

2011 Annual Report



**Lone Star
Groundwater
Conservation District**

2	District Information
3	District Staff
5	Board of Directors
6	General Manager's Statement
7	Management Goals
8	Providing the Most Efficient Use of Groundwater
10	Controlling and Preventing Waste of Groundwater
14	Controlling and Preventing Subsidence
18	Conjunctive Surface Water Management Issues
19	Drought Summary
22	Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control
25	District News
28	Articles/Publications/Press Releases
36	Financial Summary
37	In Memoriam

2011 Highlight

In 2011, the Lone Star Groundwater Conservation District broke ground on its new office building and boardroom. The new space will be located at 655 Conroe Park North Drive, approximately five miles north of downtown Conroe. Not only will the building be an attractive and efficient work space, but it was designed to be both environmentally friendly and demonstrate water conservation efforts, such as capturing rain runoff from the roof to use for the irrigation of grasses, shrubs and trees planted on the site. The District is planning to be able to move to its new location by the summer of 2012. More information on the new office can be found on Page 25.

Creation

In 2001, the creation of the District was authorized by the 77th Texas Legislature through House Bill 2362. The creation of the District was confirmed by the voters of Montgomery County on November 6, 2001, with 73.85 percent of the voters casting favorable ballots.



Since its creation, the District has carried out its statutorily-mandated functions to conserve and protect the groundwater resources of Montgomery County, and has expended considerable resources to develop a system to ensure that the groundwater supply in Montgomery County will remain a sustainable resource for years to come.

Location and Extent

The District is located within Montgomery County in southeastern Texas. The boundaries of the District are coterminous with the boundaries of Montgomery County, Texas. The District is bordered by Walker County on the north, San Jacinto and Liberty counties on the east, Harris County on the south, and Waller and Grimes counties on the west.

Peach Creek is the boundary with San Jacinto County, and Spring Creek forms most of the boundary with Harris County. The District comprises an area of approximately 1,090 square miles.

District Mission

The Lone Star Groundwater Conservation District (District) is committed to managing and protecting the groundwater resources of Montgomery County and to working with others to ensure a sustainable, adequate, high quality and cost-effective supply of water.

The District's regulatory system was developed through a public process and allows flexibility among water users in how they go about achieving compliance with the District's rules and groundwater reduction requirements.

The District will strive to develop, promote, and implement water conservation, augmentation, and management strategies to protect water resources for the benefit of the citizens, economy, and environment of Montgomery County. The preservation of this most valuable resource can be managed in a prudent and cost-effective manner through conservation, education, management and permitting.

District Offices

207 W. Phillips, Suite 300 • Conroe, Texas 77301

Phone: 936-494-3436 • Fax: 936-494-3438

www.lonestargcd.org



Kathy Turner Jones, General Manager

Kathy Turner Jones is a native Texan, having lived the majority of her life in the Lubbock area. Ms. Jones earned a Bachelor of Arts and Sciences in Business with a Finance Minor from the University of the Southwest in Hobbs, New Mexico, graduating Summa Cum Laude. She is currently completing course work towards a Master of Science at Texas A&M University in the Water Management and Hydrologic Science Program. In 2002, Kathy was named General Manager of the newly formed Lone Star Groundwater Conservation District serving Montgomery County, bringing 12 years of groundwater experience and knowledge with her. Under her direction, the District has established its offices in Conroe, built a core staff and office operation, established a well permitting and registration system, and approved District Rules. In addition, Kathy has led the District through the process of compiling hydrologic information on the characteristics of the Upper Gulf Coast Aquifer, engineering planning, information on water usage and water supply in Montgomery County, and implementing regulatory procedures associated with the District's Groundwater Regulatory Plan. Prior to the Lone Star GCD, Kathy worked for the Sandy Land UWCD in West Texas and was later employed by an Austin-based environmental law firm to serve as their groundwater specialist. Kathy serves as a member of the Region H Water Planning Group, Chair of GMA 14, and currently serves on the Trinity and San Jacinto and Galveston Bay Basin and Bay Area Stakeholder Committee created by Senate Bill 3 during the 80th Legislative Session to look at environmental river flow issues in each river basin. In addition, Ms. Jones presides as current President of the Texas Alliance of Groundwater Districts (TAGD) and as a Board of Director to Texas Water Conservation Association (TWCA).



Paul R. Nelson, Assistant General Manager

Mr. Nelson, former Planning and GIS Coordinator with the North Harris County Regional Water Authority, joined the Lone Star staff as the Assistant General Manager in May of 2011. Mr. Nelson comes to the District with an extensive background in the areas of public works administration, water conservation, and long-range water planning. He is an alternate member of the Region H Water Planning Group, and currently serves on the Trinity and San Jacinto and Galveston Bay Basin and Bay Area Stakeholder Committee created by Senate Bill 3 during the 80th Legislative Session to look at environmental flow issues in each river basin. In addition, Mr. Nelson is a member of the working committees of several state-wide water-related organizations, including the Texas Water Conservation Association. He holds a Bachelor of Science Degree in Biology from Lamar University in Beaumont. He has lived in Montgomery County for over 30 years. Mr. Nelson's activities include performing, reviewing or coordinating efforts of consultants on technical studies pertinent to the determination of the effectiveness of the District's regulatory plan as it relates to the District's overall mission, managing and reporting on progress of consultant activities, assisting in presentations and communications with public water supply entities, and assisting the General Manager interfacing with federal, state and local agencies engaged in the groundwater industry in the state.



Samantha Reiter, Receptionist/Staff Assistant

Ms. Reiter is the first point of contact for the District and can direct your call as needed. She serves as the liaison between the public and the District staff. Ms. Reiter prepares and compiles information for each monthly Board Meeting and also oversees the exempt well registration program.



Cori Stallings, Permitting Director

Ms. Stallings is the Permitting Director for the District and oversees all permitting activities for the Lone Star Groundwater Conservation District. Ms. Stallings has worked for the District for several years and also oversees the District website to ensure that information is current and available to the public.



Dawn Havran, Permitting/Technical Support

Ms. Havran has worked for the Lone Star Groundwater Conservation District for more than three years and has various responsibilities dealing with incoming well permits and permit renewals.



Darlene Milstead, Permitting/Technical Support

Ms. Milstead has worked for the District for more than three years and is responsible for processing incoming well permits and application amendments. Legal notices are also prepared within the permitting section.



Daphne Walker, Bookkeeper

Ms. Walker has been with the Lone Star Groundwater Conservation District for more than four years and oversees the financial aspects of the District under the supervision of the General Manager and the Board of Directors.

Board of Directors

The Lone Star Groundwater Conservation District was created to develop, promote, and implement water conservation, augmentation and management strategies to protect water resources for the benefit of the citizens, economy and environment of Montgomery County, Texas. To fulfill this directive, the Board of Directors adopted rules on August 26, 2002, to regulate the drilling and operation of water wells in Montgomery County and to set fees for the production of groundwater.

The Board of Directors of the Lone Star Groundwater Conservation District represent the various water interests of Montgomery County. The Board meets every month at the District Offices to dispense with District business to include the approval of well permits, decisions on rules and by-laws and provide reports on progress of District Water Committees.

2011 Highlight

In 2011, the LSGCD began a new water conservation program called “Don’t Ask, Don’t Serve” in conjunction with the consulting firm Save Water Texas and restaurants in Montgomery County. Instead of automatically providing a glass of water to each customer, participating restaurants only serve water upon request, saving both water and energy (which is used to clean the extra water glasses) in the process. “Table tents” explaining the program and providing more information on water conservation are placed on tables in the restaurants. More than 50 restaurants in Montgomery County have signed on to participate in the program. For more information on this initiative, go to Page 13.

Richard J. Tramm
President

Represents Montgomery County
Term Expires 1/31/13

Sam W. Baker
Vice President

Represents Montgomery County
Term Expires 1/31/15

M. Scott Weisinger, PG
Secretary

Represents all areas except Conroe
Term Expires 1/31/13

James M. Stinson, PE
Treasurer

Represents Woodlands Joint Powers Agency
Term Expires 1/31/15

John D. Bleyl, PE
Represents City of Conroe
Term Expires 1/31/13

Reed Eichelberger, PE
Represents San Jacinto River Authority
Term Expires 1/31/13

Roy McCoy, Jr
Represents MUD’s West of I-45
Term Expires 1/31/15

Rick Moffatt
Represents MUD’s East of I-45
Term Expires 1/31/15

W.B. Wood
Represents Soil and Water
Conservation District
Term Expires 1/31/15



By Kathy Turner Jones

2011 will be remembered for a long time for the savage drought inflicted on most of Texas.

It was the state's driest single year on record. The bright side, if there is one, is that it focused the public's attention on the importance of water and the necessity of wise water stewardship.

At the end of 2011, the attention was focused on the Texas Water Development Board, which approved the 2012 State Water Plan. The 295-page document said the state must spend \$53 billion to build its water supplies over the next 50 years in order to meet anticipated demands. Without action, the state faces economic devastation – up to \$115.7 billion in losses in the year 2060 if a drought-of-record hits.

By 2060, the population of Texas is expected to grow 82 percent, increasing water demand by 22 percent, while the water supply is projected to drop ten percent during that same period.

In Montgomery County, we will face continued difficulty in matching water supply with water demand.

At the end of 2011, approximately 96,000 acre-feet of groundwater (more than 31 billion gallons) was taken from the Gulf Coast Aquifer underlying the County. Approximately 88,127 acre-feet is produced through permits issued by the Lone Star GCD. Other uses, such as agricultural and livestock watering (exempt from permitting), account for at least 7,700 acre-feet.

Unfortunately, this exceeds the current recognized sustainable yield of the Gulf Coast Aquifer by as much as 31,000 acre-feet. In other words, we used about 10 billion gallons more water than was put back into the aquifer through recharge.

We have all heard the expression “going to the well too often.” Without sound water management, we may be forced to deal with the consequences of doing exactly that.

In 2011, the Legislature passed Senate Bill 332 in an effort to balance the interests of landowners and the need for groundwater conservation. The bill's language does a good job of describing groundwater ownership while at the same time making clear that a Groundwater Conservation District's ability to manage groundwater resources for current and future generations remains intact.

