

**Background**

A web quest is an internet-based learning activity. This web quest targets individuals interested in learning about rainwater harvesting in Texas. By exploring the Texas Water Development Board’s online resources, including the Innovative Water Technologies frequently asked questions webpage and *The Texas Manual on Rainwater Harvesting*, you will gain an understanding of the history, benefits, and components of a rainwater harvesting system and learn how to start building your own system.

**Instructions**

For help with the answers you can follow the link to the frequently asked questions page about rainwater harvesting:

<http://www.twdb.texas.gov/innovativewater/rainwater/faq.asp>

**When and where did rainwater harvesting originate?**

Rainwater harvesting is an ancient technique enjoying a revival in popularity due to the natural quality of rainwater and interest in reducing consumption of treated water. Rainwater harvesting can also provide water to places without a traditional water supply like a city pipeline or groundwater well.

Archeological evidence suggests that people have captured rainwater for thousands of years. You can visit the ruins of these ancient rainwater harvesting systems in southeast Asia, the Middle East, Europe, and many other locations across the globe. In fact, natural rainwater catchments known as “tinajas” can be found along with 10,000 year old spear points near El Paso in far west Texas. Which nomadic tribes used these ancient rainwater catchment systems?

(Hint: See the online FAQ’s.)

### **What are the benefits?**

Rainwater is free: the costs associated with rainwater harvesting vary depending on things like the size of your system. The single largest cost in a rainwater harvesting system is the . . . . In addition, the end use is located close to the source. This means the water does not have to travel very far before it is used, so the need for costly systems (like buried pipelines) is virtually eliminated.

Rainwater is great for outdoor uses like watering gardens and landscapes. Think about why this is true: what would a flower drink if you were not there to water it? **Rain!** Rainwater harvesting helps utilities . . . . peak demands during summer months. By harvesting rainwater, homeowners can reduce their . . . .

Rainwater has the potential to be an alternative source of water supply in Texas. Think about where your drinking water comes from. (If you are not sure, visit <http://www.WaterIQ.org>.) If you lived on a small island in the sea or in a remote area with no access to other sources of water, you might use rainwater for all your needs. For those that do not live in remote areas, rainwater harvesting provides an opportunity to conserve and extend our existing water resources. In fact, some parts of the country actually require newly built homes to have a rainwater harvesting system.

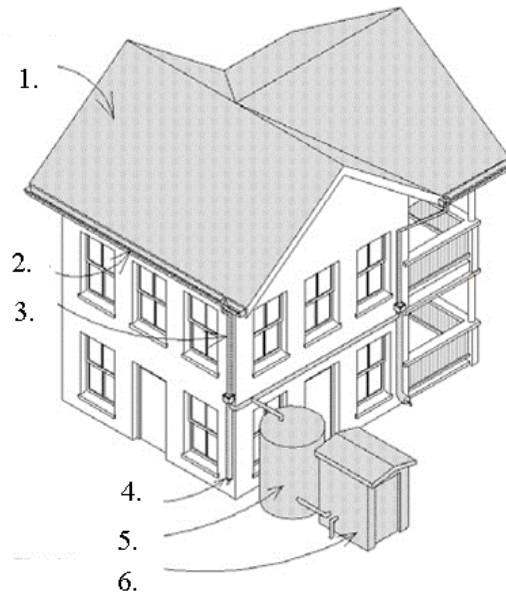
(Hint: See the online FAQ's. For more information, read *Rainwater Harvesting Potential and Guidelines for Texas*.

<http://www.twdb.texas.gov/innovativewater/rainwater/docs.asp> )

### **What do you need?**

Label the six basic components of a rainwater harvesting system.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.



(Hint: See page 5 of *The Texas Manual on Rainwater Harvesting*.

<http://www.twdb.texas.gov/innovativewater/rainwater/docs.asp> )

### **What does a typical system cost?**

Using existing gutters and downspouts, you can construct a very simple rainwater harvesting system by adding a rain barrel for \$100 or less. Some city water departments provide barrels at discounted rates. A more complex system for a typical home can cost between \$8,000 and \$10,000. The \_\_\_\_\_ can add the greatest cost, depending on size and construction material, and any other necessary components such as gutters, downspouts, or pumps could also add to cost. If the intended use of the system is to collect water for drinking, costs for \_\_\_\_\_ must be included in the budget as well.

