights holders).

How will these new rules affect water users?

Since 1986, the Commission has required that conservation plans be submitted with water rights applications. The new regulations clearly spell out the type of information that must be included in these plans.

Chapter 288 clarifies the definition of what constitutes an "acceptable" conservation plan. It establishes guidelines and minimum requirements for conservation plans for municipal, industrial, mining, and irrigation use. Both public and wholesale water suppliers may be required to submit plans. It also requires that conservation plans be developed as part of the water rights application process.

The regulations state that conservation plans for all uses must contain information on minimum water requirements, a utility profile, specific measurable conservation goals (per capita water use), continuing public education programs, water rate structures, and leak detection and repair efforts. Drought management plans that include trigger conditions, use restrictions, and implementation and enforcement tools are also required. Optional conservation strategies include water rates, plumbing codes, retrofit programs, reuse and recycling, and landscape water management.

Industrial, mining, and irrigation conservation plans must include provisions for use of water-saving equipment and conservation practices, a description of the processing methods, a list of water measuring devices, production or processing improvements, and site-specific information.

Changes to Chapter 295 include an amendment that clarifies existing content and review requirements for water conservation plans that are submitted with applications for new or amended water rights. The rules require that each applicant must submit a conservation plan and exercise "reasonable diligence" to avoid waste.

Chapter 297 allows the TNRCC to assess conservation plans to help determine if any feasible alternative to the requested appropriation exists, if the amount of water requested is reasonable and necessary for the proposed use, and if reasonable diligence will be used to avoid waste and conserve water. The rule encourages water rights holders who were not previously subject to conservation regulations to implement water-saving measures. The rules also state that amount of appropriated water saved through conservation will not be cancelled by the TNRCC.

For more information, call Kariann Sokulsky of the TNRCC at (512) 463-8038.

Austin rewards use of xeriscapes

The City of Austin is sponsoring a landscape rebate program that rewards residents who incorporate drought-tolerant Prairie buffalograss and other xeriscape plants into their landscapes. The landscape rebate program is open to new and existing residential water customers who live within the boundaries of Austin or its water district. Water bill credits or rebates of up to $240 are available to those who participate.

New residential water customers can qualify if they install water-conserving, sodded Prairie Buffalo or `609' Buffalo turfgrass on at least 1,800 square feet of relatively level yard areas. The yards must receive at least 6 hours of direct sun daily in the summer months. Existing home water customers can qualify if they install Prairie or `609' Buffalo turfgrass sod and/or xeriscape shrubs and ground covers on at least 1000 square feet of lawns that are relatively level and open to sunlight.

Prairie Buffalo grass was developed by a team of Texas Agricultural Experiment Station scientists led by Milt Engelke of the Texas A&M University Research and Extension Center at Dallas. Preliminary field studies show that Prairie needs 60 to 80% less water than conventional warm-season turfgrasses. Other Buffalo grasses may also save water.

The landscape rebate program began in January 1993, and a recent housing boom has generated a great deal of interest and activity, according to project leader Deborah Phillips. So far, more than 125 people have taken part and have installed more than 439,875 square feet of Buffalo grass.

The program requires that sites be inspected, approved, and surveyed by City staff. Specific requirements for soil depth, landscape boundaries, plant selection and spacing, and adequate mulching are also provided.

Austin also sponsors an irrigation audit program in which trained city personnel provide on-site analyses of automatic sprinkling system efficiency, irrigation scheduling, and hose-end watering units. The audit program is open to City of Austin water customers.

For details, call (512) 499-2199.