The bill should preserve Lone Star GCD's ability to carry out its regulatory plan without significant changes. This will be a positive for Montgomery County, as substantial amounts of money are being invested in major water infrastructure projects designed to reduce groundwater production in the county. It helps make sure we can continue to have a “well” to go to.

Evidence of the District's Progress in Achieving Management Goals

The 75th Texas Legislature in 1997 enacted Senate Bill 1 ("SB1") to establish a comprehensive statewide water planning process. In particular, SB1 contained provisions that required groundwater conservation districts to prepare management plans to identify the water supply resources and water demands that will shape the decisions of each district. SB1 designed the management plans to include management goals for each district to manage and conserve the groundwater resources within their boundaries.

Each year the District is charged with providing the evidence of the District's progress in achieving the Management Goals set forth in the District's Groundwater Management Plan. The evidence of the District's Progress toward each goal is included in the Annual Report to the District Board of Directors. The Annual Report is made available to the public after adoption by the Board of Directors. This report is intended to fulfill the requirement of the District Groundwater Management Plan of complying with the achievement of management goals as outlined herein.

2011 Highlight

In 2011, the LSGCD installed six periodically active monitoring sites throughout Montgomery County that will utilize Global Positioning Satellites to measure and record slight movements of the earth's surface; that is, to measure subsidence. LSGCD also took over the responsibility of two PAM units from the Harris-Galveston Subsidence District, bringing the total number of monitoring stations located throughout Montgomery County to eight. Once sufficient data is gathered by these PAM units, any detachable differences in surface elevations will be geographically displayed. These charted graphs will be available for viewing on the LSGCD's webpage. The information these PAM units provide will assist the LSGCD in establishing specific rules and regulations that will halt or avert any subsidence within Montgomery County caused by the removal of groundwater. More information on the PAM units can be found on Page 17.

Providing the Most Effective Use of Groundwater 2011

A.1. Objective

Each year, the District will require all new exempt permitted wells that are constructed within the boundaries of the District to be registered or permitted in accordance with the District Rules.

A.1. Performance Standard

The number of exempt wells registered or permitted by the District for the year will be incorporated into the Annual Report submitted to the Board of Directors of the District. To demonstrate completion of Performance Standard A.1, the number of exempt and permitted (non-exempt) wells registered or permitted by the District for the year is given in **Table 1**.

Table 1: Number of Exempt and Permitted Wells Registered or Permitted by the District for 2011

Number of Exempt Wells Registered	773
Number of Non-Exempt Wells Permitted	86
TOTAL	859

A.2. Objective

Each year, the District will regulate the production of groundwater by maintaining a system of permitting the use and production of groundwater within the boundaries of the District in accordance with the District Rules.

A.2. Performance Standard

Each year, the District will accept and process applications for the permitted use of groundwater in the District in accordance with the permitting process established by the District Rules. The number and type of applications made for the permitted use of groundwater in the District, and the number and type of permits issued by the District, will be included in the Annual Report given to the Board of Directors.

Table 2 provides the number and types of applications made to the District for the permitted use of groundwater in 2011. **Table 3** provides the number of applications for Operating Permits or Permit Amendments issued or other administrative disposition of applications made by the District in 2011. **Table 4** provides the primary use of water listed on the permit applications approved by the District in 2011.

Table 2: Number and Type of Applications for the Permitted Use of Groundwater Received in 2011

Amendment to an Existing Operating Permit or Historical Use Permit Application*	270
New Operating Permits**	93
TOTAL	363

*Applications for Permit Amendments may not reference a specific well

**Applications for new operating permits may include more than one well

Table 3: Number of Operating Permits or Permit Amendments Issued and Administrative Disposition of Applications/Permits Made by the District in 2011

Application or Permit Disposition	Number
Applications Approved as Submitted	82
Applications Approved as Amended	223
Applications or Permits Expired due to inaction by Applicant or Permittee	4
Applications Approved w/ Conditions	8
Applications Denied	0
Applications Pending at end of 2010	39
Applications Voided or Merged	4
Applications Withdrawn by Applicant	3
TOTAL *	363

*Reflects Board Action on Applications in 2011. This total includes applications submitted in late 2010 but with Board action on the application occurring in 2011. The total excludes applications submitted in late 2011 which could not be set for Board action until 2012.

Table 4: Primary Use of Water on Permits Approved in 2011

Water Use	Number of Applications
Industrial	21
Irrigation	55
Irrigation (Agriculture)	4
Public Supply/Commercial	283
Other	0
TOTAL	363

B.1. Objective

Each year, the District will make an evaluation of the District Rules to determine whether any amendments are recommended to decrease the amount of waste of groundwater within the District.

B.1. Performance Standard

The District will include a discussion of the annual evaluation of the District Rules and the determination of whether any amendments to the rules are recommended to prevent the waste of groundwater in the Annual Report of the District provided to the Board of Directors.

The 82nd Legislative Session saw the passage of several bills that could impact the Lone Star Groundwater Conservation District. While the District did not take any action on changes to the District Rules in 2011, recent legislative changes could create the need for new or amended District Rules in 2012.

B.2. Objective

Each year, the District will apply a water use fee structure to the permitted use of groundwater in the District to encourage the elimination and reduction of waste of groundwater.

B.2. Performance Standard

Each year, with the exception of wells exempt from permitting, the District will apply a water use fee to the permitted use of groundwater in the District pursuant to District rules. The amount of fees generated by the water use fee structure and the amount of water used for each type of permitted use of groundwater will be included in a section of the Annual Report given to the Board of Directors of the District. The amount and type of fees generated by the LSGCD water use fee structure in 2011 is given in **Table 5**. The amounts of water used for each type of groundwater use permitted by the District are outlined in **Table 6**.

Controlling & Preventing Waste of Groundwater

Table 5: The Amount of Water Use Fees Generated by the District in 2011

Water Use Type	Permitted Amount	Fee Rate	Fee Amount
HUP Applications/ Operating Permits*	33,751,258,84206/1000 gallons	\$2,025,075.53
Water Subject to Transportation Fee	26,153,04909/1000 gallons	\$2,353.77
AG Permits/Applications	504,436,217	\$1.00 per acre ft.	\$1,548.06
TOTAL	34,281,848,108		\$2,028,977.36

**May include water transported out of the District but not subject to transportation*

Table 6: The Amount of Water Reported to the District as Pumped for Each Type of Permitted Groundwater Use

Type of Use	Gallons
Commercial	46,578,458
Industrial	269,925,582
Irrigation	1,713,760,855
Irrigation (Agriculture)	266,266,214
Public Supply	1,673,010,000
Public Supply (PWS)	23,718,391,092
GRAND TOTAL*	27,687,932,201

**The reported pumping for 2011 is incomplete due to incomplete reporting by a small number of permittees. The District is currently pushing enforcement action to ensure compliance with reporting requirements.*

B.3. Objective

Each year, the District will provide information to the public on eliminating and reducing wasteful practices in the use of groundwater by including information on groundwater waste reduction on the District's website.

B.3. Performance Standard

Each year, a copy of the information provided on the groundwater waste reduction page of the District's website will be included in the District's Annual Report to be given to the District's Board of Directors. A copy of the information provided on the groundwater waste reduction page of the District's website is provided on Page 12.

PRESS RELEASE

Lone Star Groundwater Conservation District



FOR IMMEDIATE RELEASE

SEPTEMBER 13TH – PROTECT YOUR GROUNDWATER DAY, A PERFECT TIME TO LEARN TO CONSERVE.

The Lone Star Groundwater Conservation District encourages Montgomery County citizens to spread the word on water conservation on Tuesday, September 13th, for Protect Your Groundwater Day.

Nearly the entire water demand in Montgomery County is supplied by groundwater from the Gulf Coast Aquifer System. While steps are being taken to convert to alternate, non-groundwater sources, the fact remains that we depend on groundwater for our daily needs and it is important to do all that we can to minimize its use. In addition to local restrictions, here are a few basic indoor and outdoor water conservation tips:

- * Never pour water down the drain when there may be another use for it such as watering your indoor plants or garden.
- * Repair dripping faucets and toilets. One drop per second wastes 2,700 gallons of water a year.
- * Retrofit all household faucets by installing aerators with flow restrictors.
- * Choose appliances that are water and energy-efficient.
- * Don't run a faucet when you're not using the water, such as while brushing your teeth or shaving.
- * Only run the dishwasher when it is fully loaded, and use the "light wash" feature, if available, to use less water.
- * Store drinking water in the refrigerator instead of running the tap until the water is cool.
- * Avoid wasting water waiting for it to get hot. Capture it for other uses such as plant watering.
- * Operate clothes washers only when they are fully loaded, or set the water level to match the size of your load.
- * Plant native and/or drought-tolerant grasses, ground cover, shrubs, and trees. Once established, they do not need water as frequently and usually will survive a dry period.
- * Install irrigation devices that are the most water efficient for each use. Micro and drip irrigation and soaker hoses are examples of efficient devices.
- * Use mulch to retain moisture in the soil.
- * Use a shutoff nozzle on the hose that can be adjusted down to a fine spray.
- * Position sprinklers so that water lands on the lawn and shrubs and not on paved areas.

For more information on the conservation of water, no matter the source, go to www.lonestargcd.org.

*Lone Star Groundwater Conservation District
PO Box 2467
Conroe, Texas 77305
Phone: 936/494-3436
www.lonestargcd.org*



In early 2011, the Lone Star Groundwater Conservation District (LSGCD) undertook a new water conservation initiative called, "Don't Ask, Don't Serve", which was directed at restaurants throughout Montgomery County.

It is customary for nearly any restaurant in many parts of the country

to provide a glass of ice water to each customer as soon as they're seated; whether that customer would drink it or not. LSGCD felt it important to initiate a project that would inform and educate the restaurant owners/operators about the water and energy wasted as a result of this practice.

The District engaged the consulting firm of Save Water Texas to make "one-on-one" contact with area restaurant managers. Each was given brochures explaining that much of the ice water being placed on customer's tables went untouched, resulting in wasted glasses of water and ice that would be poured down the sink. In addition, even more water (and energy to heat that water) was required to wash those glasses before their next use. By some estimates, as much as four (4) glasses of water are needed to clean one (1) glass.

