The Denton County Master Gardener Association is a volunteer organization under the guidance of Texas A&M AgriLife Extension Service. Our mission is to provide information that encourages safe, effective and sustainable horticultural practices.
How to get copies of presentations

dcmga.com
How to sign up for DCMGA monthly newsletter
RAINWATER HARVESTING

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MG Rainwater Harvesting Specialist
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The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M AgriLife Extension Service is implied.

Non-attributed photos were taken by the author.
Rainwater Harvesting

• Why Harvest Rainwater?
• Ways to Harvest Rainwater
• Rain Barrel Installations
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/
U.S. Drought Monitor

March 19, 2013
Valid 7 a.m. EDT

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:
- ~ Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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

http://droughtmonitor.unl.edu/

Released Thursday, March 21, 2013
Author: Anthony Artusa, NOAA/NWS/NCEP/CPC
U.S. Drought Monitor
Texas

September 17, 2019
(Released Thursday, Sep. 19, 2019)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

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<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
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<td>Current</td>
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<td>72.26</td>
<td>51.75</td>
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<td>17.43</td>
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<td>Start of Year</td>
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<td>7.01</td>
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<tr>
<td>Start of Year</td>
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<td>20.19</td>
<td>7.03</td>
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<td>One Year Ago</td>
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<td>25.85</td>
<td>9.26</td>
<td>2.43</td>
<td>0.10</td>
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Intensity:
None | D2 Severe Drought
D0 Abnormally Dry | D3 Extreme Drought
D1 Moderate Drought | D4 Exceptional Drought

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

Author:
Eric Luebchusen
U.S. Department of Agriculture

droughtmonitor.unl.edu
Map of outdoor residential use as a percent of total use for 2004 through 2008
Rainwater Harvesting Benefits

• Reduces drinking water use for landscaping
• Provides an alternate source of irrigation water, fewer minerals, more neutral pH
• Helps protect watershed by reducing stormwater runoff
  – Reduces erosion
  – Reduces pollution from fertilizers, pesticides, and animal waste
Who owns water in Texas?

- Water found in watercourse
  - is the property of the state held in trust for the people
  - Storm water and flood water
- Water that does not flow in any defined water course
  - Property of the landowner until the water enters a watercourse.
  - Rain runoff or snow melt
HB 645- 2003 Texas Legislature

- Prevents homeowner associations from implementing new covenants banning outdoor water-conserving measures
  - Composting
  - Water efficient landscapes
  - Drip irrigation
  - Rainwater harvesting installations
- HOA’s can require screening or shielding to obscure view of tanks
Texas Sales Tax Exemption

• Rainwater Harvesting equipment is exempt from state sales tax under Tax Code section 151.355.

• See https://www.twdb.texas.gov/conservation/municipal/commercial-institutional/doc/SalesTaxExemptions.pdf for additional information and the required form that must be presented to the seller.
Ways to Harvest Rainwater

- Simple vs. Complex systems
- Raingardens
- Rain Barrels and Cisterns
- How Much Can I Collect?
- How Can I Use the Water?
- How Much Do I Need?
Simple vs. Complex Systems

Simple:
• Catchment surface
• Collected water is used immediately

Complex:
• Catchment surface
• Storage
• Distribution

Diagrams from “Rainwater Harvesting” Texas A&M AgriLife Extension, publication B-6153.
Simple system: Raingardens
Complex Systems: Barrels and Cisterns
Rain Barrels can be purchased or you can make your own

- From a trash can:
  - [http://dcmga.com/files/2012/05/Building-a-Rainbarrel.pdf](http://dcmga.com/files/2012/05/Building-a-Rainbarrel.pdf)

- From a food-grade barrel:
  - [https://wateruniversity.tamu.edu/rainwater-harvesting/rain-barrels/making-a-rain-barrel/](https://wateruniversity.tamu.edu/rainwater-harvesting/rain-barrels/making-a-rain-barrel/)
For large cistern installations

- ARCSA (American Rain Catchment System Association) [https://www.arcsa.org/](https://www.arcsa.org/)

How Much Rain Can I Harvest?

One inch of rain provides about 0.6 gallons of water per square foot of roof. To estimate:

roof length × roof width × fraction of the roof that drains to that downspout × 0.6

= gallons collected/inch of rain for one downspout
Footprint of the building

Diagrams from http://rainwaterharvesting.tamu.edu/catchment-area/
How Much Can I Harvest?

Rule of Thumb: roof length \times roof width \times fraction draining to the downspout \times 0.6 = gallons per inch of rain for that downspout

Example:
Dimensions of roof footprint: 40’ x 50’ = 2000 sq.ft.
Number of downspouts: 4

1 inch of rain would provide:
\[(40 \times 50) \times \frac{1}{4} \times 0.6 = 300 \text{ gallons/downspout/inch of rain}\]
<table>
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<th>Month</th>
<th>Avg. Precipitation</th>
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<td>August</td>
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<td>September</td>
<td>2.55</td>
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<td>October</td>
<td>4.22</td>
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<td>November</td>
<td>2.71</td>
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<td>December</td>
<td>2.55</td>
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<tr>
<td>Total Annual</td>
<td>36.14</td>
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</table>
DFW Normal Rainfall
National Weather Service (1981-2010)
How Can I Use the Water I Collect?

