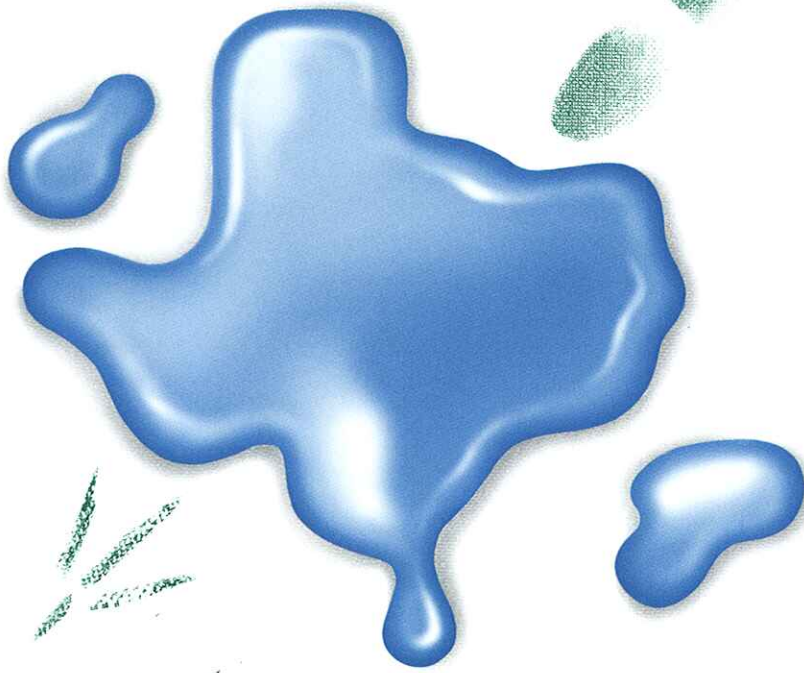


Facts About

# TEXAS WATER

and Simple Steps to Appreciate, Conserve and Protect  
Our Most Valuable Resource



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## ACKNOWLEDGEMENTS

Facts About Texas Water, produced by the Lone Star Chapter of the Sierra Club, is a publication of the Texas Living Waters Project. This project is a collaborative effort of the National Wildlife Federation, Environmental Defense, and the Lone Star Chapter. The goals of the project are to (1) ensure adequate water for people and environmental needs, (2) reduce future demand for water and foster efficient and sustainable use of current water supplies, (3) educate the public and decision makers about the impact of wasteful water use and the opportunities for water conservation, and (4) involve citizens in the decision making process for water management. More information about the project and about water issues is available at [www.texaswatermatters.org](http://www.texaswatermatters.org) and [www.texas.sierraclub.org](http://www.texas.sierraclub.org) or by writing Lone Star Chapter, Sierra Club, P. O. Box 1931, Austin, TX 78767.

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– January 2003

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— Facts About —

# TEXAS WATER

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# Introduction

Water is an essential part of our everyday life. Yet for most of us, especially those living in towns and cities in our increasingly urbanized state, we probably do not think about water very often. We have come to expect that water will be there when we turn on our faucet. Only if we turn on our tap and nothing comes out, or if the water out of our tap tastes bad or smells strange, or if we find our home flooded by a nearby creek during a heavy rain, do we give much thought to water.

Our relative lack of concern about water is rapidly becoming a luxury that we in Texas cannot afford. As the population of our state expands dramatically, as many of our underground water sources are being depleted, as our fish and wildlife populations dependent upon water struggle to survive in some parts of our state, and as water is being wasted (along with the tax and consumer dollars to pay for that water), we need to educate ourselves about water and take action to assure a dependable and safe water supply for the future for both people and the environment.

Facts About Texas Water was prepared to aid Texans in this endeavor. This publication was created out of inspiration, a desire to educate, and a commitment to fulfill a conservation mission. When the staff of the Lone Star Chapter of the Sierra Club began researching the multitude of water education materials available – whether through a government agency, non-profit organization, or private business – we discovered that no single publication on water addressed the general Texas public.

This publication aims to fill that void. Facts About Texas Water is intended to give all Texans – young and old, urban and rural – basic information about water that will help them understand this important resource and how to use and protect it. Other publications from the Lone Star Chapter of the Sierra Club will provide additional information about businesses and government entities that make decisions that affect your water supplies and about how you as a citizen or resident of this state may act effectively to shape those decisions.

We hope that you find this publication useful and inspiring. The water future of Texas is in your hands, and your action to determine that future has never been more important than it is now.