Xeriscape Demonstration Gardens: Texas Style

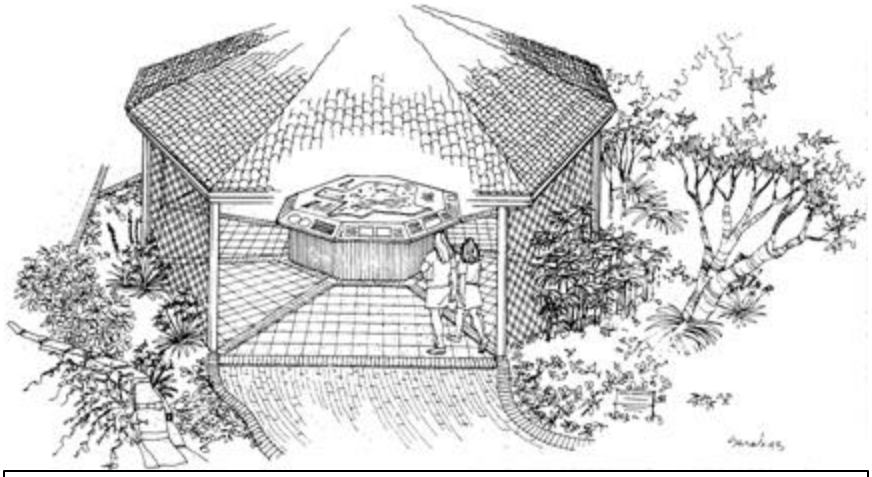
Cities throughout Texas are developing xeriscape demonstration gardens to promote landscapes that conserve water and energy.

The City of Corpus Christi has begun construction of a $500,000 xeriscape demonstration garden. Part of the garden will include a gazebo that contains interpretive panels that describe the principles of xeriscape gardening. Other panels depict the evolution of the region's water supplies. The central theme will be that principles of wise management and "stewardship" of water resources can be incorporated into attractive landscapes. Since the garden is designed to be a "learning center," there will also be a children's gazebo for teaching about conservation. The children's gazebo will also include a scale so that children can find out how much they "weigh in water."

The garden will demonstrate principles of mulching, composting, use of reasonable turf areas, and xeriscape plants. A water condensation system that captures moisture from an air conditioning unit will also be featured.

To help finance the garden, the City is sponsoring a program in which bricks are sold to families, individuals, organizations, and schools. Named the "Adopt a Brick" program,

the efforts lets buyers sign the brick, write a poem on it, or memorialize themselves in the garden.



This sketch of the main gazebo in the Corpus Christi Xeriscape Garden will include interpretative panels that describe principles of water saving landscapes.

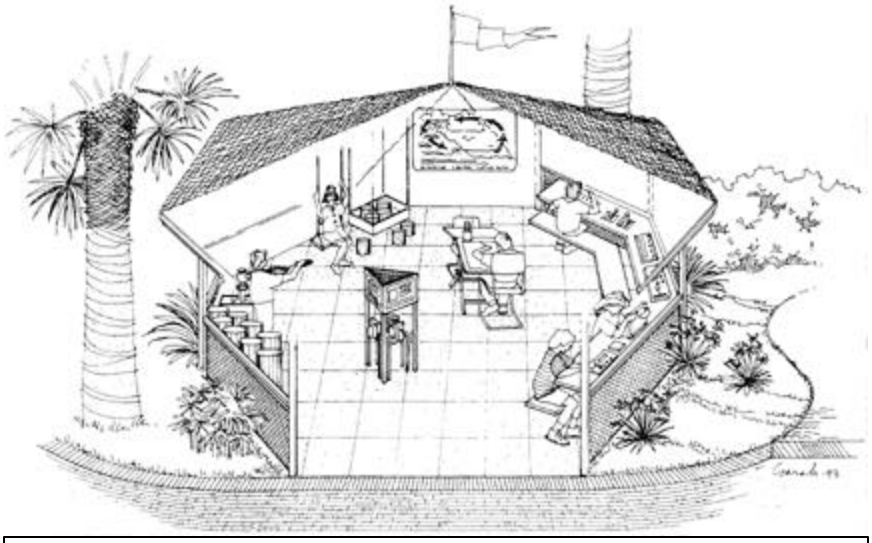
An unusual location for a xeriscape demonstration garden is the Rolling Hills Water Treatment Plant in Ft. Worth. The garden was planted in two phases beginning in 1986. It extends the full length of the plant's administration building, and is open for free guided and self-directed tours. A couple of winters with hard freezes and budget cuts have taken their toll on the garden, so the Water Department is now in the process of replacing freeze-damaged plants. The new plants (many of which are being donated by the City's Parks and Recreation Department) include perennial varieties and xeriscape beds are being reestablished. This xeriscape garden demonstrates the use of three types of Buffalo grass, a Bermuda grass, and a St. Augustine grass.