The restaurant managers were offered an opportunity to participate in a concerted effort to end the above practice; decreasing water waste and expenses at the same time. Managers were given "table tents", to place on each table, explaining why the restaurant was going to "serve water only when customers request it". The table tent also explained to customers that Montgomery County's water supply was limited and that "water on demand" was "just one way we can all help save this valuable community resource". A web page address, where customers could learn more ways to conserve, was also provided on the table tent. Coloring book pages, focusing on water wise issues, were also provided for the kids.

In addition to contacting individual restaurants throughout the county, presentations were made to the Montgomery County Restaurant Association. This initiative resulted in more than fifty (50) Montgomery County restaurants "signing on" and changing their practices.

The District's goal is to continue to encourage other restaurant owners to join in the initiative and to make "Don't Ask, Don't Serve" the new way of doing business in Montgomery County. With their continued support, many thousands of glasses of ice water will be saved every year.

C.1. Objective

Each year, the District will hold a joint conference with the Harris-Galveston Coastal Subsidence District and the Fort Bend Subsidence District focused on sharing information regarding subsidence and the control and prevention of subsidence through the regulation of groundwater.

C.1. Performance Standard

Each year, a summary of the joint conference on subsidence issues will be included in the Annual Report submitted by the Board of Directors of the District. A summary of the joint conference on subsidence issues follows:

Subsidence Joint Conference

September 28, 2011, at the Harris-Galveston Subsidence District offices

Present: Ron Neighbors (HGSD), Tom Michel (FBSD), Kathy Turner Jones (LSGCD), Rick Moffatt (LSGCD), Paul R. Nelson (LSGCD), and Mark Lowry (LSGCD).

The Harris-Galveston (“HGSD”) and Fort Bend (“FBSD”) Subsidence Districts are authorized by legislature to regulate the withdrawal of groundwater in Harris, Galveston and Ft. Bend counties; and the Lone Star Groundwater District (“LSGCD”) is authorized by the LSGCD legislation to regulate the withdrawal of groundwater in Montgomery County.

Given the withdrawal of groundwater in the HGSD and FBSD affects groundwater levels and subsidence in the LSGCD, and the withdrawal of groundwater in the LSGCD affects subsidence in the HGSD and FBSD, the districts have entered into an inter-local agreement for review and recalibration of the Groundwater Models for the Gulf Coast Aquifers.

On September 28, 2011, the HGSD, FBSD, and LSGCD met to receive an update of the progress of the review and recalibration from Freese and Nichols, Inc. The update included reports on the completion of Work Orders 1 and 2, and the status of Work Orders 3 (Groundwater Model Update and Improvements) and 4 (Population Projections).


The management of our groundwater resources has involved significant coordination with regional ground and surface water suppliers; ongoing interaction with other state and local regulatory bodies; analysis of accurate and up-to-date predictions on water usage and population growth; the enforcement of real incentives to those who rely too heavily on groundwater; and a steadfast commitment to practicing and promoting water conservation.

C.2. Objective

Each year, the District will provide one article annually on the District's website to educate the public on the subject of subsidence.

C.2. Performance Standard

The Annual Report submitted to the Board of Directors will include a copy of the article posted on the District's website. A copy of the article, which also ran in the September 2011 issue of Dock Line Magazine, can be found on Pages 15-16.



Subsidence Revisited – How and Why Is It Measured?

By: Barbara Payne

Over the years, there have been plenty of studies relating the withdrawal of groundwater to the occurrence of subsidence. As far back as the 1950s and '60s, experts had begun to link the increased frequency and severity of flooding in certain areas to the phenomena. The real wake-up call came back in 1961, when Hurricane Carla struck the area, and some of the worst fears about the potential impact of subsidence were realized. Fortunately, local governments got the message, and began to address the growing problem.


Subsidence – and all of its related problems and consequences – is not generally a topic for dinner table discussion. Perhaps three out of ten people might be able to accurately define it, and ten out of ten folks may have difficulty explaining why anyone should worry about it at all. That's not surprising; subsidence is one of those geological situations that go without notice because it happens gradually and without visual reference – unless it occurs in your neighborhood and there's enough rain to cause flooding.

Subsidence in the Houston area...

The Gulf Coast Aquifers, the source of our groundwater, consists of many layers of clays and sands. The sediments that have been left, over geologic time, slowly and naturally compacted. Sadly, some of our actions have sped up this natural process. By pumping increasing quantities of groundwater, for example, we de-pressure the aquifers and begin to pull our drinking water from the clay layers. The reduced pressure in the clays combined with the weight of the materials above, compacts the layers – triggering land-surface elevation loss, or what is called subsidence.

A period of rapid and sustained growth in the Houston area -- and the huge influx of new residents tied to the expansion of the petrochemical industry and allied businesses after World War II – adding six or more feet of subsidence in Harris and Galveston Counties along the Ship Channel by the mid-1970's. By 1979, up to 10 feet of subsidence was measured there, and over 3,000 square miles had 'sunk' by more than 1 foot.

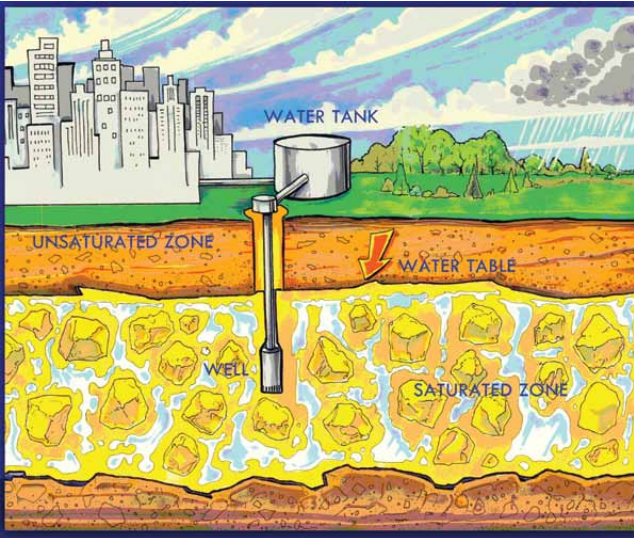
One of the most dramatic incidences of subsidence took place in Brownwood, a subdivision in the City of Baytown that actually had to be abandoned. While regional land subsidence can be subtle and difficult to detect, there are locations in and near Houston in addition to Brownwood, where the effects are quite evident.



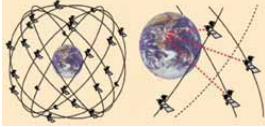
The Jersey Village subdivision in northwest Harris County experienced horrific flooding in June 2001 when a Tropical Storm Allison dumped about 35 inches of rain on the Houston area in a little over 24 hours.

After the creation of the Harris-Galveston Subsidence District (HGSD) in 1974, the District concentrated on developing and implementing its first Groundwater Regulatory Plan. The good news is that after industries along the Houston Ship Channel were converted to surface water supplied from the newly completed Lake Livingston reservoir, subsidence in the Baytown-Pasadena area was arrested and dramatically improved. While subsidence was stabilizing in the coastal areas, however, groundwater levels in inland areas north and west of Houston were still rapidly declining. In just one area in the Evangeline aquifer, USGS measurements recorded a decline of more than 180 feet between 1977 and 2005.

The Lone Star Groundwater Conservation District (LSGCD) was created by the 77th legislature in 2001 to protect and manage the groundwater resources of Montgomery County. As with the other such Districts, Lone Star works to maintain a balance between protecting the rights of private landowners and their responsibility to protect groundwater. The District focuses on preventing waste, collecting data, educating the public about water conservation and



66 Dock Line Magazine, Inc. - Lake Conroe Edition September 2011



Twenty four GPS satellites ring the earth at 17,000 kilometers. Receiving the signal from three of them gives your position on earth.

preventing irreparable harm to the aquifer.

Montgomery County faces similar groundwater withdrawal problems. Quite simply, Lone Star has been warning that we're pumping groundwater faster than the aquifers can recharge. According to Kathy Turner Jones, general manager of LSGCD, "Virtually all of our current water supply is provided by groundwater. Over the years, there have been adequate supplies of groundwater to fuel and sustain significant economic growth and development in Montgomery County. In just the last decade," she continued, "the County's population had already experienced a staggering 52 percent increase, making it one of the fastest growing counties in the U. S. Obviously, more people means increasing demand for water...at least that has always been true in the past."

"Since the early 1990's however, some parts of the state have learned that by aggressively taking some common-sense measures to use water more efficiently, they were actually able to keep the level of demand relatively constant even though the

population continued to increase. And that is our goal, as well," she explained. "In order to evaluate the impact of our regulations, we will need good, historical elevation data, and to continue to incorporate new and exciting technologies into our monitoring network."

So, how do you measure subsidence?

The Harris-Galveston Subsidence District has been measuring subsidence since the mid-1970s. Fortunately, Lone Star has been able to share this data that has been collected in Montgomery County over the years. The current measurement methods combine the latest technology – some of which is collected from orbiting satellites – with knowledge gained from more traditional methods, to deliver highly accurate measurements of change in land elevation due to subsidence. Included in their data acquisition arsenal is Global Positioning Satellite (GPS) technology, in use since 1987.

There are permanent stations known as GPS Continuously Operating Reference Stations, or CORS. In the mid-1990s, HGSD and the National Geodetic Survey (NGS) began utilizing portable units, as well, called PAMS – an acronym that originally stood for Port-A-Measure because they were moved from location to location on a trailer. Today, the acronym is for Periodically Active Monitor -- thanks to improvements in technology and cost decreases, the units can be permanently placed at a site where ongoing measurements are needed.



PAM Units

Basically – very basically – subsidence is measured by a number of highly technical, interactive devices that monitor, collect, and exchange information that is of critical importance in determining the relationship between groundwater withdrawals, water-level declines, and subsidence.

■ PAM units – very unobtrusive sites that

Continued on page 68 ->

include a 4'x4' concrete pad, an 8' antennae pole, and a 5' tall equipment pole on which is mounted a small solar panel and battery box. GPS data at the PAM sites is collected by a transportable monitor shared and moved among several PAM sites. It collects data every 30 seconds for a period of 7 days. At the end of that time, the information on the monitor is downloaded to a laptop, and the monitor is moved to the next site in rotation. This same process is followed until all the PAMS' data has been collected, and then the data-collection cycle begins once again.