## General Questions

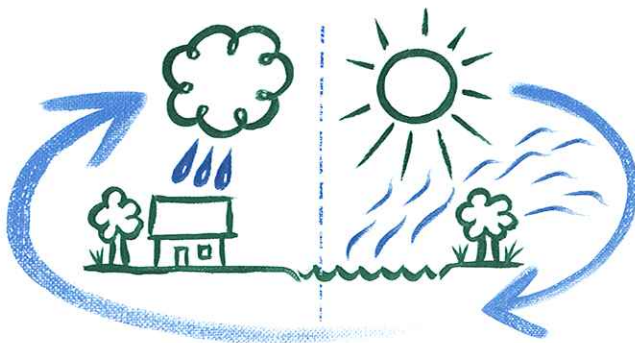
### 1. If I have a problem or question about my water, whom do I contact?

It is confusing deciding whether you contact your local water supplier, a plumber, or state agency staff member. In general, you'll want to contact your water supplier first if you are having problems. If they are not responsive, then call the Texas Commission on Environmental Quality (TCEQ), formerly known as the Texas Natural Resource Conservation Commission (TNRCC). You can call them about problems with pressure, chlorine, taste, odor, quantity, or quality, or if you are having problems getting service. You'll want to contact a plumber if you are having mechanical problems, i.e. leaky faucet, broken pipes or fixtures, or clogged pipes.

Besides the TCEQ, there are other state agencies that have water responsibilities. To understand which government agency handles what, consider ordering a free Sierra Club publication called, "A Guide to Texas Water Decision-Makers." To order, call the Sierra Club Chapter Office at 512-477-1729, or contact us by e-mail at [lonestar.chapter@sierraclub.org](mailto:lonestar.chapter@sierraclub.org).

### 2. What is the water cycle? What is the hydrologic cycle, and are they the same thing?

Yes. One is just a fancier name. Basically, the water cycle is an illustration of the natural cycle of water movement from the atmosphere to the earth and back to the atmosphere. Some think of it as nature's way of recycling water. It begins with water evaporating from water and land surfaces, then condensing into clouds and rainfall, and finally flowing into rivers, streams or aquifers. Water that is not absorbed runs off into streams and rivers. When it reaches the ocean the cycle begins again. The water cycle also acts as a filter, purifying and removing salts from the water. This natural process produces 3% of all fresh water on Earth.



*Water Cycle or Hydrologic Cycle*

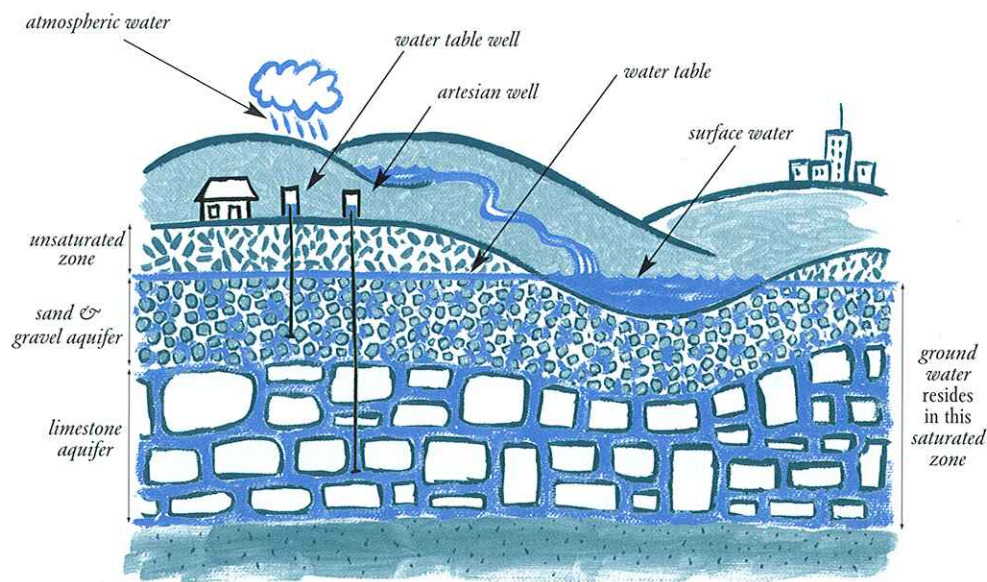


### 3. Is the water table the same thing as an aquifer? Or are they different?

Think of the water table as the area below the ground that is no longer solid soil, but is at a depth in which it is saturated with water in all pore spaces; handily this is referred to as the saturation zone. Think of an aquifer as a porous rock formation made of limestone or sand and gravel that exists below the top of the water table. Water moves freely through these porous rock formations, which vary in shapes and sizes.