The City of Austin established a xeriscape demonstration garden next to the Austin Area Garden Center in the Zilker Botanical Gardens. The garden was developed in 1986 as a kind of "naturalized" area. It was renovated in 1993 by volunteer labor and donated native plants and materials. The garden is sponsored by the City, the Xeriscape Garden Club, and the Xeriscape Advisory Board. The volunteer groups work together to weed and maintain specific areas of the garden that they have adopted. The Xeriscape garden club sponsors monthly "learn by doing" sessions. Volunteers receive "hands on" experience in exchange for helping to maintain the garden.

Other improvements in the Austin garden include a revised pathway system (which follows the natural contours to reduce erosion and runoff), a new drip irrigation system, and a new raised-bench seating area.

The City of Arlington has incorporated a xeriscape demonstration garden into Veterans Park. Much of the labor and plant material have been donated by volunteers. The garden is intended to provide an educational landscape along a system of trails that run through the park. Plant materials were selected to show a variety of bloom and leaf colors and textures from flowers, trees, and shrubs throughout the year. The garden contains 17 types of grasses including seven turf types. There are 17 types of trees, 53 perennial and

annual plants, 30 herbs, 23 lilies, 13 antique roses, 85 shrubs, 45 irises, nine wildflowers, and 10 bulbs.



The Corpus Christi Xeriscape Garden will feature a children's gazebo with learning activites.

Sometimes, xeriscape gardens have a dual purpose. For example, the City of Bryan is planning a *historical* xeriscape demonstration garden that will be located next to the Carnegie Library in downtown Bryan. Civic groups in Bryan are now raising funds to help renovate the Library. Planners hope that the combination of a newly renovated historic building and a xeriscape demonstration garden will provide an inviting landscape and "walk-through" into a revitalized downtown. The garden beds will radiate from a central area in an octagon, with a canopy of Crepe Myrtle trees extending to the new library building. The garden is expected to cost $50,000 and local groups are currently in the processes of raising funds.

Xeriscape gardens like the ones described here can play an important role in helping further the widespread use of water-saving landscapes throughout Texas. Many people may be more inclined to incorporate water-saving plants into landscapes at their homes and businesses after visiting a xeriscape demonstration garden. Xeriscape gardens can provide needed information on how well different plant species perform in specific climate, soil and management conditions. This can provide an opportunity to observe and gather data that can be useful for homeowners and landscapers who are trying to decide which species they may want to use. Ultimately, it should make the general public more eager to use xeriscape plants in their landscapes.

NOTE: We are looking for information on xeriscape gardens in Texas that we can feature in future issues. Please contact us at (409) 845-8571 if you know of a garden that we may want to highlight.

New Report Identifies Conservation, Water Use in Texas Industries

A new report prepared for the Texas Water Development Board (TWDB) contains up-to-date information on the amount of industrial water conservation that is now taking place.

The report, *Texas Industrial Water Use Efficiency Study*, was published in October, 1993 by Pequod Associates, Inc., of California. The TWDB contracted with Pequod to prepare the study.

