



Rainwater Harvesting

**WATER
UNIVERSITY**

**“Saving From a Rainy
Day”**

**Presented by:
KAREN COLWICK**

Rainwater harvesting is the process of capturing, diverting, and storing rainwater for future use.

Implementing rainwater harvesting is beneficial because it reduces the demand on the water supply, and reduces run-off, erosion, and contamination of surface water.

Rainwater can be used for any purpose that requires water.

These include landscape use, stormwater control, wildlife and livestock watering, in-home use, and fire protection.



U.S. Drought Monitor

Texas

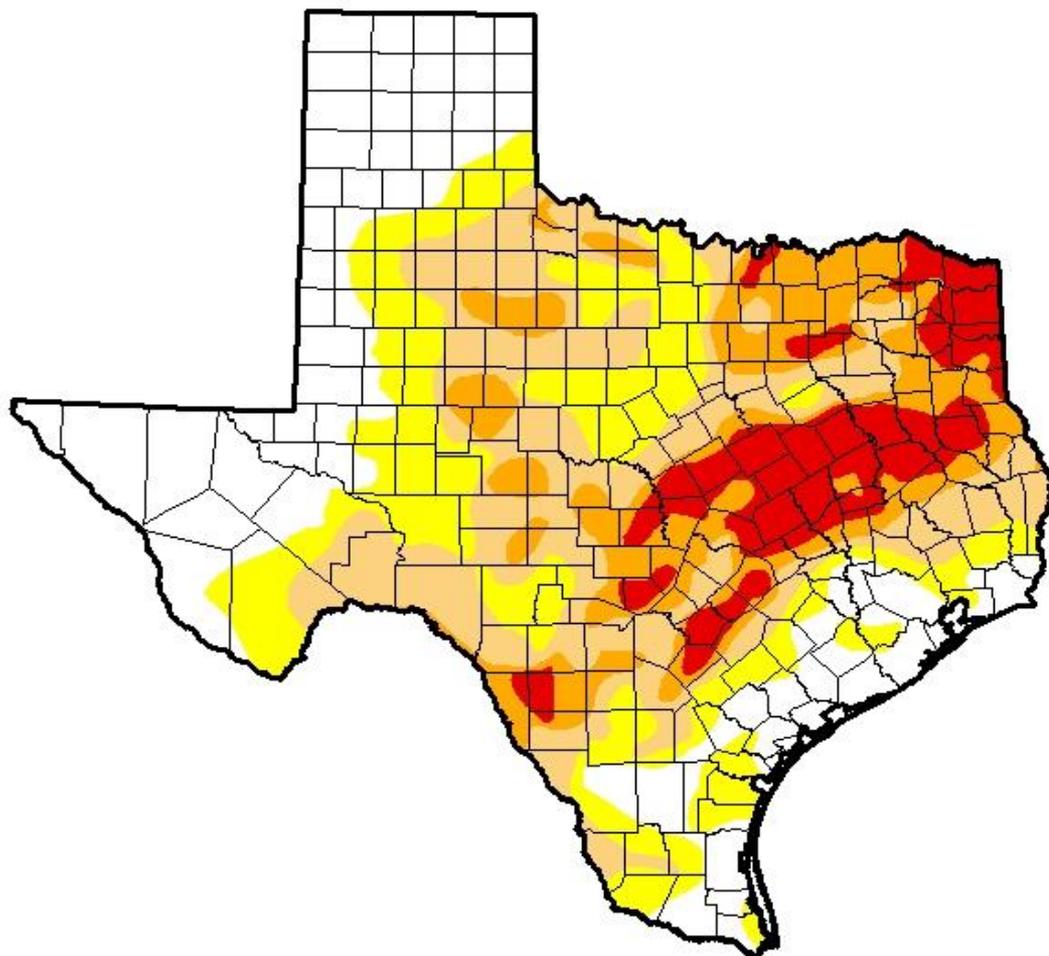
October 6, 2015

(Released Thursday, Oct. 8, 2015)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	29.70	70.30	48.43	24.66	10.17	0.00
Last Week 9/29/2015	34.51	65.49	38.32	17.55	6.27	0.00
3 Months Ago 7/7/2015	95.37	4.63	0.25	0.00	0.00	0.00
Start of Calendar Year 12/30/2014	34.37	65.63	44.68	25.73	11.70	3.17
Start of Water Year 9/29/2015	34.51	65.49	38.32	17.55	6.27	0.00
One Year Ago 10/7/2014	29.64	70.36	49.29	29.49	11.78	2.88



Intensity:



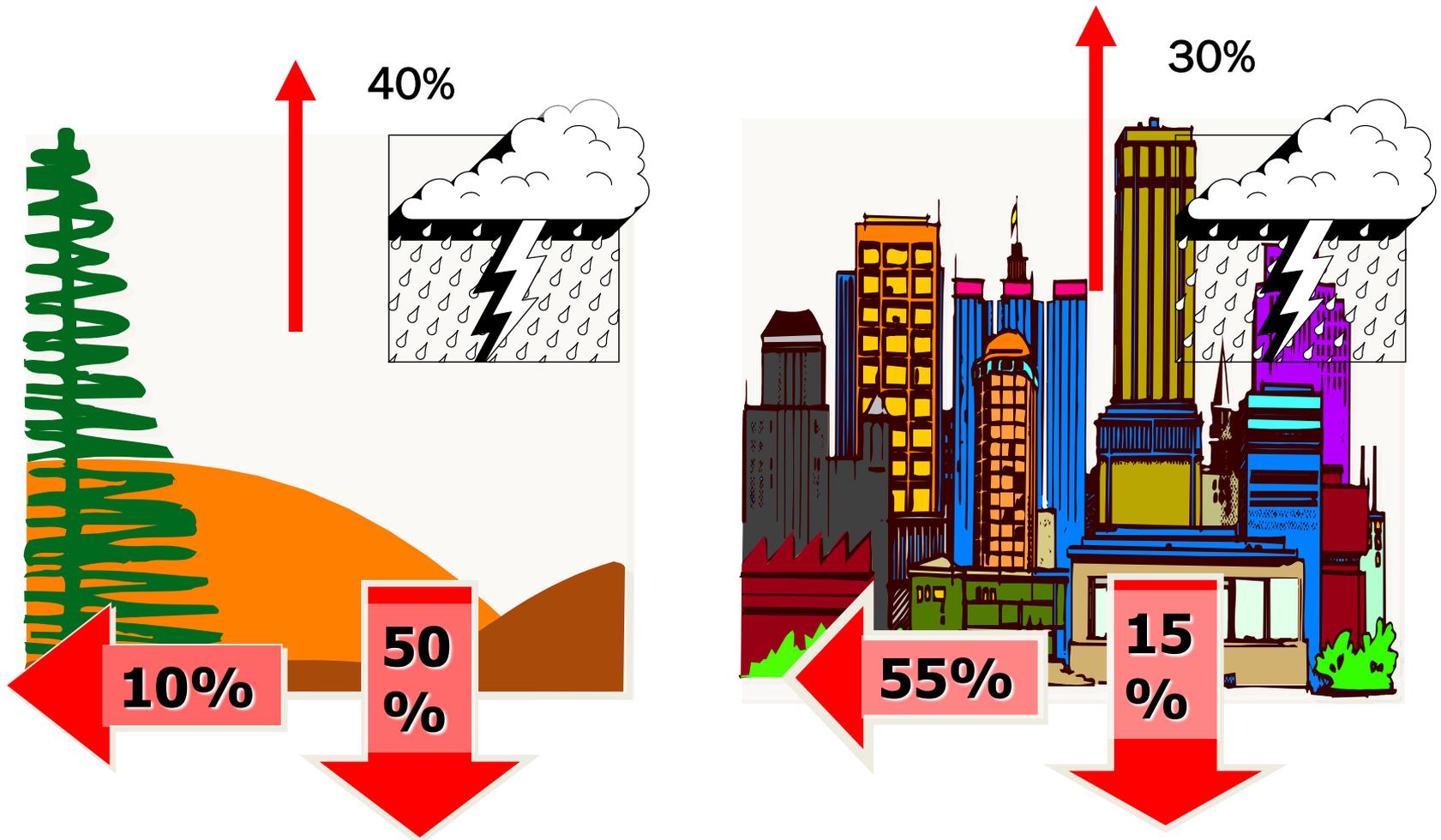
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