### 4. I'm hearing the term water rights more and more. Is there an easy explanation of what this is?

In short, water rights refer to a legally protected right to take possession of water, to divert the water, and put it to use. In Texas surface water is owned by the state but allocated to different water users through the issuance of water rights. Many different entities may hold surface water rights, including irrigators, cities, industries, and individuals. Groundwater rights are another matter. Texas courts have established the so-called "right of capture" that allows landowners to pump as much water as they like from aquifers beneath their land. The Texas Legislature has modified the right of capture in certain areas of the state by creating government entities for the management of groundwater in those areas.



Water Table

## Where We Get Our Water

### 1. Where does that water that I use in and around my home come from?

In general, your water will come from either surface sources, like lakes, streams, and rivers, or ground water (i.e. aquifers). Think of aquifers as underground porous rocks which water can flow through freely. Then again, your water might come from a combination of ground and surface water sources. For instance, if you live in the Austin area, 95% of your water comes from surface sources, like the Lake Austin section of the Colorado River. However, if you live in the San Antonio area, almost 100 percent of your water comes from underground, specifically from the Edwards Aquifer. If you live in the Amarillo area, half your water comes from Lake Meredith and the other half comes from the Ogallala Aquifer. To find your local source of water, contact either your water supplier or your Texas Commission on Environmental Quality (TCEQ) regional office. A listing of these offices can be found at <http://www.tceq.state.tx.us/admin/directory/region/reglist.html>. It's important to note, however, that it's rainwater that replenishes our surface and ground water sources. The effects of drought conditions, and water use, can greatly affect water availability.

#### Percentage of Total Municipal Use Supplied by GROUNDWATER in Major Urban Counties

URBAN COUNTY	1997
Bexar (San Antonio, Kirby)	100%
Cameron (Brownsville, Harlingen, San Benito, Port Isabel)	3%
Dallas (Dallas, Irving)	1%
Ector (Odessa, Penwell)	36%
El Paso (El Paso, San Elizario, Anthony, Socorro)	63%
Galveston (Galveston, Texas City)	14%
Harris (Houston, Pasadena, Waller)	64%
Jefferson (Beaumont, Port Arthur)	24%
Lubbock (Lubbock, Shallowater)	39%
Midland (Midland, Greenwood, Spaberry)	18%
Potter (Amarillo, Ady)	49%
Tarrant (Ft. Worth, Arlington)	6%
Travis (Austin, Manor, Lakeway)	8%

Source: "Texas Water Development Board, Summary Historical Water Use 1995" (1997)



## **2. How many different sources of water are there?**

You can collect water from surface water (i.e. rivers, lakes, streams), groundwater (wells tapping into aquifers) or a mix of surface and groundwater, rainwater, or springs. The methods of treatment needed for making water safe for drinking varies according to the region and method of collection.

## **3. What does it matter whether my water comes from surface sources, an aquifer or a combination?**

All three of these sources have to meet federal drinking water standards if the water is provided through a public or private water system. Regulations are very strict for surface water, and testing occurs four times a year. However, groundwater is not tested with the same intensity as surface water because it generally does not get exposed to as many contaminants and pollutants as surface water. If you have groundwater under the influence of surface water or a mix of surface and groundwater, that water must be treated like surface water. Surface water goes through several treatment steps, many more than groundwater. If you get all of your water from an aquifer the TCEQ recommends just chlorinating it and doing a bacteriological test once a month. Fractured aquifers like the Edwards and Trinity have to meet federal standards.

Also, using a particular source of water may have environmental and economic impacts. For example, if your water comes from an aquifer, and pumping exceeds what is being replenished by rainfall through the soil to the aquifer, this may result in a lowering of underground water levels. This, in turn, could lead to such things as increased energy costs for pumping water, possibly intrusion of salt water into freshwater aquifers, and perhaps a reduction in or even elimination of flows from springs that serve as points of discharge water from the aquifer. Those springs may provide habitat for fish and wildlife and consequently feed the stream with water.

If your source of water is a surface reservoir, that reservoir affects downstream water flows important for fish and wildlife and, depending upon location, it may reduce freshwater inflows to bays and estuaries – affecting the production of shrimp, fish, and oysters.

For related information on water and wildlife, see section three, questions 12 and 13.

## **4. Is the water that fills my toilet bowl the same as the water coming through my kitchen tap?**

You may be surprised to know that the water that fills your toilet bowl is the same water that comes out of your kitchen and bathroom tap. All water that comes to your home travels through the same pipes and is required to be "potable," meaning that you and your pets can drink it safely. Once the water leaves the tap, however, whether outside or inside your home, be cognizant of how clean that faucet, sink, bathtub, and toilet are that the water is flowing through.