Tax breaks and rebates are available in some areas of the state to help offset the costs associated with installing a rainwater harvesting system. Check with your local authorities, such as your county \_\_\_\_\_ district, for potential county property tax exemptions. In addition, Texas Tax Code §151.355 exempts rainwater harvesting equipment and supplies from \_\_\_\_\_. (Hint: See the online FAQ's.)

### **How much could you collect?**

The amount of rainwater you can collect depends on a few factors. First, what is the area of your collection surface (or how big is your roof)? Second, how much rain can you expect to receive in your area? Rainfall totals vary across the state of Texas. The attached map shows the annual average rainfall totals in inches. Red areas show the least amount of average rainfall (between 8 and 12 inches per year) representing the dry conditions of far west Texas near El Paso. Dark blue areas show the very wet conditions of southeast Texas near Beaumont (between 56 and 60 inches per year on average).

Ideally, your rainwater harvesting system would be 100% efficient, meaning that every drop of water that falls on your roof is collected. In reality, most systems lose some water to things like overshoot from gutters, evaporation, or splash-out.

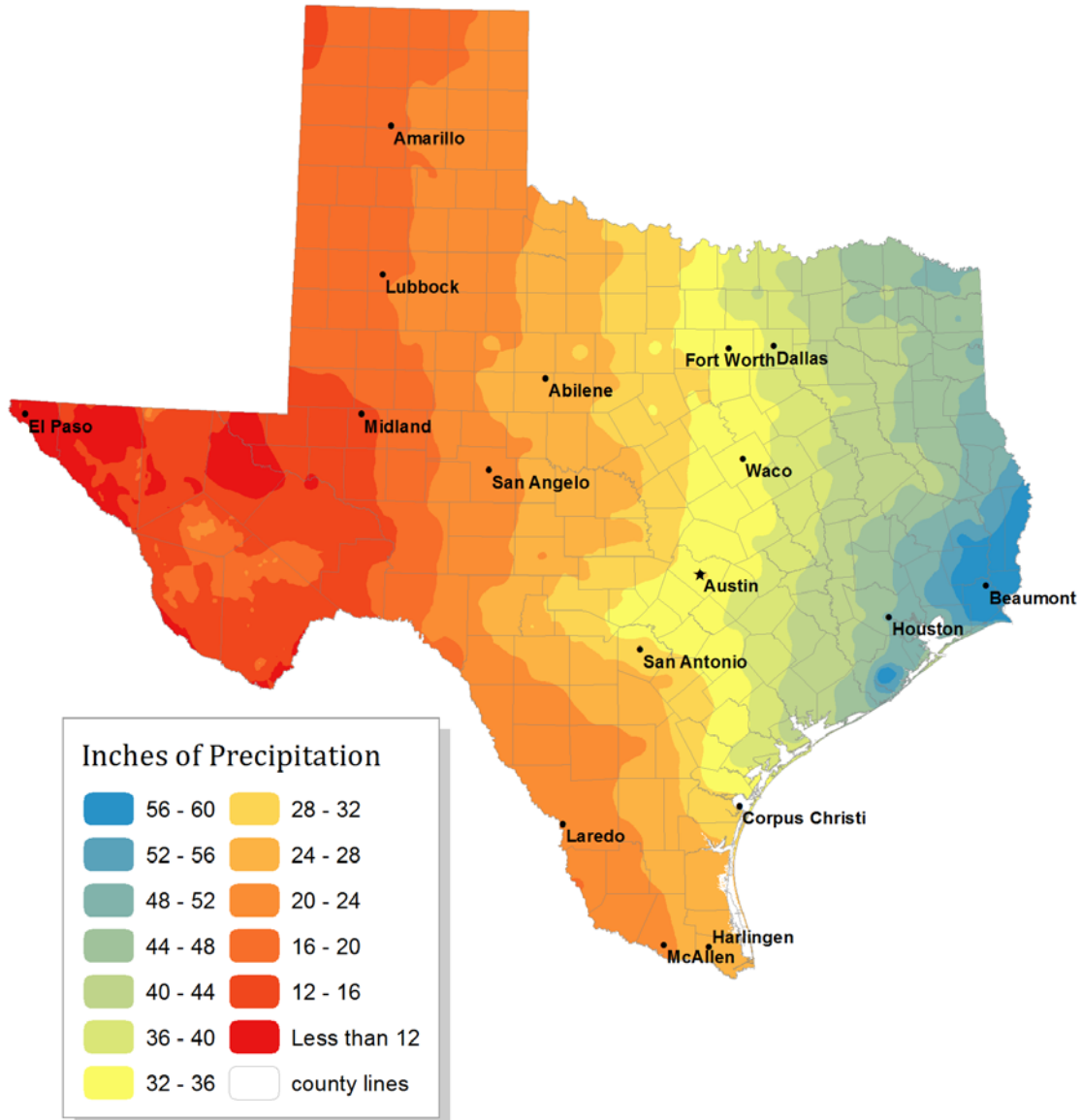
With an assumed 85% system efficiency, the collectible volume of runoff is about 0.62 gallons per square foot of roof (collection rate) for every inch of rainfall. If the roof of your school's gym has a surface area of 40,000 square feet and is located in Austin where annual rainfall last year was about 32 inches, approximately how many gallons of water could be collected in a rainwater harvesting system?