David Miskus
NOAA/NWS/NCEP/CPC



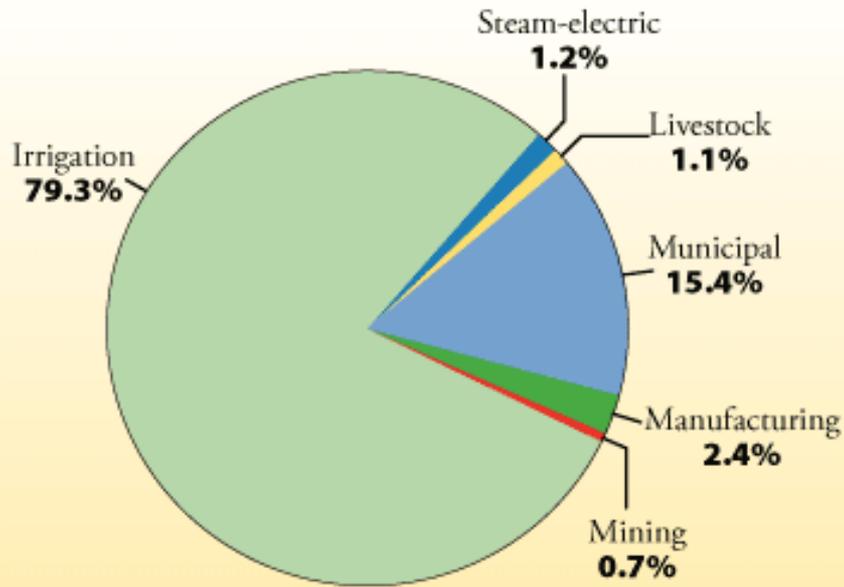
On the Water Cycle





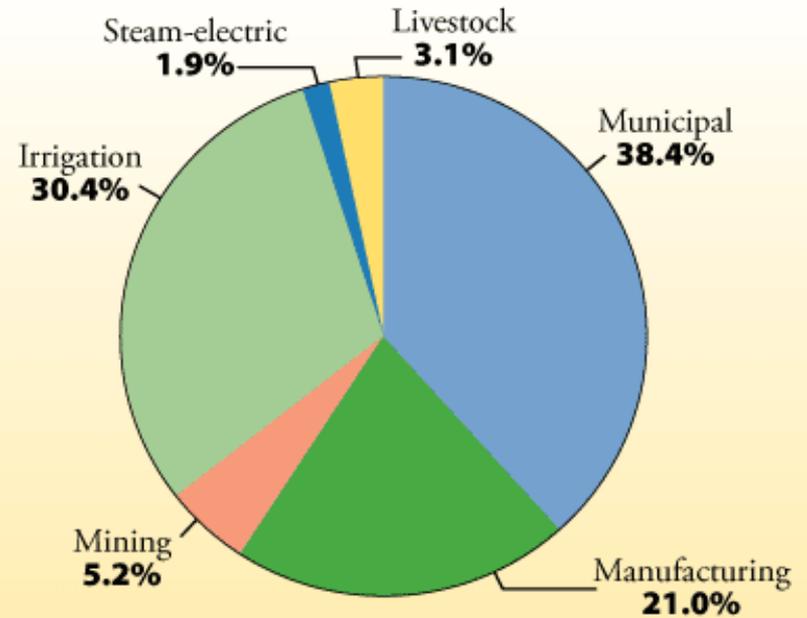
During the summer, 35 to 70 % of water used by residential customers is applied to the landscape

Texas Water Use



Sources: Texas Water Development Board and Texas Comptroller of Public Accounts.

Groundwater



Sources: Texas Water Development Board and Texas Comptroller of Public Accounts.

Surface Water

Conservation

Conservation is the easiest and least expensive method to sustain our water resources



What is Rainwater Harvesting?

Rainwater Harvesting is the process of capturing, diverting, and storing rainwater for future use.

Why Harvest Rainwater?

- **Reduces demand on municipal water supply**
- **Makes efficient use of a valuable resource**
- **Reduces flooding, erosion, and contamination of surface water**





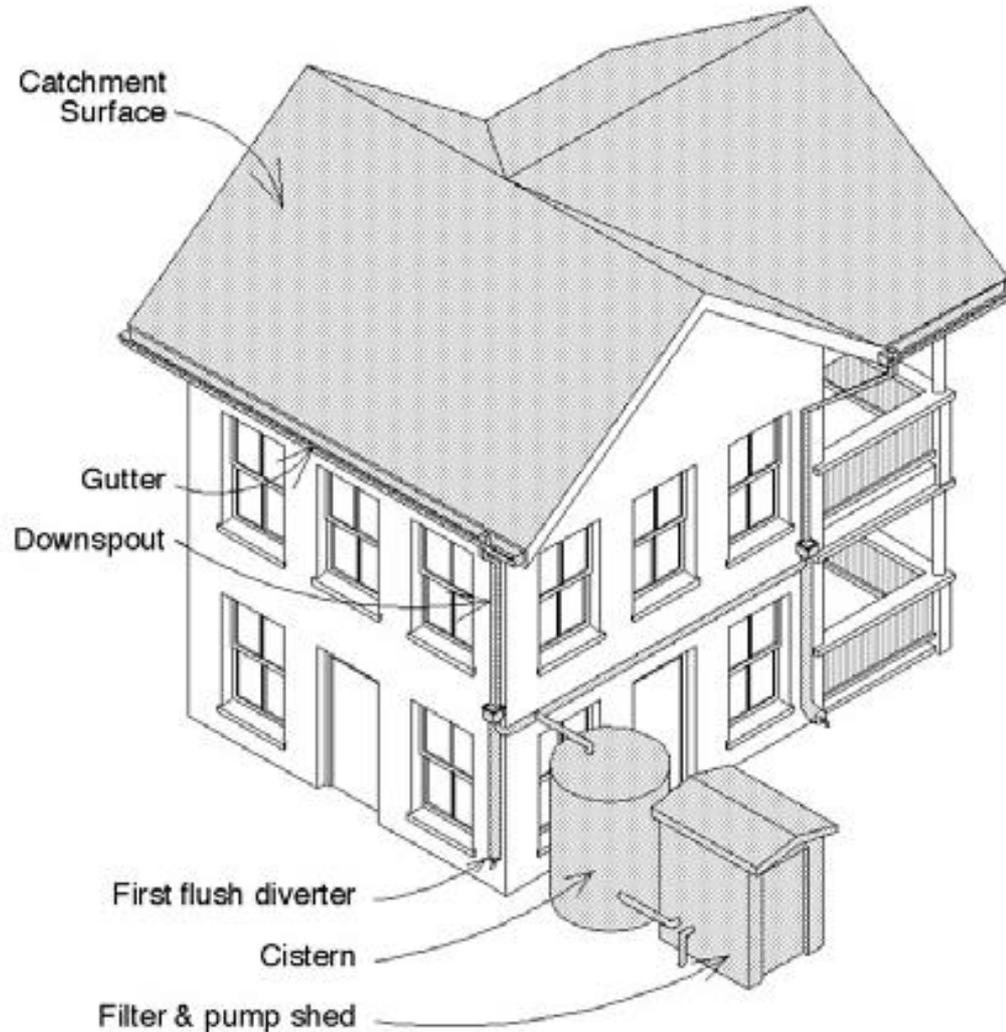
Rainwater Quality

- Salt free
- Chlorine free
- Calcium Free
- Lime Free
- pH slightly
- below 7
- As clean as filtered going in and filtered going out