■ CORS reference – these permanent stations continuously output data, and provide a basis from which change comparisons can be made and analyzed. The PAM GPS data is compared to CORS stable points – deep, anchored borehole extensometers, drilled with a pipe inserted to a stable subsurface, below the level of the aquifers from which the groundwater is being withdrawn.

Measuring the Future...

Recently, the Lone Star Board of Directors approved assuming the responsibility for two of HGSD's monitors located in Montgomery County, as well as the installation of six additional PAM monitoring stations throughout the county.

"These units will be instrumental in detecting any subsidence occurring in our area," Jones explained. "The information these instruments will provide will help us establish appropriate, meaningful, and specific rules and regulations to halt subsidence and allow the aquifers to recharge in the years ahead. The goal, obviously, is to make sure that we avoid situations like those in Brownwood and Jersey Village neighborhoods. Access to good data will help allow that to happen."

For additional information about the role of LSGCD in halting subsidence and in promoting water conservation, please visit online: www.lonestargcd.org. ♦

Monitoring of Subsidence by Installing Periodically Active Monitors (PAM's)

In 2011, the Lone Star Groundwater Conservation District installed six (6) periodically active monitoring sites throughout Montgomery County that will utilize Global Positioning Satellites (GPS) to measure and record even slight movements of the earth's surface; that is, to measure subsidence.

The Harris-Galveston Subsidence District has been utilizing the PAM units for many years to measure subsidence in Harris and Galveston counties. They have also had 2 monitors in Montgomery County for over 10 years. This year, LSGCD has taken over the responsibility of maintaining those two (2) units and, with the addition of the six (6) new monitoring stations, LSGCD is now tracking at 8 stations spread across east and west Montgomery County.

The PAM monitoring unit and antennae are situated on equipment poles positioned within a 4' by 4' concrete slab and are powered by a solar-charged battery. GPS data at the site is collected by a transportable monitor that is shared and moved on a regular schedule among the eight (8) stations. The monitor collects data from up to eight (8) global positioning satellites every 30 seconds for seven (7) days. At the end of the seven (7) day period, the data collected by the monitor is downloaded to a lap top computer and the monitor and antennae are moved to the next PAM site in rotation.

The data collected from these sites is compared to a stationary landmark; one that is anchored in bed rock and will not subside or change positions. Detectable movements of the earth's surface will generally take place over long periods of time. Once sufficient data is gathered by these PAM units, any detachable differences in surface elevations will be geographically displayed. These charted graphs will be available for viewing on the LSGCD's web page.

The information these PAM units will provide will assist the LSGCD in establishing appropriate, meaningful, and specific rules and regulations that will halt or avert any subsidence within Montgomery County caused by the removal of groundwater.

Conjunctive Surface Water Management Issues

D.1. Objective

Each year, the District will participate in the regional planning process by attending at least 75 percent of the Region H – Regional Water Planning Group meetings to encourage the development of surface water supplies to meet the needs of water user groups in the District.

D.1. Performance Standard

The attendance of a District representative at each Region H Regional Water Planning Group will be noted in the Annual Report presented to the District Board of Directors and posted on the District website, www.lonestargcd.org.

A record of attendance of District Representatives at each Region H Regional Water Planning Group is noted in **Table 7**:

Table 7: Record of District representative attendance at Region H Regional Water Planning Meetings (Total of 5 meetings were held with 100% attendance)

Meeting Date	Attendees
Jan. 5	Reed Eichelberger
March 23	Kathy Turner Jones
May 4	Kathy Turner Jones
Aug. 3	Philip Taucer
Dec. 7	Kathy Turner Jones, Paul R. Nelson

E.1. Objective

Each month, the District will download the updated Palmer Drought Severity Index (PDSI) map and check for the periodic updates to the Drought Preparedness Council Situation Report (Situation Report) posted on the Texas Water Information Network website, www.txwin.net.

E.1. Performance Standard

Quarterly, the District will make an assessment of the status of drought in the District and prepare a quarterly briefing to the Board of Directors. The downloaded PDSI maps and Situation Reports for 2011 can be found on the District website.

Quarterly Drought Briefings for 2011

1st Quarter 2011

Despite most of central and eastern Texas receiving much needed rain in January, drought conditions were still prevalent across most of the state. Through the months of February and March, the drought continued to develop across Texas, with many counties implementing or extending burn bans. Monthly precipitation totals in most of Texas were 1"-2" below normal in March, and by the end of the month, all ten climate regions were considered to be in a drought/dry spell, with eight climate regions escalating to higher levels of drought. The NOAA Climate Prediction Center predicts that drought is likely to develop, persist, or intensify for most of the state over the next three months.

2nd Quarter 2011

The period of October 2010 through June 2011 was considered the driest consecutive nine-month period on record in Texas since 1895. The drought intensified in almost every climate region in the state, with the percentage of Texas with at least extreme drought (D3) conditions increasing from 81.09% to 90.21% and the percentage of Texas with exceptional drought (D4) increasing from 50.65% to 71.30% during June. Based on the PDSI index, nine out of the ten climate regions in Texas were in Severe to Extreme drought. Seven regions were considered Extremely Dry, the highest drought level in this category. The state's total reservoir storage has continued to decline and the entire state has been declared a Natural Disaster.

3rd Quarter 2011

After July, the Office of the State Climatologist declared the past 12 months as the most severe one-year drought since 1895. Most regions in Texas received little rainfall, and almost all major cities were under 50% of their average precipitation for July. Texas only received an average rainfall of 0.73 inches in August and the month was the "warmest month ever recorded" in Texas. During August, the percentage of Texas with at least extreme drought (D3) conditions increased from 95.04% to 96.65% and the percentage of Texas with exceptional drought (D4) increased from 81.08% to 85.75%. Drought conditions did not improve in September. Despite its shorter duration, this drought has been more severe than the one in the 1950s and has created a tremendous negative impact on agriculture over the last several months.

4th Quarter 2011

Although areas across the state received precipitation in October, the rainfall only put a small dent in the drought. November was the fourteenth consecutive month with drier than normal weather for Texas as a whole. Nine out of the ten climate regions were classified in the level Extreme Dry, the highest drought level in this category. Drought conditions across most of the state are expected to continue to worsen over the next three months.

The Drought of 2011

It would be difficult to write about major happenings in 2011 and not make note of the exceptionally hot and dry weather that was experienced by Montgomery County residents and the rest of Texas this year.

In Conroe this summer, there were 52 consecutive days during which the temperature was above 100 degrees. The prior record had been 42 days in 1998. During the period between Oct. 10, 2010 and Sept. 15, 2011, Conroe experienced a rainfall deficit of more than 29 inches. Despite the eventual imposition of mandatory watering restrictions throughout the county, the combination of the extended heat and the unusually dry period resulted in a tremendous stress being placed on public and private water systems as they tried to keep pace with water demands.

Even with restrictions in place and the increased use of water conservation methods, the drought took its toll on water levels in the Gulf Coast Aquifers. There were many instances of water tables being diminished to the point of rendering wells inoperable, and even large providers found it more and more difficult to bring water to the surface.

Not all groundwater aquifers in Texas react the same to drought conditions. For example, we know that there can be a strong tie between rainfall events in the San Antonio area and fairly immediate responses to aquifer levels in the Edwards Aquifer. Similarly, lack of rainfall on the surface can mean quick drops in aquifer levels in those formations. That is largely not the case for formations like the Ogallala, or even for the formation that the LSGCD manages, the Gulf Coast Aquifer, where recharge occurs on a much less rapid pace.

In fact, even different parts of a single aquifer formation can be affected differently by drought or rainfall conditions. Aquifer outcrops, where the aquifer is at the surface of the land, can be the first parts of the formations to flourish with water during wet times, but they can also be the first to dry up during drought conditions. However, where the aquifers are hundreds of feet below the land surface, they are often oblivious to drought conditions on the surface of the earth, where the impact to the formation may not be felt for years, decades, or even centuries. As might be expected, these differences in aquifers have led to differences in approaches by districts in how they manage groundwater production during wet times and during drought.

The results of TAGD's recent survey reinforces what the Legislature has already concluded — there is no one-size-fits all solution to the varying groundwater management challenges among and between aquifers across this state. Some districts with aquifers immediately impacted by the drought are implementing drought contingency and conservation measures and limiting groundwater production in order to protect wells, homeowners, public water supplies, and other uses. Meanwhile, other districts with deeper formations are processing permit applications for even greater groundwater production during these drought times to offset the reduced amount of surface water supplies available to water users.

The Gulf Coast Aquifer responds relatively slowly to rainfall or drought events, because the aquifer's recharge rate is slow in comparison to groundwater-bearing formations common to other

Continued on Page 21

The Drought of 2011

Continued from Page 20

parts of Texas. So, compared to many other areas in the state, we have been blessed in these drought times to have deep aquifer formations that are generally reliable to meet demands.

That is not to say, however, that the Lone Star District is unaffected by the terrible drought conditions that have plagued most of our state since 2010. As might be expected, demands for water in Montgomery County increased notably in 2011 when compared to historical trends. Much of this production increase is due to increased residential use because of the lack of rainfall. But with wholesale increases in groundwater production come decreases in static water levels in the producing formations. As the water levels decline, the pumps used to lift that water to the surface must work harder. This leads to an increased consumption of energy and exacerbated wear on pumps and equipment. Shallower wells are affected first, which means that individual domestic and livestock users are typically the ones first affected by dramatic water level declines. Across Montgomery County, we have seen many calls for replacing burned out pumps and motors, and for drilling wells to deeper depths. In parts of the county, even larger wells, including public water supply wells, are experiencing similar problems.

And of course with crippling drought comes the increased threat of wildfires — especially in a heavily forested area like Montgomery County — and the immediate need for water to control them. While Montgomery County has been lucky — so far — to avoid the tragic loss of life and property on a scale that was experienced by our friends in Bastrop County, we have not completely escaped the devastation of fire in our drought-plagued area. Until we get some rain, the widespread threat of wildfires will continue to haunt Montgomery County.

But, again, compared to many other groundwater districts in other regions of this state, our groundwater supplies remain generally reliable to meet demand.