Pequod conducted the detailed survey by contacting numerous Texas industries, including semiconductor and computer manufacturers, oil and gas refineries, petrochemical plants, pulp and paper mills, meat producers and beverage bottlers. The surveys included questions about water use, water costs, conservation practices currently being used, the amount of investment required to implement conservation, and technologies that were most likely to be implemented. The report also identified the amount of water being used by specific types of Texas industries.

One of the most interesting aspects of the report is that it measures the actual amount of water saved from specific conservation measures, and the cost of implementing that technology. Results of the survey show that pulp and paper plants have the potential achieve the most water conservation by volume (60%), followed by semiconductor manufacturers and organic chemical factories (both 40%), petroleum refineries (25%), and meat packing plants (15%). The report also showed that oil refineries in the Houston and Beamont area use two to three times as much water per barrel produced as refineries in Corpus Christi and Far West Texas.

For more information, call Hoffman at TWDB at (512) 463-7932.

Conserv '93 Proceedings Includes Many Papers Focusing on Water Conservation in Texas

Many papers that focus on water conservation issues in Texas are included in the proceedings of *Conserv' 93: The New Water Agenda*.

Individual presentations focused on such topics as the potential for water conservation along the Texas-Mexico border; the effectiveness of ultra low flush toilets in El Paso; the impact of education programs on water conservation in the Texas High Plains; the use of plumbing retrofit programs on conservation in the Houston area; the impact of conservation on on-site wastewater systems; the evolution of Texas' water conservation policy.

Many of the Texas presentations focused on conservation in the Austin area. These included commercial and industrial conservation case studies in Austin; a summary of the water recovery program at the University of Texas; an overview of Austin's Xeriscape program; Summer water demand patterns in the area; and best management practices (BMPs) to preserve, protect, and enhance recharge in stream-fed caves along the Barton Springs portion of the Edwards Aquifer.

The two-volume proceedings was published by the American Water Works Association (AWWA). To order a copy, call the AWWA at (303) 794-7711.

Book shows that Xeriscapes can be beautiful, while promoting water conservation

For many of us, xeriscape landscaping is something of a mystery. In our mind's eye, we may imagine xeriscapes as nothing more than gravel, concrete, and a few cactus plants. If we imagine any plants, they look as though they may have flowered at one time but are now brown and straw-like. The whole scene is pretty dry and dusty -- more of a "zero-scape" than anything else.

Experts tell us that this is exactly what xeriscape landscaping is *not*. Xeriscape landscaping is defined as quality landscaping that conserves water and protects the environment. Coined from the Greek word *xeros*, meaning "dry," and *landscape*, xeriscape landscaping has come to mean "quality, water-efficient landscaping."

Doug Welsh, an extension horticulturist for Texas A&M University and past-president of the National Xeriscape Council, Inc., recently collaborated with two Colorado authors (Connie Ellefson and Tom Stephens) to produce a reference book on xeriscape landscape practices. The book is titled *Xeriscape Gardening: Water Conservation for the American Landscape*. It contains text, graphics, tables, charts, and photographs and describes how to plan, grow, and maintain a beautiful, water-efficient, landscape in any region of the country. The book devotes a full chapter to each of the seven principles of xeriscape landscaping: planning and design, soil analysis and improvements, practical turf areas, appropriate plant selection, efficient irrigation, mulching, and appropriate maintenance.

The xeriscape concept evolves around the use of plants that require little or no irrigation. Ideally, xeriscapes are landscapes that echo the natural world of individual regions by emphasizing native plants that have adapted to the area's level of natural rainfall. Xeriscape plants are not always "desert plants." Instead, they are the appropriate plant choices for the climate of a particular region or site. Xeriscaping decreases landscape water use without sacrificing beauty. It is a versatile style of gardening which can accommodate many landscape styles. Varying degrees of xeriscape can be practiced, and some landscapes may even require supplemental irrigation. The bottom line is that water savings are possible in these landscapes if water is applied efficiently.