Rainwater Harvesting Requirements

- Catchment
 - Footprint of roof
- Conveyance
 - Gutters and Downspouts
- Storage
 - Cistern/Tank
- Treatment
 - Filtration
- Distribution
 - Filter
 - Irrigation



Rainwater Collection

**.6 gallons per square foot roof per
1" rainfall**

2,000 sq. foot roof X 1" rain = 1,200



Rainwater Collection

.6 gallons per square foot roof per 1" rainfall
2,000 sq. foot roof X 1" rain = 1,200 gal. water
1,200 gal. X 32" rainfall per year = 38,400 gal/yr



begins.

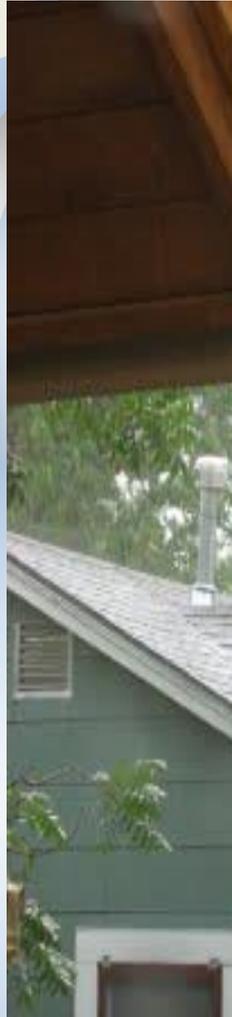


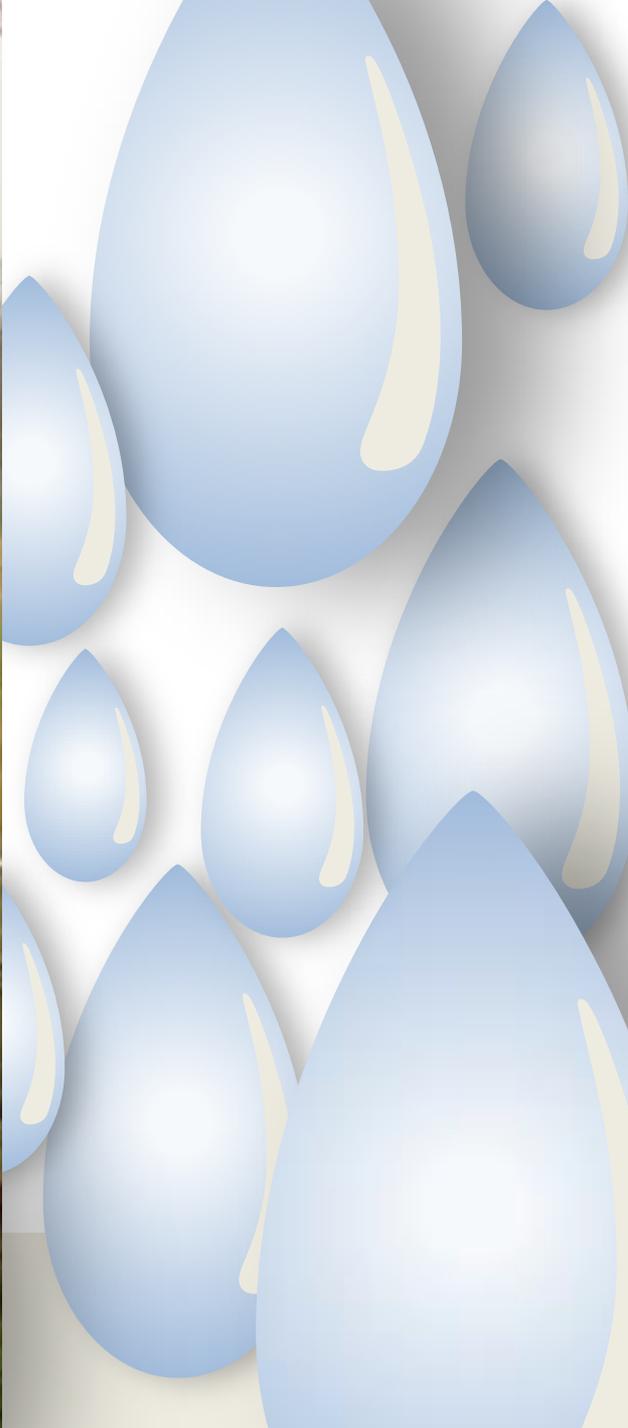
**Gutter
Down
or Ro
Valley**

begins.