Because we don't have dual water lines (one for potable water, one for non-potable water), it is important to make sure that your toilet is approved and legally installed to prevent contamination. It is also important that you check your lawn sprinkler system to ensure no water is pulled back into the pipes. Avoid using attachments on hoses to spray fertilizers, since these can be pulled back into the pipes and affect your water quality.

## 5. Do people in the country get their water the same way as people living in the city?

In general, city residents get their water from a public water system, meaning water is piped to residences through a common system. Public water systems are defined as those serving 25 people or more OR having at least 15 customer connections. Folks living in the country are most likely on a private water system, i.e. individual wells. Public water systems are regulated for safety by federal laws such as the Safe Drinking Water Act and state drinking water rules which are enforced in Texas by the Texas Commission on Environmental Quality. For instance, a public water system must maintain a certain level of chlorine. TCEQ doesn't regulate private water systems such as wells.

Some urban, suburban, and rural Texans are also getting a portion of their water through rainwater collection.

(See Rainwater Harvesting section on p. 21.)

## 6. How do I know if I'm part of a Public Water System or a Private Water System?

Are you paying a water bill? If so, then you are part of a public water system. There are 6700 public water systems in Texas. A public water system is defined as water piped into residences with 15 connections or serving 25 or more people.

## 7. I live in a mobile park, and I don't pay a separate bill for water that comes with the house. Am I on a public water system?

Best to ask your landlord. If water is going to at least 15 different houses or providing for 25 or more people, you are on a public water system, and, therefore, safeguarded by federal water quality laws and state regulations. If you suspect a problem with your water quality, talk to your landlord first, and then contact your local regional office of the TCEQ. A listing of these offices can be found at:

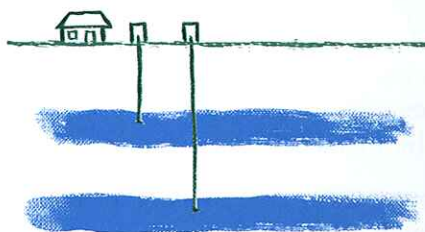
<http://www.tceq.state.tx.us/admin/directory/region/reglist.html>.

### Could I be getting my water from more than one aquifer?

Yes. Within the same area, many aquifers may be sitting on top of each other, simply at different depths. The Long family in Wimberley, Texas explains their experience:

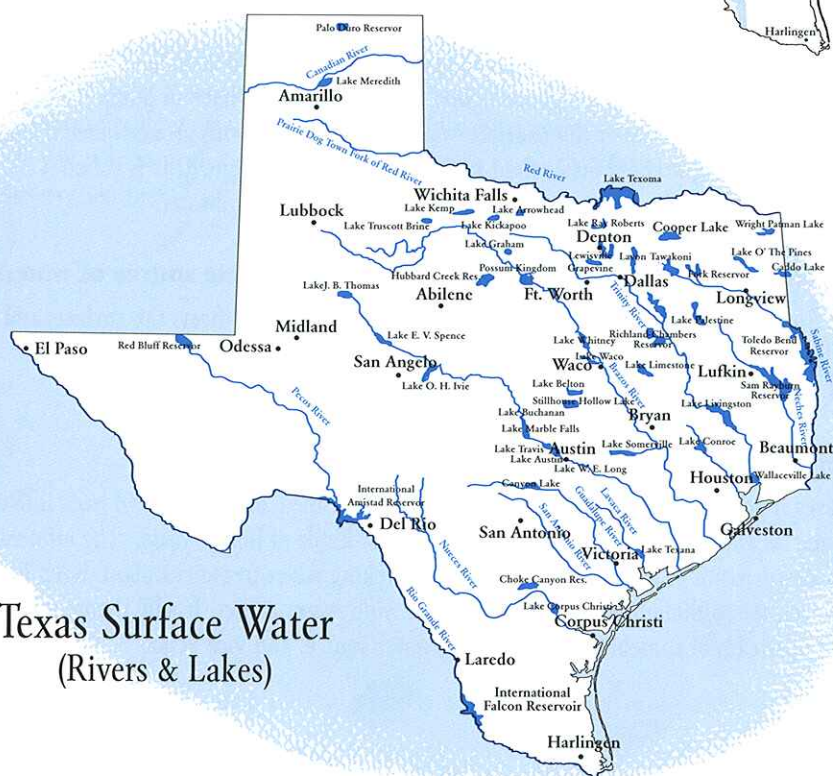
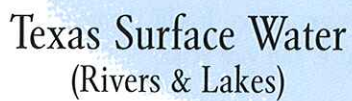
"Our water comes from the Glen Rose Aquifer, since the drill hole site is 600 ft. deep. Newer homes in the area, however, have holes 800 ft. deep, and, therefore, are getting their water from the Trinity Aquifer. I know we're buying time with this well. There are too many people sucking it (the water) out. The water table is dropping and the pumping time is less." – Wes Long, Wimberley.