A truly effective regulatory approach is one that can demonstrate flexibility and balance when addressing real world conditions. The Lone Star District is well-served, in my opinion, by a board of directors who have insisted since day one on being flexible and balanced in our regulatory approach, while at the same time providing an element of long-term reliability and certainty to those that depend on groundwater in Montgomery County. That has been our mission for the last decade, and it will continue to be our mission as we work through these lingering drought conditions and beyond. We are working with water users impacted by the drought to help alleviate short-term problems, while continuing to press forward with our long-term groundwater reduction plans and achievement of desired future conditions in our aquifers as contemplated by the Texas Legislature.

While Montgomery County has fortunately experienced a relatively mild and wet winter, the LS-GCD will continue to encourage the practice of watering lawns a maximum of two times per week (with the use of an inch of water or less), as well as all other forms of conservation. Regardless of how hot or dry it may be next summer, the lessons learned from the Drought of 2011 should not soon be forgotten.

Addressing Conservation, Recharge Enhancement, Rainwater Harvesting, Precipitation Enhancement, or Brush Control Where Appropriate and Cost Effective

The Lone Star Groundwater Conservation District remains committed to educating the residents of Montgomery County about the need for water conservation as an alternative to groundwater pumping. The cost for recharge enhancement is high due to the need for land acquisition for the use of spreading basins or through injection wells which is also cost prohibitive. To promote the use of alternative sources of water, the Lone Star Groundwater Conservation District continues to encourage the use of rainwater harvesting collection systems.

Altering precipitation patterns through artificial means is not a cost effective or feasible program for the District at this point in time. Brush control is not being considered as a viable program for the District at this time due to the lack of cost effectiveness for this type of program.

F.1. Objective

The District will annually submit an article regarding water conservation for publication to at least one newspaper of general circulation in Montgomery County.

F.1. Performance Standard

A copy of the article submitted by the District for publication to a newspaper of general circulation in Montgomery County regarding water conservation will be included in the Annual Report to the Board of Directors.

The Lone Star Groundwater Conservation District has provided articles and press releases to general circulation publications in 2011 to keep the citizens of Montgomery County better informed about their water resources and the rates of groundwater decline. The Conroe Courier is one such newspaper that is distributed throughout Montgomery County. Another vehicle used to disseminate information to the public is through the Dock Line magazine, which is published monthly and has a circulation of 18,000. Examples of these efforts are provided on Pages 27 through 33 and on the District website, www.lonestargcd.org.

F.2. Objective

The District will develop or implement a pre-existing educational program for use in public or private schools that will be included in the Annual Report to the Board of Directors for the year 2011.

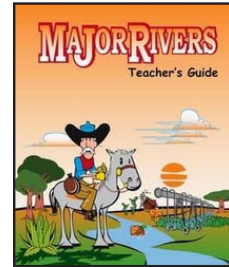
F.2. Performance Standard

A description of the educational program developed or implemented by the District for use in Montgomery County public or private schools will be included in the Annual Report to the Board of Directors for the year 2011.

Conservation Education Programs

Major Rivers: A Texas Water Education Program

Classroom curriculum is geared towards educating 4th and 5th graders about conservation of water resources. The District sponsors the curriculum in conjunction with SJRA. Through this joint partnership with SJRA, we have been able to provide over 300 teacher kits to schools in Montgomery County. Major Rivers' lesson objectives not only define important knowledge and skills related to water, but they also support many of the Texas Education Agency's TEKS and TAKS objectives for social studies, science, language arts and math. Each year we cost share with SJRA to replenish the individual student pamphlets.



Walraven — Book Cover Program

In 2004, the District, jointly with SJRA, initiated a program providing book covers with water conservation messages to Montgomery County Schools. In 2011, over 57,000 book covers were distributed to six (6) school districts within the county to assist in meeting the Texas Education Agency's requirement that all textbooks be covered.



In 2011, LSGCD spent \$4,626.75 for its part of the program. School districts included:

- Conroe ISD
- Montgomery ISD
- New Caney ISD
- Splendora ISD
- Willis ISD
- Magnolia ISD

Other Activities

The District accepts every opportunity to educate the public on water conservation. Outside the many efforts already highlighted above, in 2011 the District participated in many meetings and numerous events. The District's goal at these events is to present water conservation concepts in an entertaining and educational format. The events include:

- General Manager Kathy Turner Jones, Assistant Manager Paul R. Nelson, and Field Operations Coordinator Mel Lonon attended The Woodlands Landscape Solutions Event on Sept. 24
- Mobile Lab Trailer classroom presentations
 - Texas Wildlife & Woodland Expo on March 26
 - Kidzfest in Conroe on April 2
 - Montgomery County Fair & Rodeo on April 8-10
 - East Montgomery County Sawmill Festival on April 16
 - Toyota Bass Classic on Oct. 28-30

- Community Association presentations
- Rotary, Kiwanis, and Lions Club presentations
- Chamber of Commerce presentations
- Presentation to various City Councils as requested (Conroe, Panorama, etc.)

Water Conservation Kits

The District provides complimentary water conservation kits. Each conservation kit contains the following items with a detailed description of the water benefit saving of each:

- Toilet Tummy
- Aerator
- Rain Gauge
- Moisture Meter
- Leak Detection Dye Tablets
- 5-Spray, Water-Saving Hose Nozzle
- Shower Flow Meter Bag

District staff maintains stock of these items for various presentations, meetings and outreach events. Staff estimates that approximately 150 bags were distributed in 2011 at various events and presentations throughout the county. In addition, the conservation kits are available to the walk-in public on request. The District spent \$1,856.46 on supplies and reorder of items for the water conservation kits in 2011.

District Library

The District has created and established an in-house reference library of educational information available for all ages. Books, games, coloring books, videos and other factual information is included in the library, to be checked out for a period of time, depending on the specific resource.

The District offers and encourages educators to take advantage of the District's water resource information material. A new item added in 2008 was a desktop Groundwater Flow Model, which serves as an interactive classroom tool designed to show the flow of water and pollutants through differing gradients. It can be used in front of the classroom and is easily used by students themselves. It demonstrates flowage through confined and unconfined aquifers, as well as the effects of pumping on these aquifers. The District maintains this teaching tool as a means to teach the community about the hydrologic characteristics of aquifers and the impacts of groundwater pumping.

Lone Star Groundwater Conservation District Constructs New Office

2011 saw the beginning of the construction of the District's new office building and boardroom. Since its creation some 10 years ago, the District's Board and staff has leased space in various buildings in downtown Conroe and has had no real home of its own. That will change with the construction of this new facility.

The new office/boardroom will be located at 655 Conroe Park North Drive, approximately five miles north of downtown Conroe and will be readily accessible via several major thoroughfares.

In addition to planning the building to be an attractive and efficient work and meeting space, the District focused on designing the building and grounds to standards that would be both environmentally friendly and a show place for water conservation. To that end, some of the amenities included in the design are pervious concrete sidewalks, and a dry river bed (arroyo) that will be planted with water-efficient shrubs and trees and will drain rain water into a 15,000 gallon underground water storage tank. In addition, four above-ground metal cisterns will capture rain runoff from the roof of the building. All of the captured water will be used for irrigating the grasses, shrubs and trees planted on the building site.

The latest available water-efficient fixtures will be installed in the building's restrooms and informational placards will be placed within the building and grounds, informing the visiting public of the water conservation features used in the development of the District's new offices.

In 2011, the Lone Star Groundwater Conservation District broke ground on its new offices in Conroe. The new building will include a dry river bed that will drain rain water into a 15,000 gallon underground water storage tank and four above-ground metal cisterns to capture rain runoff from the roof (pictured below). All of the captured water will be used to irrigate the grasses, shrubs and trees planted on the site.



Lone Star Groundwater Conservation District Continuously Fights to Keep Injection Disposal Wells Out of Montgomery County

For more than four years, the Lone Star Groundwater Conservation District has been fighting to keep four injection disposal wells out of Montgomery County.

Several years ago, TexCom Gulf Disposal, LLC filed applications with the Texas Commission on Environmental Quality seeking approval to inject industrial commercial nonhazardous wastes underground in the County. Since becoming aware of the situation in July 2007, the District has been fighting to prevent the permit applications for these injection disposal wells from being approved, and has spent more than \$750,000 in the process.

Once learning of the proposed TexCom project, the District engaged environmental attorneys, engineers, geologists, and scientists to review the applications and the potential impact to groundwater resources in Montgomery County. After studying the TexCom project applications and potential issues, the District's attorneys and experts concluded that the applications contained significant deficiencies, oversights, and misleading scientific assumptions.

The Lone Star District then took the position that TexCom's applications presented an unreasonable risk of contamination of the aquifers in Montgomery County and would commit its time, resources, and efforts to prevent the applications from being approved and stop the project from moving forward.

In May 2009, an agreed motion between TexCom and the Lone Star District, the City of Conroe and Montgomery County, and the individual resident protesters, was filed to temporarily suspend the contested case until additional testing was performed on the existing well on Creighton Road. This put the second round of evidentiary hearings, which had been ordered by the TCEQ Commissioners, on hold until the additional testing was conducted.

"The District has since day one argued that this case should be considered using hard science, not theory or best-guesses," said Board President Richard Tramm in a May 2009 press release. "By abating the case to allow TexCom to conduct more testing on the existing well, we are giving ourselves a chance to learn more hard science about that well and how the TexCom injection project will impact groundwater quality in Montgomery County."

Despite the District's continued efforts to stop the TexCom project, on Jan. 26, 2011, TCEQ voted to grant TexCom's permit requests. At its March 8, 2011 Board meeting, the Lone Star District's Board of Directors voted to unanimously agree to work with other parties challenging the injection well permits rather than initiating its own legal challenge to the permitting decision.

"If we can help this effort by letting some of the other parties, particularly Denbury [Onshore], take the lead with their technical arguments, then to me it is a very simple decision," said Board Treasurer Jim Stinson in a March 8, 2011 press release. "What we cannot do is risk undermining the entire effort by crowding the field of challengers just for the sake of saying we were there."