(Hint: Multiply efficiency, collection rate, square footage, and rainfall. Be mindful of units! See FAQ's for an example calculation.)

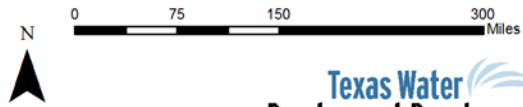
\_\_\_\_\_ gallons, or enough to fill 5,396,480 sixteen ounce water bottles!!!

By obtaining your average annual rainfall from the following map and using this same formula, you can estimate how much rainwater you could harvest from the actual square footage of your roof.

# Average Annual Precipitation



Source: Natural Resources Conservation Service (NRCS) Water and Climate Center, NRCS National Cartography and Geospatial Center (NCGC), PRISM Model, and the Oregon Climate Service at Oregon State University.



**Texas Water**  
Development Board

## **Who is leading by example?**

Since 2007, the Texas Water Development Board (TWDB) has presented the Texas Rain Catcher Award to those who have demonstrated the potential of rainwater harvesting as an alternative source of water supply. The award has recognized catchment systems installed at schools, community centers, homes, office buildings, and even a fire department. The Texas Rain Catcher Award website highlights each of the award winning systems and includes photos. Follow this link to find out more about the award, previous winners, and how to apply or nominate someone you know.



<http://www.twdb.texas.gov/innovativewater/rainwater/raincatcher/>

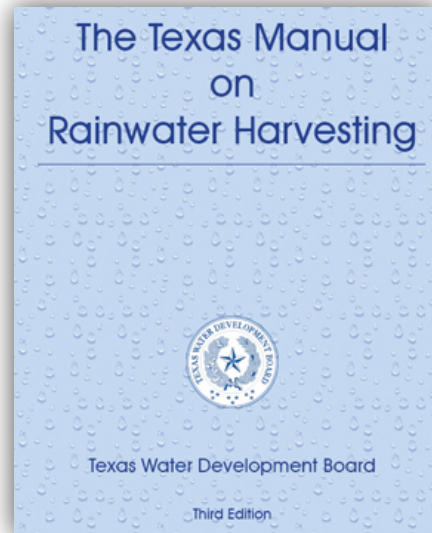
## **Where can I get more information?**

The TWDB has an online manual that presents the basics of residential or small-scale commercial rainwater harvesting system design. Use the manual as the first step in considering your options for building your own rainwater harvesting system.

The TWDB developed online training resources in response to state legislation in 2011. The training is designed for permitting staff but may be of use to anyone interested in installing a rainwater harvesting system.

For more information, visit our rainwater harvesting page and click on “Training”.

<http://www.twdb.texas.gov/innovativewater/rainwater/>



**What other resources are available?**

Find even more information by clicking on “Useful Links” on TWDB’s Rainwater Harvesting webpage. <http://www.twdb.texas.gov/innovativewater/rainwater/>

TWDB also has information on all things WATER in TEXAS.  
Check out some of our other pages.

How full is the lake by your house? <http://www.waterdatafortexas.org/>

What is the source of the water coming out of your faucet? <http://www.wateriq.org/>

Where can I get cool maps or geospatial data for Texas? <http://www.tnris.org/>

You can also visit the main TWDB webpage for even more information on water in Texas, like groundwater, surface water, drought, floods, conservation, water planning, and more!

<http://www.twdb.texas.gov/>



The Texas Water Development Board's mission is to provide leadership, information, education, and support for planning, financial assistance, and outreach for the conservation and responsible development of water for Texas.