Xeriscape landscaping experts contend that their gardens are colorful, multi-dimensional, and unusual -- a reflection of each region's own inherent lushness, as well as a way of saving significant amounts of water. An estimated 50% of residential water use goes to maintain traditional landscapes, and roughly half of *that* water is wasted or applied unnecessarily.

The book is published by MacMillan Publishing. To order a copy, call them at 1 (800) 257-5755.

Integrating conservation into planning efforts: three Texas case studies

Since 1986, the Texas Natural Resource Conservation Commission (TNRCC) has required that water conservation be included in water supply planning strategies.

As a result, municipalities and other water suppliers have been learning how to best integrate conservation into planning efforts. The Upper Guadalupe River Authority in Kerrville uses conservation to address a long-term supply shortage. The City of Austin uses conservation to cope with shortages in infrastructure and as a long-term planning tool. The City of Laredo is using conservation to avoid a short-term water supply shortage.

Kerrville

Using conservation to address a long-term supply shortage

The Upper Guadalupe River Authority (UGRA) supplies water for the City of Kerrville and surrounding towns in Kerr County.

Long-range plans developed by UGRA show that there will be a shortage of approximately 5,300 acre-feet (AF) per year by the year 2040. For example, surface and ground water supplies now being utilized will not be adequate to meet projected demands. As a result, the UGRA is pursuing the development of additional supplies and water conservation to offset the shortage.

The goal set by the River Authority is to reduce current per capita use by 15% by the year 2040. In this case, Kerrville's water use will be reduced from current levels of 185 gallons per capita day (gpcd) to 157 gpcd, and water use in the nearby town of Ingram will be cut from 160 gpcd to 136 gpcd. The UGRA is also requiring reductions in per capita use as part of any new contract for water supplies issued by the Authority.

To meet the 15% reduction in per capita water use, the River Authority and its customers will have to rely on some combination of additional water conservation measures such as pricing, retrofits, a xeriscape education program and other ordinances. The choice of the specific strategies will be determined locally by cities served by UGRA.

The River Authority is also trying to obtain state approval for an innovative program in which surplus river water would be stored in a local aquifer, as an alternative to a surface water reservoir. The Authority says this approach could be more efficient than storing water in lakes, because there would be no losses due to evaporation.

Austin

Conservation serves as long-term planning tool

The City of Austin Water and Wastewater Utility serves more than 500,000 people and has administered active water conservation programs since 1983. The City first developed conservation programs when rapid growth overwhelmed the City's water supply and wastewater treatment plants. Since then, the City has continued to use conservation programs as a tool for long-range planning.

In 1983, Austin approved an Emergency Water Conservation Ordinance that imposed mandatory restrictions on outdoor water use. The goal of the order was to assure there

would be adequate water to fight fires and to service customers. The strategy was to spread out peak demands and to minimize the threat of service disruptions from stress-related equipment failures. By 1987 the City had added 72 million gallons per day (MGD) of treatment capacity to serve higher peak demands. The emergency program succeeded in extending the limited water treatment capacity for five years.

In 1988, new water conservation efforts were implemented to reduce the growth of seasonal peak demands, to limit the growth in per capita water use and wastewater volumes, and to integrate water conservation concepts into long-range planning. The program reduced peak day demands and produced an estimated savings of 5.6 MGD.

In 1990 the City set two new goals for the year 2000 -- cutting peak day demands by 10% and reducing per capita consumption by 5%.

Laredo

Using conservation tooaddress a short-term water supply shortage

The City of Laredo Water Utilities Department serves approximately 130,000 people. To meet near-term supply shortages, the City incorporated aggressive conservation programs as part of an overall water management plan.

From 1988 to 1991, the average daily per capita water use in Laredo was 146 gpcd (compared to a statewide average of 174 gpcd and an average of 188 gpcd for the South Texas region). Even so, the City set a goal of a 10% reduction in per capita use over the next five years.