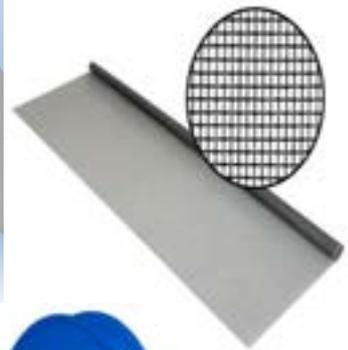
Connecting to Downspout

**Reduce length of downspout as needed.
Downspout fittings may be necessary to
divert rainwater into barrel or rain chains
are effective too!**





egins.



- Barrel
- Insect netting
- Faucet
- Drill-with 1 3/4 bit
- Saw – Jig or small hand saw
- Silicone Caulk
- 1 3/4" Bulk Fitting with 3/4" internal pipe thread
- Teflon Tape
- Optional
 - Bungee cord
 - Cinder Blocks

begins.

DRILLING HOLES

**Create 1 3/4" hole on side using
hole bit for bulk fitting and faucet.
(Twist to the left)**



Installing 3/4" Faucet

Wrap Teflon tape around pipe

the ...

*Yo
fit

ead
eal.

Turn

Faucet

Off!!



begins.

DRILLING HOLES

**Create a 5" – 6" hole on lid using
drill, Jig saw, or Drywall Saw**

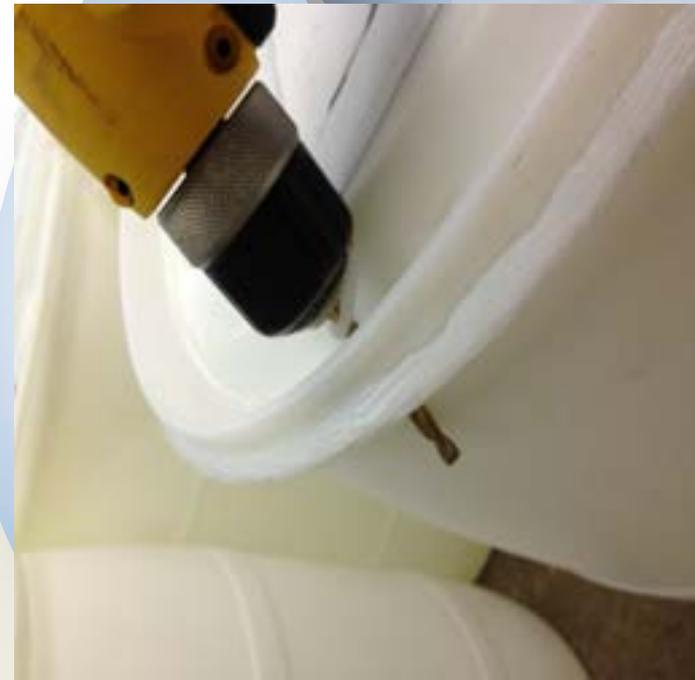


begins.

Installing Netting

Apply caulk around lid hole and place netting over hole working caulk outward spreading all over netting in contact with lid.

**You can drill holes around lid lip for drainage.*



begins.

Additional Storage

Connecting multiple barrels together using allows you to capture more rainwater.

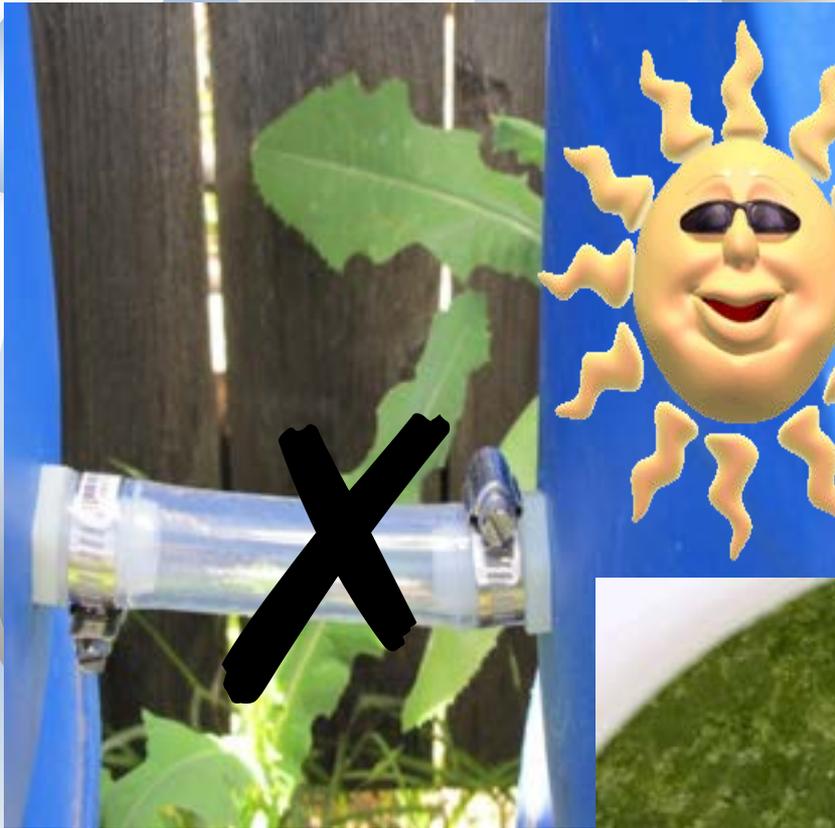


begins.