Catahoula Aquifer Studies Initiated by LSGCD

For many years, the focus of the groundwater users and regulators of Montgomery County has been concentrated on the so-called “Gulf Coast Aquifer System;” being made up of the Chicot, the Evangeline and Jasper formations of that aquifer system. Modeling done by the Texas Water Development Board has previously ignored a lower formation called the Catahoula formation, which is included in the definition of the Gulf Coast Aquifer but which was assumed to have water quality issues and limited availability. More recently, there has been increased interest in the water of the Catahoula Aquifer as a reliable alternative source of water for the Lone Star GCD.

As noted above, the viability of the Catahoula as a source of potable drinking water for Montgomery County has not been extensively studied. However, the sustainable yields of the county’s three formations of the aquifer that are most utilized are currently being reached or exceeded, and new sources of supply are needed. Several entities within the county have made a significant commitment in time and resources to explore the Catahoula aquifer as a source of water that fulfills those permittee’s requirement to locate and utilize alternative water sources. Preliminary results of test drilling have indicated that the extent of fresh water in the formation is greater than previously reported in studies based primarily on electric log and other data from oil wells in the area. Based on this renewed interest and usage, the District convened an expert panel of hydrologists from LBG-Guyton Associates, INTERA Inc., and Bill Mullican and Associates, to study the Catahoula formation and determine the impacts that pumping may have on the Gulf Coast system, including transmissivity between aquifers. That effort began in April 2011, with the results expected early in 2012.

Throughout 2011 the District has strived to keep the citizens of Montgomery County updated with the latest news and information concerning groundwater. The District submitted many articles through many sources during the year in hopes to keep the communication lines open with the public.

Below is a summary list of press releases distributed to area newspapers, including The Houston Chronicle, Montgomery County News, and Conroe Courier, as well as being distributed electronically by District staff via an email distribution list:

Press Releases

March 8, 2011, Conroe, Texas: Lone Star GCD Board Votes to Continue Fight of Injection Well Efforts by Supporting Denbury, County – The Lone Star Groundwater Conservation District Board elected to work with other parties to challenge the injection well permits issued to TexCom Gulf Disposal, LLC, instead of initiating its own legal challenge to the permitting decision.

July 14, 2011, Conroe, Texas: Lone Star GCD Board Votes to Maintain 2012 Water Use Fees at Current Level – The Lone Star Groundwater Conservation District Board voted to maintain the current water use fee for the third consecutive year.

September 13, 2011, Conroe, Texas: Protect Your Groundwater Day, A Perfect Time to Learn to Conserve – The Lone Star Groundwater Conservation District encourages citizens to participate in and spread the word regarding water conservation for Protect Your Groundwater Day.

November 9, 2011, Conroe, Texas: Drought Continues Despite Moderating Temperatures The Lone Star Groundwater Conservation District continues to urge citizens to conserve water despite moderate temperatures and rainfall.

A sample of the press release issued on Nov. 9, 2011 can be found on Page 29.

The Dock Line Magazine

The “Dock Line” Magazine is published monthly and the District authors an article for each issue, which is printed at no cost to the District. In 2011, 11 articles were published with a circulation distribution of 65,000. Copies of each published article are available on the District website, www.lonestargcd.org, and samples can be found on Pages 30 through 32.

PRESS RELEASE

Lone Star Groundwater Conservation District



FOR IMMEDIATE RELEASE

DROUGHT CONTINUES DESPITE MODERATING TEMPERATURES.

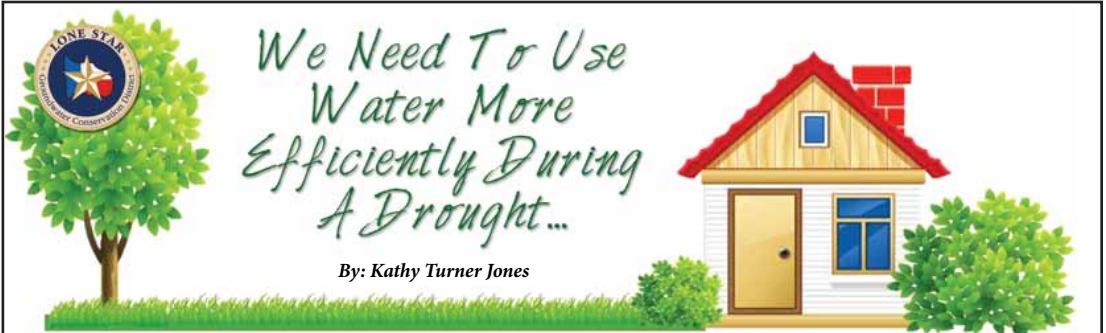
CONROE, TEXAS. NOVEMBER 9, 2011 - - At its regularly-scheduled meeting held on Tuesday, November 8th, the Lone Star Groundwater Conservation District Board discussed the increased levels of groundwater pumping throughout the county during the past year, caused by record-low levels of rainfall and abnormally high temperatures.

While temperatures have moderated and many parts of Montgomery County have been blessed with periodic showers this fall, the Board stressed the importance of reminding our citizens that, despite the changes in the weather, the drought has not been broken; the need to conserve is with us more than ever. State climatologists predict that the drought will continue throughout the remainder of the year, and in fact is likely to extend throughout all of 2012.

Many municipalities and communities within Montgomery County initiated "2-days-a-week" lawn watering restrictions, as well as other conservation methods as a result of the drought. These efforts had a very positive effect on groundwater usage; however, citizens are encouraged to continue to limit the times they water their yards even though conditions have changed. In fact, many experts tell us that Bermuda and other common grasses become dormant during the winter months, and that it is unnecessary to water our yards at all until spring.

Lone Star wants to remind you that the water we save during the winter is no less valuable than that which we conserve during the hot summer months. We encourage you to visit our website at www.lonestargcd.org to find even more ways to conserve.

*Kathy Turner Jones, General Manager
P.O. Box 2467
Conroe, TX 77305
Phone: 936/494-3436
Email: kjones@lonestargcd.org
www.lonestargcd.org*



Some important information from the Lone Star Groundwater Conservation District

"We have a serious drought in Texas. It has been months since any appreciable rainfall, and the burning question on everyone's mind is, 'When will it rain enough to make a difference?'" said Kathy Turner Jones, general manager of the Lone Star Groundwater Conservation District. "Making a bad situation worse, we're having summer instead of spring... and the unseasonable temperatures keep climbing. The recent wildfires underscored the consequences of no rain and high winds, and folks are paying attention. It is just human nature that it takes an emergency to drive us to action. In this case, the actions are still voluntary...but it is time to give more than just a passing thought to conserving water. Fortunately, there is plenty we can do to help stretch this finite natural resource – even during a drought – and we're asking folks to do what they can to ease up on water demand."

Here are some timely suggestions about sustaining your lawn and landscape areas with less water.

Priority #1—SHRUBS AND TREES

These are your highest priority since they are the "bones" of your landscape. They must receive deep watering that goes to the roots where the moisture is useful and cannot be provided by your automatic sprinkler system.

Invest in a soaker hose (no longer than 100 feet) and a timer, winding the hose between your shrubs and trees. Attach the timer to the closest outdoor faucet and connect the two with your garden hose. Turn it on to seeping — not spraying — strength and leave it on until an 8-inch screwdriver goes easily into the earth to a depth of 6-8 inches. Now you know how long to leave it on and can program your timer to do this deep watering once a week. Adding mulch over the hose and around the shrubs and tree drip line will help conserve moisture even more.

For trees older than 3 years that are not planted alone, simply using the garden hose will work about once a week. Placing the hose midway between the trunk and the end of the canopy, water slowly and deeply, avoiding any runoff. Move the

hose around the tree until every quadrant has been soaked. Do this about once a month. There is also an interesting product called a Treegator, which is a slow release bag of water that will water the tree



over a 5-9 hour period.

Priority #2—GARDEN BEDS

Perennials and annuals (hopefully these are only in your seasonal color containers) also can use a soaker hose system. Remember to mulch, mulch, and mulch! That extra layer can make all the difference in whether your plants survive or not, the longer the drought lasts.

Last priority—THE LAWN

Lawns are big drinkers and St. Augustine grass is especially thirsty turf. The grassy areas should be diminished as much as possible; relying instead on small areas to contrast with your other landscape components. Automatic sprinklers work best here, but, during a serious drought, having a sprinkler system doesn't guarantee that your lawn will stay green. Grass naturally goes dormant in dry conditions, conserving water for its roots. Your goal should be the same, watering as infrequently as possible. Serious drought years are not



the time for Green Lawn Contests, but for landscape survival tactics in the long term.

St. Augustine needs ¾ -1 inch of water per week to stay green. Water long enough to get the dirt damp to a depth of 6 inches (use that screwdriver again to check the water's penetration). Don't "scalp" the lawn — mow St. Augustine at 3 inches, allowing the grass to shade its own roots.

A general rule of thumb for all sprinklers is to run them a maximum of 20 minutes per cycle, then allow 30 minutes for the water to percolate into the soil instead of running off. Remember, no street looks better after watering; flowers and grass don't grow in concrete!

During a drought, your concern should be about promoting and sustaining healthy soil for roots to grow in – which is the real secret to surviving droughts. If you decide to add fertilizer, use only the organic kind that will encourage the root and soil health your lawn needs.

The best thing you can do to lower the amount of water your landscape uses over time, is to consider planting natives, Texas Superstars, and drought-tolerant greenery...and to minimize your "thirsty" lawn areas. Plant annuals in seasonal containers, and make them attractive focal point areas in your yard, where they offer the most return on your investment. These container plants can easily be sustained by inexpensive drip irrigation options available at your neighborhood nursery or do-it-yourself store.

With the proper watering, you can not only protect the dollars you have invested in surrounding your house with a lovely landscape, but this will help your plants and turf survive the drought, as well.

The Lone Star Groundwater Conservation District was created by the 77th legislature in 2001 to protect and manage the groundwater resources of Montgomery County. As with the other Districts, Lone Star works to maintain a balance between protecting the rights of private landowners and the responsibility to protect groundwater. The District focuses on preventing waste, collecting data, educating the public about water conservation and preventing irreparable harm to the aquifer. For additional information, please visit www.lonestargcd.org. ♦



Climate Is What You Expect...Weather Is What You Get!

The impact of sustained drought on our water supplies...

By: Kathy Turner Jones

With the prolonged drought, just about everyone is talking about the weather. The longer it persists, of course, the greater impact on our water demand...and this is one for the record books!