Laredo's main reason for implementing conservation was that the City's water treatment plant was not large enough to provide adequate water supplies for area residents. Laredo is now planning to upgrade its water treatment facility with an elevated storage system, booster station upgrades and repair, and new and expanded distribution system lines. Still, water waste and inefficiency need to be avoided. Other measures that Laredo is taking to reduce waste include a new metering system, upgraded computer hardware and software, acquisition of water rights, and the adoption of additional ordinances controlling waste.

The City is also hoping to sponsor a number of public awareness and education programs on conservation, revised plumbing codes, retrofitting or replacing inefficient water use devices, rate structures that encourage conservation, universal metering, meter repair and replacement, xeriscaping, water audits, leak detection, recycling and reuse.

Water-Recovery and Reuse at UT-Austin

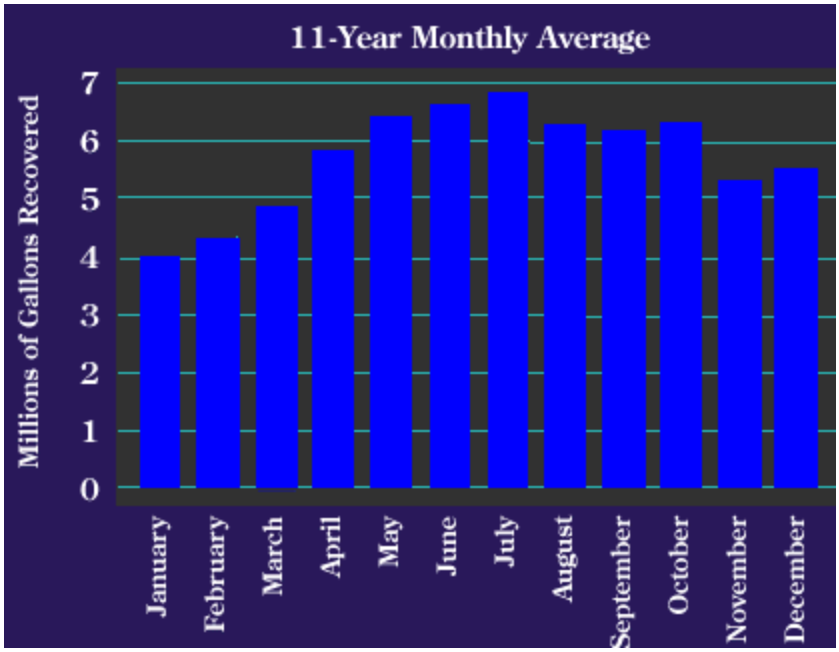
By Myron P. "Rusty" Osborne
Engineering Assistant
The University of Texas at Austin
Austin, Texas

In the fall of 1979, during a routine visit to the mechanical equipment machine room of a major dormitory on the campus of the University of Texas at Austin, Miles Abernathy, a Utilities Mechanical Distribution engineer, peered down at the floor drain at his feet and watched as roughly one gallon per minute (gpm) of clean water gurgled into it. The source of the water was a unit that chilled drinking water for fountains in the dorm. At $1.30 per thousand gallons (rates charged by the City of Austin for water and wastewater at the time), he realized that this was an expensive way to keep the trap in the floor drain charged with water. This began a series of efforts designed to eliminate this waste, increase water recovery, and to get captured water to where it was needed.

UT uses a large amount of water. In 1979, for example, 50,000 students and 15,000 faculty and staff used 900 million gallons. Like many large universities, UT generates some of its own utilities. And, like many of the larger institutions, it distributes steam and chilled water through a network of underground tunnels. The tunnels and the high cost of water are the keys to the success of UT's program. Buildings on campus are cooled by four chilling stations. UT also utilizes two large cooling towers as part of its power plant operations. The cooling towers can each consume 1 million gallons of water per day in summer months.

The first phase of UT's water recovery pilot program was to gather cooling water from drinking water chillers in two or three dormitories that were close together. The recovered water was piped to cooling towers where it could be reused.