- Container plants
- Drip irrigation
- Water garden or pond
- Wildlife and livestock water

- Water used indoors must be treated. See https://rainwaterharvesting.tamu.edu/in-home-use/
Drip Irrigation from a Rain Barrel

• Drip pipe or emitters or soaker hoses

• A pump may be necessary, depending on
  – Length
  – Number of emitters

• Higher barrel relative to the garden helps pressure

• A filter is recommended to prevent ‘sludge’ from clogging the drip system.
How Much Do I Need?

• Start small with an inexpensive rain barrel that provides water for your container plants, wildlife or a small garden.

• For a larger landscaped area, calculate needs from:
  – the monthly average evapotranspiration (ET) for your city,
  – the plant water use coefficient (which depends on the types of plants in the landscape), and
  – the square footage of the landscaped area.

• Sample calculations and worksheets can be found in the Texas AgriLife Extension Rainwater Harvesting publication, found on the Texas AgriLife Extension Rainwater Harvesting page: https://rainwaterharvesting.tamu.edu
Landscaping Practices to Minimize Water Usage

• Select plants that need less water and place plants with similar water needs together.
• Use practical turf areas.
• Water deeply and infrequently. Minimize runoff.
• Maintain irrigation equipment.
• Mulch.
INSTALLING RAIN BARRELS

- Choosing and preparing the site
  - Roof Washers or First Flush Diverters
  - Downspout connections
  - No downspout
  - Overflow
- Connecting rain barrels in series
- Maintenance
Choosing and preparing the site

• Locate the barrel close to where you’ll use the water.

• Consider HOA restrictions and visibility.

• Consider overflow.

• Level the surface.
  – Water weighs 8 pounds/gallon, so barrel can’t be moved when full
  – An unstable barrel may tip—especially dangerous to children

• Consider elevating the barrel.
  – Allows bucket or watering can under spigot
  – Higher barrel provides more pressure for drip systems.
  – Base must be sturdy!
Screens or Filters

A screen is needed to prevent leaves, large debris and insects from entering the rain barrel.
Downspout Connections

No matter what type of downspout connection you choose, you must decide on the height of the rain barrel first.

• Flexible downspout extender
  – Easy to install
  – Save the removed section of downspout. It can easily be replaced later.
Downspout Connections

• Downspout routed directly into the barrel
  – Be sure to allow room to clean screen when determining length of downspout.
Downspout Connections
Downspout connections
Hidden in Plain Sight
Downspout Connections

Other Diverter Options

Image from gardeners.com

Image from aquabarrel.com

Image from instructables.com
Roof Washers or First Flush Diverters

• Captures and diverts first water from a rain before it enters the rain barrel, to remove dust and other contamination.

• DIY construction from PVC pipe or ready-made available online.

• Must drain in between rain events.
If you don’t have a downspout

• Rain chains
• Cut a larger hole in the top, cover it with screen and place the barrel directly under a valley.
Dry Line vs. Wet Line

Dry line

Wet Line
Wet Installation
Overflow

- Some diverters handle overflow by routing the water back into the downspout when the barrel is full.
- Other types of installations require an overflow hole or pipe to route the excess water away.
Connecting rain barrels in a series

• Barrels can be connected via the overflow at the top. Barrels fill in succession.
• Barrels can also be connected at the bottom. Barrels fill at the same time.
• Easy connection: Use Y-connector at hose bibb and length of hose with 2 female hose menders.
Connection at the top via overflow
Connection at the bottom
Inverted barrels with PVC connection
Bottom Connection using hose bibb
Maintenance

• You can paint your barrel using paint made for plastic.

• Keep the screens free of debris.

• Algae
  – Will not affect the water quality for landscape use.
  – Dark, thick-walled barrels = less light entry + less algae.

• Mosquitoes
  – Screen all openings to keep them out. Lids should be tight fitting.
  – May use “Mosquito Dunks”

• Scrub out barrel as needed when empty.
Tips:

• When choosing hose bibs, ‘manifold’ or Y connectors, choose ‘full flow’ designs.
• Remove the plastic disc with a small hole inside soaker hoses.

• Use the water!
Rainwater Harvesting Resources

- Texas A&M AgriLife Extension Rainwater Harvesting: http://rainwaterharvesting.tamu.edu/
- Texas A&M AgriLife Extension Raingardens page: http://rainwaterharvesting.tamu.edu/raingardens/
- Texas A&M AgriLife Extension Rainwater Harvesting Supply Calculator and Hazen-Williams Pressure Loss Calculator: http://rainwaterharvesting.tamu.edu/calculators/
Resources (continued)

• TWDB Technical Note 12-01 “The Grass Is Always Greener... Outdoor Residential Water Use in Texas” by Sam Marie Hermitte, M.A. and Robert E. Mace, Ph.D., P.G. , November 2012
  

• Texas Water Development Board (TWDB) FAQ page:
  

• Texas A&M AgriLife Extension Waterwise principles page:
  
  http://urbanlandscapeguide.tamu.edu/waterwise.html

• Texas A&M AgriLife Extension Earth-Kind Water Conservation publications:
  
  http://aggie-horticulture.tamu.edu/earthkind/drought

• Texas Smartscape:
  
  http://www.txsmartscape.com

• HB 645-2003
  
  http://www.legis.state.tx.us/tlodocs/78R/billtext/html/HB00645F.htm
Resources (continued)

• HB 3391:  


• American Rain Catchment Systems Association:  
  http://www.arcsa.org/

• Texas Rain Catchment Association:  
  http://www.texrca.org/