Here are some alarming statistics: Texas has been experiencing drier winter and spring seasons since 1950, and wetter summer and fall seasons since 1960. Charting these climate trends reveals that overall, Texas annual rainfall has been greater since 1960, compared to 1895 through 1960. Apparently, drought was much more common before the 60's than it is today. That is difficult to believe since the summer 2009 drought seemed pretty dramatic and the fact that we have had no appreciable rainfall since January 24, 2011 keeps this drought on everyone's mind.

The real news was that less than a quarter of an inch of rain fell in Houston during the month of April...making it the driest April on record. Three-digit temperatures are also shattering records; record temps were set five of the first six days in June, with both June 5 and 6 hitting 105 degrees -- the maximum temperatures ever reached during the month of June.

A brutal combination...

Record heat and no rain are stressing area water suppliers. As many have observed, "It isn't every year that we get summer in April!" The Woodlands Joint Powers Agency, for example, announced that it was implementing its Stage 1 Drought Plan back in May, encouraging residents to "Water Less... Save More."

Experts warn that during spring and summer months, when about 80 percent of residential water use is for lawn and landscaped areas, as much as 50 percent of that water is wasted. The popular W.L.S.E. Guys irrigation system evaluation program -- available in The Woodlands and the City of Conroe -- is helping residents get their watering cycles under control and educating homeowners that even thirsty St. Augustine grass needs a lot less water to thrive than most systems routinely deliver. The drought underscores the need to stop excessive irrigation use.

Just as Americans have long had a love affair with their automobiles, for the past 50 years or so folks have been wedded to their lush, sculptured, manicured lawns. Thanks to the significant requirements for chemical supplements and water, many homeowners are seeking a divorce. Some are

going so far as tearing out their front lawns, replacing them with native plant gardens, or courtyards with ground-covered, stepping-stoned seating areas. World travelers often report that you're more likely to see lovely natural areas with seating alcoves in other countries than you are to encounter them in this country.

Garden writer Rosalind Creasy has observed that, "Many people keep a lawn because they just can't picture any other option. There's just no place else on earth that people have this much residential turf."

Creasy also calls the lawn the "Hummer of the landscape...because it is like a big gas guzzler but uses lots of water instead of gas. Lawns are big polluters, too," she points out, "because they consume large amounts of herbicides, pesticides and chemical fertilizers to maintain them."

According to NASA data, lawns have outpaced corn to become America's largest irrigated "crop" by area -- at about 32 million acres -- based on satellite and aerial imagery collected by the agency over 13 metro areas. Experts suggest that the lawns of the future will look much different, due, in part, because of the rising cost of water. Depending on how long the current drought continues, the switch to less thirsty turf might happen sooner than anticipated.



Adequate Water Supplies Fueled the Post-WWII "American Dream"

In the 1950's, significant measures were taken to improve public drinking water supplies and to enhance public safety in the bargain. That's when local water supply facilities emerged to manage the piped infrastructure to supply treated potable water to homes and businesses. The prevailing attitude of the post-war time populous was that "bigger was better," and the exodus to the suburbs was on...bigger houses, urban shopping centers, neighborhood schools, and large expanses of non-

porous asphalt surfaces appeared on the landscape. What had been rural grassy areas disappeared under concrete, and rainwater runoff had no place to go but racing down gutters, taking artifacts of the new lifestyle with it...lawn fertilizers, motor oil, trash and even discarded household chemicals.

An article in the June 2011 American Water Works Association "Journal" (Fighting Water with water: Behavioral change versus climate change) suggests that since our modern water infrastructure is designed to be "invisible", perhaps it is not surprising that people have no clear idea where our water comes from, how it is treated, gets delivered to our homes, returned for treatment again and gets back to its source. The "watchwords" for the future, the authors suggest, are "sustainable water resource management", embracing strategies that include community involvement and watershed protection. These concepts are very much in use at the Lone Star Groundwater Conservation District (LSGCD).

According to Kathy Turner Jones, LSGCD general manager, "Virtually the entire water demand in Montgomery County is supplied by groundwater from the Gulf Coast Aquifer System. Current research and information indicate that the long term sustainable recharge of the aquifer we rely upon is about 64,000 acre-ft a year. In 2009, the permitted demand in the was 87,000 acre feet per year -- already exceeding the sustainable recharge rate by 50 percent!"

Phase I of the District's Regulatory Plan has established January 1, 2016 as the date that groundwater withdrawals must be reduced and alternative sources of water will be required.

"This action is critical for Montgomery County to continue to grow and prosper. We need a reliable and adequate water supply, directed by new management strategies that promote public support and understanding that water conserving measures are indeed essential for economic growth. And that oversight is exactly what we are committed to providing."

The Lone Star Groundwater Conservation District was created by the 77th legislature in 2001 to protect and manage the groundwater resources of Montgomery County. Lone Star works to maintain a balance between protecting the rights of private landowners and the responsibility to protect groundwater. For additional information, please visit the District's website, www.lonestargcd.org. ♦



Important New Year's Resolutions Just About Everyone Can Keep!

From the Lone Star Groundwater Conservation District

RESOLUTION...just the word is enough to make some folks uncomfortable. We might have had all the right intentions, sure...but somewhere between "I resolve" and "I did it!" something comes unraveled. Maybe we aimed too high. Or adopted someone else's 'plan' for what we should accomplish, and everyone knows how that works out. Perhaps it is time to shift that tired old paradigm and see the beginning of a new year more as a genuine opportunity to accomplish something worthwhile rather than to make halfhearted commitments to goals we're unlikely to achieve.

The Lone Star Groundwater Conservation District (LSGCD) has some important suggestions for things each of us can do to help conserve our precious -- and finite -- groundwater resources. According to Kathy Turner Jones, LSGCD general manager, "We are facing some serious challenges in the years ahead to reduce our reliance on groundwater and enable the aquifer that serves Montgomery County to recharge. This takes more than converting to surface water; it involves making a specific commitment, or resolution, to use water more efficiently. And that means everyone changing some wasteful habits and behaviors. No one gets up in the morning and says, 'I'm going to waste some water today!' Many of these behaviors aren't deliberate...they've simply become habit."

There is a wealth of information circ-

ulating about how to save water, but some efforts are more productive than others. For example, we have learned that unnecessary residential irrigation of lawns and landscaped areas is unarguably the single greatest water waster. In summer months, a staggering 50 percent of the water used outdoors is wasted -- either by running off sidewalks and streets into storm drains or simply saturating the ground beneath turf that isn't even thirsty.

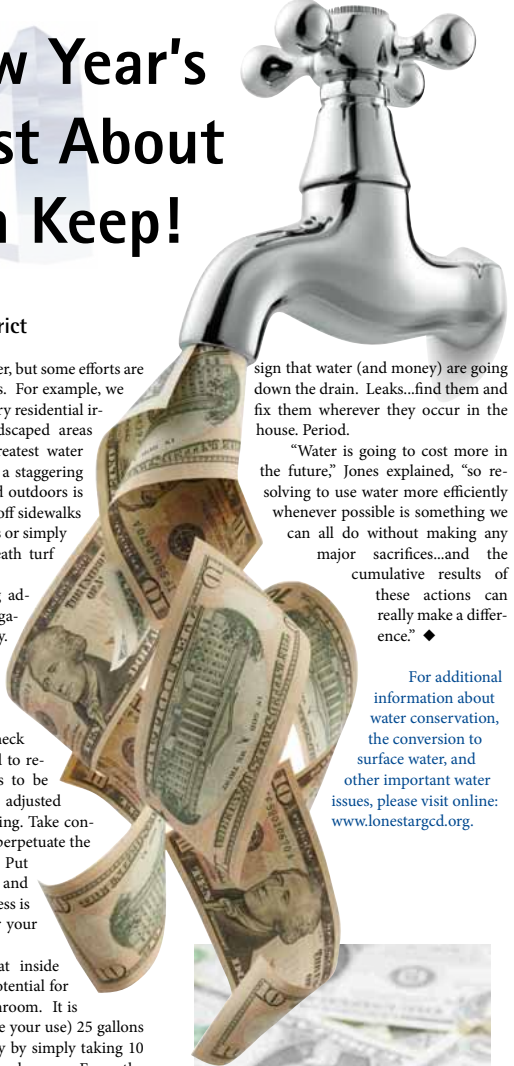
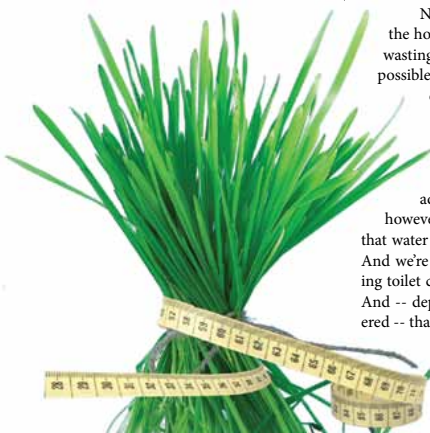
So, let's assign making adjustments and repairs to irrigation systems the top priority. Start with having the system completely evaluated. It should be turned off during the winter months, so this is a good time to check for leaks, broken heads, and to review the automatic settings to be used when the controller is adjusted to come on again in the spring. Take control of the controller...don't perpetuate the problem of overwatering. Put your grass on a water 'diet,' and you'll quickly discover that less is best -- for the grass and for your wallet.

Next, consider that inside the house, the largest potential for wasting water is the bathroom. It is possible to save (or reduce your use) 25 gallons of water every day by simply taking 10 minute shorter showers. Even the water saved by doing something as simple as turning off the water while brushing your teeth or shaving can add up. The most insidious water waster, however, is a silent toilet leak...there is no clue that water is escaping until you get the water bill. And we're not talking small change here...a leaking toilet can waste as much as 200 gallons a day. And -- depending on how long it goes undiscovered -- that can add up to some significant money. Turning OFF the water -- at the sink or in the shower -- takes a conscious decision, and so does tracking down leaks. It is easy to see a dripping faucet and a 'running' toilet is a good

sign that water (and money) are going down the drain. Leaks...find them and fix them wherever they occur in the house. Period.