(See question 9 for more information.)





Source: *Water for Texas – 2002*,  
Texas Water Development Board





**8. I live in something called a MUD. Do I get my water the same way as everyone else?**

A Municipal Utility District (MUD) most likely purchases its water from the closest large supplier. A MUD is a special governmental entity of the State of Texas that is regulated by the TCEQ. All MUDs provide water and wastewater services, maintain drainage facilities within their boundaries, and are governed by an elected board of directors. There are close to 600 MUDs in Texas.

**9. I keep seeing the term groundwater. Is this simply all water that is underground?**

You'd think so, but all water found underground isn't necessarily defined as groundwater. Here's what you need to know. Beneath the surface the earth has layers, like a cake. In those layers there are two water areas, or strata, known as the unsaturated and saturated zones. The unsaturated zone is higher up and its pore spaces, pockets

between soil or rock, are filled with water and air. In the saturated zone, all of the pockets are filled with water, and this water is defined as groundwater.

Groundwater is the major source of drinking water in most rural areas and San Antonio. You have to drill a well to get to it, and in most cases you have to pump it out. Groundwater is generally cleaner than surface water. The problem with groundwater is that some aquifers are being drained faster than rainfall can replenish them. This is called depletion, and it is a major concern in many areas that rely on groundwater.

**WELL WATER FOCUS**

**How exactly is water pumped out of a well?**

For those of us not on a well system, it may be a mystery. You start with a holding tank (for instance, 1500 gallons for a family of four). The water is pumped out of the ground, either electrically or mechanically with a windmill or hand pump, and fills certain check valves until it reaches the pressure tank. Then water is released through water pressure on the rubber bladder and maintained at an average of 40-60 psi.

**10. So what about springs? Are they considered a separate source of water?**

Not really. Springs are simply where a groundwater source naturally meets the surface, and the water bubbles up out of the ground because it cannot move downward any farther because of an obstruction.

**11. Where does all the water go when I'm done with it?**

In most cases it goes to a wastewater treatment plant, is cleaned, and is released back into a body of water as effluent. Effluent is a term for different kinds of liquid waste. The effluent is released downstream of the intake at your local drinking water treatment plant. Keep in mind, however, that although it is downstream from your water source, it will almost always be released upstream of someone else's drinking water source, and vice versa.

**12. Are there different pipes for the water that is going into my home and water that is leaving?**

Water coming into the house goes through one set of pipes, and water leaving the house passes through a different set of pipes known as your sewer line. Regulations stipulate that when the lines initially are being laid down, the potable water line has to be above the wastewater line and in separate trenches. All potable water distribution systems must be designed, installed and constructed in accordance with American Water Works Association standards. 30TAC 290.44

**13. Where does the water for industrial use come from?**

Industrial surface water users need to get a water rights permit from TCEQ or purchase water. Depending on what their permit allows, an industry may take saline water from coastal areas or divert freshwater from rivers, streams, or reservoirs. Sometimes they contract with municipalities to use treated effluent, also known as recycled water.

**14. Why do I need to know where my water comes from?**

So you don't inadvertently pollute your water source, someone else's water source downstream from you, or the aquatic habitat of wildlife. Basically, if you know where your water originates, you will be able to keep tabs on the quality of that water source and take steps to protect it.

In addition, knowing where your water comes from, or what new sources are being considered, may help you make decisions about how much water you use, or what actions you encourage your water supplier to take. For example, if your water comes from an aquifer that is in danger of depletion (more water is being pumped out than being replenished by rainwater through the soil to the aquifer), you may want to reduce the amount of water you use so that your water supply will last longer. If your water supplier proposes to build a new reservoir that would reduce freshwater inflows into a bay where you fish, you may want to encourage that supplier to explore potential water savings from conservation first.