Over Flow



begins.



**Sunlight
+ Water
= Algae**



begins.

Getting The Water



begins.

Drip



Water Pressure From Rain Barrel

- **.433 psi per foot of water column**
- **Rain Barrel 3' x .433 = 1.3 psi**
When barrel is full
- **Elevated 12"-18" increases to about 2.6 psi**
When barrel is full
- **Drip tubing works best with 15 to 25 psi**
- **At 15 psi water comes out at .6 gallons/hour**
- **At 25 psi water comes out at .9 gallons/hour**
- **Drip and soaker hose will work but not at manufacturer's specification**

egins.

Increase Rain Barrel Height (12"-18")



begins.

Pressure

Elevating your barrels increases the available pressure from the faucet.



begins.



Submersible Pump

egir



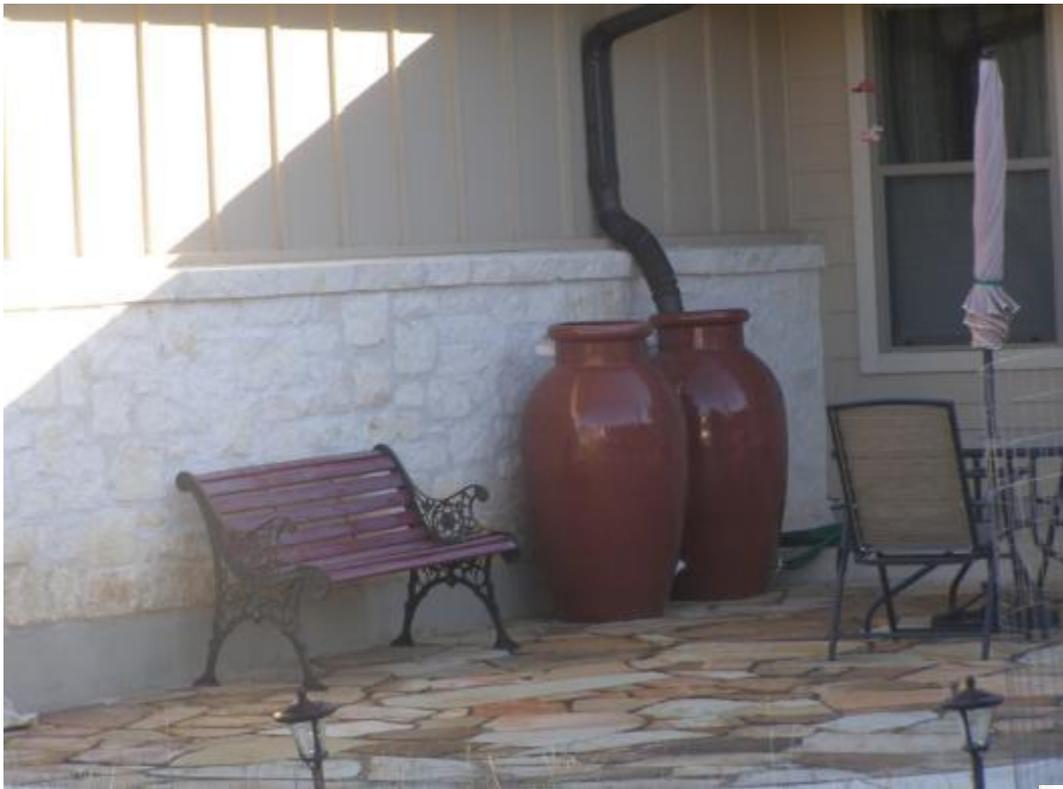


Maintenance

- **Brush off insect netting as debris falls**
- **Replace insect netting when necessary**
- **Bleach or vinegar?**
- **Larvicide?**
- **Watch weather and distribute water before a rain event**
- **Do not collect water when oak leaves and catkins are falling**
- **Keep gutters and downspout clean**
- **If the barrel is full when a freeze is expected, lower the water height by about 2 to 3 inches**







Cisterns similar to rain barrel.





Southface
Atlanta, GA









"When the well runs dry
we will know the worth
of water."

— Benjamin Franklin

Rainwater Harvesting in Texas

Billy Kniffen, Water Resource Specialist, The Texas A&M System

Rainwater harvesting was a common method of providing water for many of the first settlers in Texas; however, much has changed in the past 100 years. As urban areas grew, wells and lakes were dug and municipal water supplies were established. But with the growth of the population and the demand for fresh water, spring flow was reduced or dried up, and rivers became polluted and their flow diminished.

Population growth and urban sprawl has led to more buildings, pavements and other impervious cover. Rangeland is dominated more by woody plants and shorter grasses because of livestock grazing and the absence of fire. These factors increase stormwater runoff, decrease water absorption into the soil, and affect water quality in Texas.