"Water is going to cost more in the future," Jones explained, "so resolving to use water more efficiently whenever possible is something we can all do without making any major sacrifices...and the cumulative results of these actions can really make a difference." ♦

For additional information about water conservation, the conversion to surface water, and other important water issues, please visit online: www.lonestargcd.org.



Conservation Programs

F.3. Objective

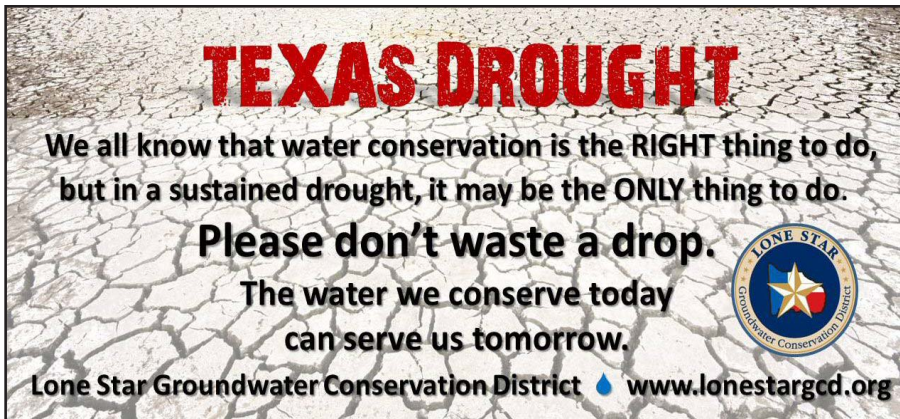
Each year, the District will include an informative flier on water conservation within at least one mail out to groundwater use permit holders distributed in the normal course of business for the District.

F.3. Performance Standard

The District's Annual Report will include a copy of the informative flier distributed to groundwater use permit holders regarding water conservation and the number of fliers distributed.

Annually, the District will include an informative flier on water conservation within at least one mail out to groundwater use permit holders to be distributed in the normal course of business for the District.

Approximately 10,000 fliers were distributed in Montgomery County in 2011. The printing and distribution cost to the District totaled \$1,027.95.



The Do's and Don'ts of Saving Water...

Do...

- ◆ Take shorter showers instead of tub baths
- ◆ Find and fix toilet and faucet leaks
- ◆ Install water-efficient toilets and showerheads
- ◆ Run water appliances **ONLY** with full loads
- ◆ Take control of your irrigation system!
Water less...save more!



DONT...

- X Water lawns during the heat of the day or after rainfall
- X Use water to "sweep" driveways, sidewalks or patios
- X Let water run while shaving, brushing teeth, rinsing foods
- X **DON'T LET A SINGLE DROP OF WATER GO TO WASTE!**

F.4. Objective

Each year, the District will promote rainwater harvesting by posting at least one informative article on rainwater harvesting on the District website. The District will also consider sponsoring rainwater harvesting activities when the project offers opportunities to advertise and promote the technology.

F.4. Performance Standard

Each year, the annual report will include a copy of the article that has been provided on the District website in rainwater harvesting.

The following information on Pages 34-35 was placed on the District's website in 2011 to educate the residents of Montgomery County about rainwater harvesting:

Capturing Rainwater at Your Home

As we all now know, this summer (and year) has been the driest and hottest on record in Montgomery County, as well as across the state. While some welcome rains came in December, we still ended the year with as much as 36 inches below our average annual rainfall. Montgomery County was designated as in an Exceptional Drought during most of last year. All of this gives us an even greater appreciation of the importance of conservation and the use of water saving efforts such as harvesting rainwater.

Locating a rain collection system:

If you already have a rain gutter system on your house, you can easily adapt it to accommodate a rain barrel, or rain barrels. Cutting off a portion of the downspout and re-directing it to a barrel is not only simple, but can be done very inexpensively. If you live in an area that has homeowner restrictions that may prevent you from placing a rain barrel (or anything else of that nature) in your front yard, then you can consider placing the barrel in the back or side yard. It's best to find out whether or not there are restrictions in your neighborhood before you spend time and money on a project, but anywhere a downspout is located, or can be located, is an ideal spot for a rain collection system.

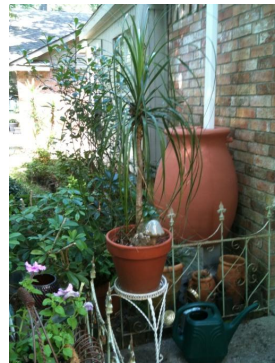


Photo courtesy of Paul R. Nelson

Choosing a rain barrel:

There are a variety of pre-fabricated rain barrels available at any of the large home and garden stores. One such plastic barrel is shown in the above photograph. This barrel, made to look like a terracotta vase, is not only attractive, but comes equipped with a hose bib/spigot and length of hose. It also has a screened entry portal and a small planter on top and holds approximately 50 gallons. Most commercially available rain barrels come equipped with these amenities and cost less than \$100.00.

If you'd rather make your own system, then choose a watertight container such as an old barrel, 55-gallon plastic drum, etc.... Make certain that the inside of the container is clean and sealed at both ends, with only a small opening at the top for rainwater entry. This will prevent creating a drowning hazard for small animals and will help eliminate a potential breeding ground for mosquitoes. Don't use a clear or white barrel, as too much sunlight inside the barrel can lead to excessive algae growth. You will also need to drill a hole in the container about 5-inches from the bottom. A hose bib or spigot (available at most home improvement stores) will then be screwed into the drilled hole. Seal around the spigot using a silicone or other waterproof sealant.

The barrel, purchased or made, can be set on the ground or, as in the case of the pictured one, be placed on concrete blocks or bricks. Elevating the barrel will make it easier to place a container or 'watering can' under the hose and spigot. Most commercially-available barrels come equipped with an outlet on the back of the barrel, allowing for connecting additional barrels, thus providing even more storage capacity.

Connecting the modified downspout to the barrel:

This can be as simple as positioning the barrel opening under the gutter's downspout and removing (with a hack saw) a portion of the downspout; permitting the rainwater to empty directly into the opening on the barrel. If needed, a flexible downspout can be purchased at any home improvement store. This inexpensive device will allow you to re-direct the water from the end of the downspout to the barrel opening should they not otherwise line up. If you don't have a gutter system in place, one can be installed relatively easily. Even a short piece of guttering (as little as 10 or 12 feet) can produce a surprisingly large amount of water in a very short period of time. Make certain that you wear all of the appropriate safety equipment, such as gloves and safety glasses, when modifying the downspout or constructing a gutter system.

Using the harvesting system:

Once your rain barrel is in service, you can use the provided hose, a watering can or other container to water potted plants, bushes, or any other greenery that you would normally water with a hose. You will be surprised how much water is collected during even a small rain event, and how far 50 gallons of water will go towards keeping your plants in good shape. Best of all, you're using rainwater instead of drinking water.

So, even though the rains have been few and far between this summer, installing a rain barrel is a relatively inexpensive and easy way to take advantage of the rain we do get. It's a water wise thing to do! And just maybe...your actions will encourage your friends and neighbors to do the same thing.

For more information:

- Visit the Montgomery County Extension Service Office (Texas Agri-Life) across from the Lone Star Convention Center to see their demonstration garden and to learn more about rain harvesting techniques.
- Visit Memory Park in Montgomery, walk around to the back of the building, and view the cistern that was constructed to harvest rainwater and was funded by the Lone Star Groundwater Conservation District.
- Check out a book by Brad Lancaster, "Rainwater Harvesting For Drylands and Beyond, Volume 1: Guiding Principles to Welcome Rain Into Your Life and Landscape"
- The Texas Water Development Board ("TWBD") publishes an excellent document called The Texas Manual on Rainwater Harvesting, Third Addition, 2005 and can be found on the TWBD web site at: www.twdb.state.tx.us/innovativewater/rainwater/docs.asp
- Visit the Lone Star's website at www.lonestargcd.org for even more information on harvesting rainwater.

The Lone Star Groundwater Conservation District was created by the 77th legislature in 2001 to protect and manage the groundwater resources of Montgomery County. Lone Star works to maintain a balance between protecting the rights of private landowners and the responsibility to protect groundwater. For additional information, please visit the District's website, www.lonestargcd.org.

For the fiscal year ending December 31, 2011, the District's assets increased by 1,014,188 and liabilities increased by 729,166. Net assets increased by \$285,023.

During the year, the District had expenses that were \$36,744 more than the prior year. Total revenues were \$311,713 more than in 2010.

Net assets of the District increased by 12% (\$2,374,731 compared to \$2,089,708). Lone Star Groundwater Conservation District has a long-term debt of \$491,198.69 due to the financing on the new District building.

Total revenues for the District increased by 14.4% due to drought conditions resulting in an increase in water usage. Total expenses increased by 1.9% for acquiring land and building consulting/consultation.

Copies of the annual audits are available at the District office.



James "Jim" Wesley

Lone Star GCD lost a dear friend and board member in March 2011 with the passing of James (Jim) Wesley following a lengthy illness.

Jim was appointed to the Lone Star GCD Board of Directors in May of 2009, by the City of Conroe Mayor Webb Melder. While only serving briefly as a board member, Jim quickly adhered to his position, playing an intricate role in the future of the District while serving on the Rules and By-Laws and Findings and Review committees.

Left behind to cherish his memories is his wife Sandra Schoenfield Wesley, and numerous family and friends. Jim will always hold a special place in the history of the District; his contagious smile and inspiring charisma is truly missed.



Mel Lonon

Mel Lonon, a cherished friend and Lone Star GCD family member, passed away unexpectedly in November 2011.

Mel came to the District in May of 2008 and served as the District's Field Operations Coordinator. That position consisted of inspecting water wells and metering devices throughout all of Montgomery County and required a great deal of interaction with people on a daily basis. Mel's friendly and outgoing personality and ability to "get along" with anyone he met allowed him to establish a rapport that proved most valuable in accomplishing his job.

In addition to his work with the District, Mel was also very active in the community. He was a tireless member of the Conroe Noon Lion's Club, once serving a term as its President, and was always willing to give of his time for others in need.

Mel is survived by Karen, to whom he was married for over 24 years and their son Hunter. Mel was greatly loved by the District and the community and will be deeply missed.

Lone Star Groundwater Conservation District

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