## What You'll Find in Water

### 1. How clean is my drinking water?

Every public water system customer in Texas should receive a copy of the Drinking Water Quality Report or Consumer Confidence Report once a year. Your water supplier should mail this document to you automatically. If you have not received a copy call your local water supplier, and they should provide you with one. The Drinking Water Quality Report has information on the source of drinking water for your area, what body of water they take the water from, a detailed report on the quality of your water, and any violations the water system has had. If you are unable to obtain a copy of this report from your water supplier, call the Texas Commission on Environmental Quality (TCEQ) 512-239-1626.

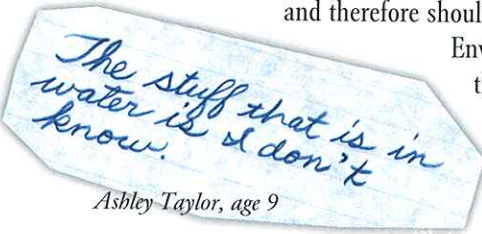
Public water systems are required to use a multi-barrier system to protect drinking water. The combination of barriers is intended to ensure that all contaminants are caught and eliminated from the water system. In general all water being treated for drinking purposes in Texas will go through five barriers, or stages of treatment:

1. Pre-treatment (addition of chlorine)
2. Addition of chemicals to sink sludge (solid materials) to the bottom
3. Skimming the clean water off the top
4. Passage of the water through settling basins to allow any remaining small solids to be removed from the water
5. Distribution to filters

### 2. I get my water from a well. How clean is this water?

Generally speaking groundwater sources, like wells, are less susceptible to pollution, and therefore should be cleaner than surface water sources. The

Environmental Protection Agency (EPA) recommends that well water users have their wells tested yearly for nitrate and bacteria levels. If you suspect that your well might be contaminated with pesticides, radon or some other pollutant, test more often. Tests run in the range of \$10.



*The stuff that is in water is I don't know.*

*Ashley Taylor, age 9*

### 3. Who sets the standards for the amount of pollutants in my water?

The EPA sets standards for drinking water. These are known as the Federal Drinking Water Standards. The TCEQ is responsible for enforcing these and any other additional standards.



#### 4. How clean is my bath water?

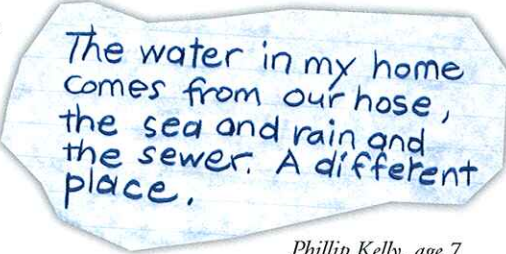
It is the same quality as the water that comes out of all faucets in your home. That means it is potable, i.e. safe to drink. That is, until you take a bath in it.

#### 5. If the pipes in my home are old and gross, how clean is my water?

The State of Texas requires that chlorine residual be present in your water when it comes out of your pipes into your home or yard. This means that even though your water may pass through old, dirty pipes, the chlorine will act as a disinfectant, keeping the water clean and drinkable.

#### 6. Why is my water sometimes a rusty color?

That rusty color you are seeing is actually caused by old, rusty pipes. To treat the problem simply let your water run for a few seconds until the rusty color is gone. Keep in mind that hot water tends to make water appear rusty more often than cold water because hot water is more corrosive. If the problem is really bad call your local water supplier and have them check it out. They will be able to tell you whether these pipes are indeed causing the rusty color, and whether they need to be replaced.



The water in my home comes from our hose, the sea and rain and the sewer. A different place.

*Phillip Kelly, age 7*

#### 7. If water comes from lakes, streams and rivers, how does all that junk get out of it?

Water from lakes, streams, rivers and other sources will come into a drinking water treatment plant where it is treated in the multi-barrier system described in question 1. This includes adding chemicals to sink sludge to the bottom, skimming the clean water off the top, passing it through settling basins, and finally through various filters.

#### 8. What is hard water?

Water is considered to be hard, as defined by the EPA, when it contains a large amount of dissolved minerals, such as salts containing calcium or magnesium. Hard water is not a health hazard, and you will usually find groundwater to be harder than surface water.

#### 9. How do I know if my water is hard?

Hard water will make it difficult to lather up with soap. Your skin may feel dry after showering, and you'll need more laundry detergent to wash your clothes. Some cities, like Austin, automatically soften their municipality's drinking water supply by adding lime to a pH factor of around 10, followed by a treatment process of adding CO<sub>2</sub> gas to bring the Ph level down to 9.5.

## 10. Why do some people have hard water?

If you live in Central Texas, your water tends to be hard because we have limestone aquifers that contain an abundant supply of calcium. Magnesium is another chemical found in water that can cause hardness.