Captured rainwater can save large amounts of water both outside and inside the home. As Texas' population grows, conserving water becomes more vital. Capturing rainwater is one tool in this process because of:

- The need to have enough high-quality water available now and in the future
- Environmental and economic costs of providing water through municipal systems or wells
- Health concerns linked to the source and treatment of water
- The relatively low cost of rainwater harvesting
- Rainwater's high quality

Collecting Water for Potable and Non-potable Uses

Captured rainwater can be used on landscapes and gardens, and for pets, wildlife and livestock. Rainwater can be filtered, disinfected and used in homes and businesses in place of other sources of water. The process is simple and often less expensive than drilling a well.

How Much Rainwater is Available for Collection?

Use this formula to estimate the amount of rainwater that can be harvested from a catchment surface—defined as any surface used to collect rainwater, such as a roof: About 0.6 gallons of water falls on each square foot of roof area in a 1-inch rain. That means a 1,000-square-foot roof could yield 600 gallons of water for each inch of rainfall.





Complex water harvesting system with roof catchment, gutter, downspout, storage and drip distribution system.

Water Uses

Landscape: Drip irrigation is the most practical way to use rainwater on landscapes because it can be applied by gravity alone or used in combination with mechanical equipment.

Wildlife: Water guzzlers are rainwater collection systems built in remote areas to provide water for wildlife. A roof, storage tank and watering device are the only items needed. Rainfall also can be collected off existing barns, deer blinds or other structures.

Water for livestock and pets: One horse or cow can consume 7 to 18 gallons of water per day; collecting enough rainwater from roof surfaces for large herds of livestock would be difficult. But rainwater can be used for livestock in addition to a low-water production well and large existing storage tank. Smaller herds, individual animals or pets could benefit from the collected rainwater.

Water for the home: Rainwater supplies many homes worldwide and is becoming more common for homes in Texas. The storage capacity of a rainwater harvesting system must be large enough to provide several months' supply of water.

Select rainwater harvesting components to reduce the risk of contaminants in the water. The system must include pre-filters, pump, pressure tank, filters and a sanitizing device such as an ultraviolet light to provide high quality water for drinking and cooking. Nonpotable uses for the home include commodes and clothes washers.

In Texas, rainwater harvesting has been encouraged through the elimination of the sales tax on collection system supplies. Several cities have waived permit fees, offered rebates on tanks, waived property taxes and provided rain barrels, irrigation audits, low-flow toilets and/or demonstration sites to help encourage and educate the public. Check with local officials and visit these Web sites for more information:

Texas AgriLife Extension Service Rainwater Harvesting:

<http://rainwaterharvesting.tamu.edu/>

The Texas Water Development Board:

<http://www.twdb.state.tx.us>

American Rainwater Catchment Systems Association:

<http://www.arcsa.org/>

Texas Rainwater Catchment Association:

<http://www.texrca.org/index.html>

The Texas AgriLife Extension Service bookstore at <http://agrilifebookstore.org> has these publications available:

Rainwater Harvesting, B-6153

Harvesting Rainwater for Wildlife, B-6182

Harvesting Rainwater for Livestock, E-450

Other resources:

Texas Manual on Rainwater Harvesting:

<http://www.twdb.state.tx.us/>

Harvesting, Storing, and Treating Rainwater for Domestic Indoor Use: <http://www.tceq.state.tx.us>



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Extension publications can be found on the Web at: <http://agrilifebookstore.org>

Visit the Texas AgriLife Extension Service at <http://agrilifeextension.tamu.edu>

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Some cities and counties offer rebates or reduced costs for rain barrels. Check with your local government or water utility to find out if incentives are available in your area.

Troubleshooting

Like most things around your home, your rain barrel needs a little regular attention to keep working smoothly.

To keep it in the best shape:

- Use all the water in the barrel regularly.
- Clean your gutters at least twice a year to reduce debris.
- Once a year, during a dry spell, tip the barrel over and rinse it out with a hose.

Any standing water will begin to smell after a while, especially if it contains organic matter, such as leaves. Smelly water won't hurt your plants, but it can be a nuisance. To avoid it:

- Use all the water in the barrel within a month of collecting it.
- Put a capful of chlorine bleach into the water. This small amount won't hurt plants.

A well-sealed screen will help keep mosquitoes from getting into your rain barrel. However, mosquito larvae may still wash in from your gutters. You can help prevent mosquitoes from breeding and keep them at bay by emptying the barrel regularly. You can also add mosquito dunks to the water. These dunks contain a nontoxic bacterium that kills mosquito larvae. It's safe for your plants, and it will not harm pets or people. You can find this product at most garden-supply stores.

The Next Steps

Remember that the water collected in a rain barrel as described in this publication is intended to be used for outside purposes only, such as watering your container plants, landscape, and garden.



- If you decide that you want to store even more rainwater, you can connect two or more rain barrels.
- To safeguard the quality of your drinking water, never submerge a water hose in a rain barrel.
- To collect rainwater for extensive landscape use, you can install larger systems using cisterns.