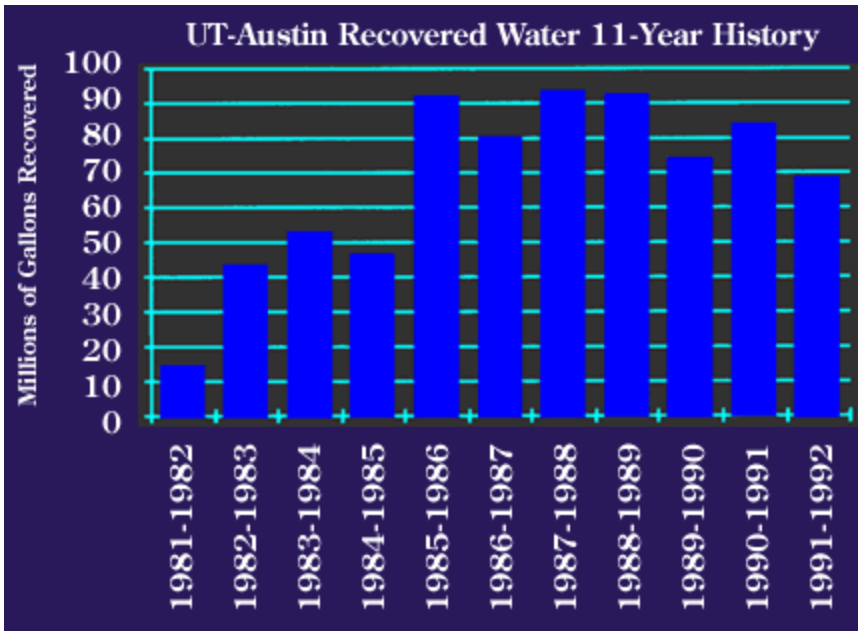
Because the initial program was a success, UT decided to identify other sources where water could be recovered.



UT contains a large number of research laboratories. Water-cooled research equipment is located throughout the campus in laboratories of many disciplines (particularly biology,

chemistry, engineering, and physics). Water use analyses suggested that an enormous amount of water was being used and discarded which could be suitable for recovery. In some cases, individual labs were consuming up to 30 gallons per minute and operating 24 hours per day, year-round. By 1987, the cost of water and wastewater in Austin was $5.72 per 1,000 gallons. This meant that using 1 gpm continuously would cost $3,000 per year. In some cases, major water-consuming research projects used as much as $90,000 worth of water annually.

The water recovery program took a "quantum leap" when engineers decided to utilize sources of once-through cooling water for recovery. From 1980 to 1990, the system grew in scope and in the amount and value of water that has been recovered. For example, water and wastewater rates increased by 436% during this period. The higher rates charged by the City made it more feasible to recover ever smaller quantities of water. Very little additional capital expenditures have been required as the infrastructure is virtually complete.



Diversification

As rates escalated, the search for new sources led to a departure from the once-through contributions which had characterized the system. The project was then expanded to include four new sources of recoverable water:

1. Swimming pool "blowdown" (or backwash) that results from pool cleaning;

2. Groundwater (encountered at various locations in the tunnel system, where its accumulation was causing maintenance problems);

3. Fin water (water dripping from the fins of chilled water coils that is condensed when humid outside air passes over the coils). This can be as much as 10 gallons per minute from large units;

4. Raw water (appropriated water from Waller Creek to be used for a single chilling station).

Current Status and Conclusions

So far, roughly 800 million gallons of water have been recovered in this program. The total value of this recovered water (adjusted for rate increases and the value of water after 1988) is more than $2.5 million. Several new buildings on campus are being designed from the ground up to accommodate water recovery. The high cost of water and wastewater is making conservation an economic necessity. In sum, the water recovery program at the University of Texas has been an outstanding success.

NOTE: Osborne can be reached at (512) 471-5050 for more information