## 11. How do authorities treat hard water?

Since it's a very expensive process to treat hard water, and because it does not pose a health hazard, many cities choose not to treat it. Some cities, like Austin, however, do soften the water by adding lime.

## 12. What is black water?

In Texas, we define it as the wastewater from toilets and sinks.

## 13. What is grey water?

Grey water is not the same thing as black water. In Texas, it refers to the wastewater from residential appliances or fixtures other than toilets and kitchen sinks.

## 14. What is recycled water?

Recycled water is water that has been treated for reuse. This water can be used for industrial uses, landscaping, and other non-consumptive uses.

## 15. What is sludge?

Sludge is the solid material remaining after the wastewater treatment process (this is different from the sludge that is chemically separated from the water early in the treatment process). Some municipalities use sludge as fertilizer, such as the Dillo Dirt program in Austin.

## 16. I live in the city, but plan on retiring to the country. What do I need to know about what might be in my private well water?

A general complaint by families using well water is the abundance of minerals. Some people find it necessary to take steps to reduce the mineral content of their well water (i.e. water softener).

### WATER WORDS OF THE WISE

"Throughout the history of literature, the guy who poisons the well has been the worst of all villains..."

– Author unknown

"The frog does not drink up the pond in which he lives."

– American Indian Saying

"When the well is dry, we know the worth of water."

– Ben Franklin

"We forget that the water cycle and the life cycle are one."

– Jacques Cousteau

"Children of a culture born in a water-rich environment, we have never learned how important water is to us."

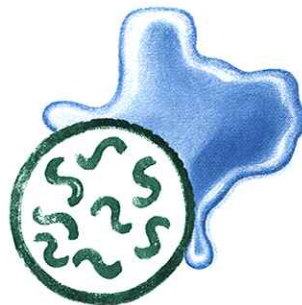
– William Ashworth



## *Why water matters to you and the environment*

### **1. How does water affect my health?**

You need water in order to live. Without it, we would dehydrate and die fairly quickly. Two-thirds of our body mass is water. If your local water source is poor it will affect not only your health, but that of every other living organism in your area and downstream of it. According to EPA, for instance, water with high concentrations of lead can cause serious damage to the brain, kidneys, nervous system, and red blood cells. The quantity and quality of water can have a direct effect on your health.



### **2. How susceptible is my water to contamination?**

This is where it is really helpful to know the SOURCE of your drinking water. If your water supply is surface water, try to determine what the potential sources of pollution are upstream from your water supply. Pollution sources can be non-point sources, meaning the pollution may come from many sources rather than one identifiable source. Examples of non-point sources are pesticides, herbicides, leaky septic systems, animal waste, oil, and grease. Point source pollution comes from a single, identifiable source, and can include factories, confined animal feeding operations, and oil and gas production.

If your water supply is groundwater, try to determine whether there are pollution sources on the surface that might be transmitted into the underground water source when it rains through sinkholes, abandoned but unplugged oil and gas wells, seepage through sand soils, or other means. In portions of the Edwards Aquifer region, where water flows directly from the surface into the aquifer very quickly, special efforts have been made to restrict certain actions on the surface that might result in pollution of this underground water source. In other aquifers the movement of contaminants into and through the aquifer may be much slower. In almost all cases, however, once an aquifer is contaminated it is difficult, if not impossible, to clean it up, and the cost of cleaning it up is astronomical.

In regard to how susceptible our water is in Texas to potential terrorists attacks, the Texas Commission on Environmental Quality (TCEQ) says that it is working with the EPA, water utilities, and water-related interest groups to share information and ensure that water systems assess any vulnerabilities and take whatever preventative measures they can.

### **3. Is it safe to drink hard water?**

Yes. It is not a health hazard, and you will likely find groundwater to be harder than surface water. (See questions 8, 9, 10, and 11 in section two for more information.)



#### 4. How can I make my water softer?

You could use a water softener, but these tend to increase the amount of lead and copper in your water. Soft water is also a common cause of corrosion. This corrosion causes a reaction between the water and the lead pipes or solder, which can allow lead to get into your pipes.