Additional Information

For information on building a complex rainwater harvesting system for landscape use, see *Rainwater Harvesting* (GI-404, reprinted courtesy of the Texas A&M AgriLife Extension Service). You can download a copy of this manual at <www.tceq.texas.gov/publications/gi/gi-404.html>. Texas A&M AgriLife's website also discusses rainwater harvesting and lists publications, training programs, and suppliers of rainwater-harvesting equipment.* Visit "[Rainwater Harvesting](http://rainwaterharvesting.tamu.edu)" at <rainwaterharvesting.tamu.edu>.

The Texas Manual on Rainwater Harvesting, from the Texas Water Development Board, offers comprehensive information on all levels of rainwater harvesting. Download a copy at <www.twdb.texas.gov/innovativewater/rainwater/docs.asp>.

- Check your faucets and fix any leaks you might have, to save up to \$35 a year on utility bills.
- Wait until you have a full load of laundry before washing, or use a lower water-level setting.
- Avoid overwatering your lawn. When needed, water 1 inch, once a week. To water only 1 inch, place a 6-ounce tuna can on your lawn and stop watering when it is full.
- Invest in water-efficient plumbing fixtures. Replacing an older toilet with a water-efficient model can save up to 4,000 gallons of water a year. Installing a faucet aerator can cut water consumption in half. For additional information on water-efficient products, visit the Environmental Protection Agency's WaterSense website, at <www.epa.gov/WaterSense>.

For more water-saving tips and other ways to do your part, visit <TakeCareofTexas.org>.

This Old House offers "How to Install Rainwater Collection," a video with step-by-step instructions on how to set up a rain barrel. This video is available at <www.thisoldhouse.com/toh/video/0,,20045365,00.html>.

Contact the Texas Comptroller's office at 800-252-5555 for questions about the exemption of rainwater harvesting equipment from state sales tax.

*The listing of suppliers is provided by Texas A&M AgriLife Extension solely to inform the reader of the different types of equipment and products that are available for harvesting rainwater. Neither Texas A&M AgriLife Extension nor the TCEQ endorses any particular vendor, manufacturer, or product.



How is our customer service? www.tceq.texas.gov/customersurvey

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254-780-6313

TakeCareOfTexas.org

Rainwater Harvesting with Rain Barrels

A "TAKE CARE OF TEXAS" GUIDE

What Is Rainwater Harvesting?

Rainwater harvesting is the collecting and storing of rainwater. You can collect rainwater from a roof, which is the most common method, and store it in catchment tanks, such as rain barrels.

A Brief History of Rainwater Harvesting

Before there were public water utilities, many American households harvested rainwater. With the development of large, reliable water treatment and distribution systems, the appeal of rainwater harvesting diminished.

However, as the environmental and economic costs of providing centralized water escalate, a new interest

in rainwater harvesting has emerged. The easiest way to begin harvesting rainwater for your home is to use a rain barrel to collect water for your container plants, landscape, and garden.

Reasons for Harvesting Rainwater

Benefits

- The water is free.
- Rainwater is better for plants than chemically treated water.

- Rainwater harvesting can help reduce flow to storm water drains and reduce stream pollution.
- Using stored rainwater can reduce utility bills.

Other Incentives

Texas Tax Code 151.355 exempts rainwater-harvesting equipment from sales tax. To download the Texas Sales and Use Tax Exemption Certificate, visit www.window.state.tx.us/taxinfo/taxforms/01-339.pdf.

HOW TO CONSTRUCT A RAIN BARREL

Materials

- 55-gallon polyethylene plastic barrel
- 3/4-inch hose spigot
- 3/4-inch PVC closed nipple
- window screen
- Teflon cement
- water hose (optional)
- bricks or concrete blocks (optional)

Tools

- drill with a 1-inch paddle bit
- utility knife or jig saw

- 1. Inflow.** Use the utility knife or jig saw to cut a hole in the top of the barrel approximately the same diameter as your gutter downspout.
- 2. Spigot.** Measure 3 to 4 inches from the bottom of the barrel and drill a 1-inch hole. Screw the spigot halfway into the barrel, apply some Teflon cement to the exposed threads, and continue to twist until tight. In addition, you can use a rubber washer, metal washer, and a lock nut to more firmly secure the spigot to the barrel from the interior.
- 3. Overflow.** Measure 3 to 4 inches from the top of the barrel and drill a 1-inch hole. Twist in the 3/4-inch PVC closed nipple about one-quarter of the way, apply Teflon cement to the exposed threads in the middle portion of the coupling, and continue to screw it in, leaving 1 inch of thread exposed.

Connect the hose to the pipe coupling overflow spigot at the top of the barrel. You can run this hose into another barrel or to a soaker hose (which will evenly distribute excess water and help avoid flooding).

- 4. Downspout.** Place the barrel directly below the downspout. You will need to reconfigure the downspout to flow into the hole. If you like, place the barrel on concrete blocks or bricks. Raising the barrel will allow you to get a bucket under the spigot, and will facilitate leveling the area where your barrel will sit.

Cover the hole on the top of the barrel with the window screen, to prevent sticks, rocks, or dirt from getting into it. Screens also keep mosquitoes out. Secure the screen with a few bricks or rocks to keep it in place.