#### 5. What causes water from the tap to smell sometimes?

Cross-contamination, algae, methane, fish, chlorine, musty leaves, seasonal turnovers in bodies of water, and lots of other things can cause funny smells in your water. If you get your water from surface sources, the odd smell could be caused by an organic source like an algae bloom. If it is persistent you should call your water supplier first, not a plumber. If they are unresponsive, then call your regional TCEQ office. To find your regional TCEQ office, log on to <http://www.tceq.state.tx.us/admin/directory/region/reglist.html>

#### WELL WATER FOCUS

##### **But, I use private well water. Shouldn't I get a water filter and softener?**

Many families that get their water from private wells recommend water filters and softeners. The Long family in Wimberley, Texas remembers what it is like without these:

"Without these we'd be running our fingers down our skin and having them stick to us because of the hard mineral deposits, and, seeing the 'crud' left on our clean drinking glasses. However, I have noticed that the salt used in the water softener does seem to steadily eat away at our bathtub faucets, requiring me to replace them more often than I ordinarily would need to."

– Wes Long, Wimberley

#### 6. Are water filters really necessary for drinking and showering?

If your area has an approved water system, then they are not necessary. If you want to get a water filter, check to make sure that is approved by the National Sanitation Foundation.

#### 7. Boats and jet skis dump a lot of gasoline and oil into rivers and lakes. How does this affect my drinking water?

The engines in many boats and jet skis dump about 30 percent of their unburned oil and gasoline into the water. These watercraft are using 2-stroke engines. This poses a potential water pollution problem. For instance, an average two-hour ride on a jet ski with a 2-stroke engine dumps 2.5 gallons of unburned gas and oil into the water. Some drinking water lakes (like the Colorado) have banned motorboats and jet skis because of this concern. Gasoline has harmful chemicals like MTBE and benzene in it. Make sure and check your annual Drinking Water Quality Report, sent to you by your water supplier, to see if there have been violations in your area.

Consumers should be aware, however, that some manufacturers like American Honda and Mercury Marine now offer a cleaner alternative in a 4-stroke engine.



## **8. How does water affect my pocketbook?**

Water is going to affect your pocketbook whether you are paying a water bill or getting your water for free from your private well. The impact on your pocketbook will differ according to your situation.

*For those paying a water bill (i.e. on a public water system):*

Generally, water is not priced to encourage conservation. Ideally, there would be a low rate for the minimum amount of water needed, and then the rates would increase in graduated steps from there. That means if you don't use much water, or you practice water conservation, you would pay less. The converse would be true as well. If you used excessive amounts of water then you would pay more. You would pay the base rate until a certain amount is used, and then you would be billed at a higher rate for the remaining water used. This is referred to as a tiered water rate structure or "conservation rate structure". If we do not have a tiered system, then there is no pocketbook incentive to conserve water.

A tiered water rate structure is becoming more common, though, and consumers should know that the tiered approach may be different for each water supplier. To find out if your water supplier bills you based upon a tiered approach, simply contact them and ask.

*For those getting water from a private well:*

You can expect to get your actual water for free, but there are still substantial costs. Even if a well was already in place when you moved in, a family of four should expect to eventually spend thousands in maintenance and replacement costs. To drill a new hole the costs are \$10-12 per foot for drilling at least 800 feet. Add \$200 for an 1100-gallon holding tank, \$500 for a pump, and \$1400 for labor, and that adds up to a grand total somewhere between \$10,100 and \$11,700. After that, you can expect to spend \$25 every six weeks for salt for the water softener, and \$30 a year for replacement filters. Compare that cost for a family of four using approximately 4200 gallons of well water a month to \$720 per year for a family of four that uses the same amount and gets their water from a public water system.

## **9. Who decides how much water costs, and how do they do this?**

Most water users are served by a municipally owned water system that sets its own rates. This means that your local government sets your water rates. Eighty percent of water users in Texas are served by a municipally owned water utility.

Privately owned utilities may set their own rates as well. However, if 10% of their customers protest the rate change, the utility then has to go before the TCEQ to get their rate changes approved. This means that TCEQ has regulatory oversight on this kind of rate change.

## **10. I live in an apartment. How am I charged for the water I use?**

This can be done in one of four ways. The tenant can have an individual account with the water utility. The apartment can be "all bills paid," which means that your water costs are rolled into your rent. These first two examples are pretty rare. Apartment dwellers are more commonly charged for their water by submetering, or allocation. Submetering



determines your actual water usage; the landlord then pays the bill for the whole building and bills you for your portion according to your submeter. Allocation is the more controversial of the two methods. There is one meter on the whole building and the landlord allocates the bill to the renters based on square footage of their apartments and other factors. The landlord should deduct some from every tenant's bill for grounds upkeep and swimming pools, etc. This last method does not encourage conservation. For instance, if your neighbor uses lots of water, and you, on the other hand try to use it wisely, your respective bills do not reflect this.

### **11. How does water affect my family?**

Water affects just about every aspect of your family's life—health, wealth, and quality of life. You need it to live. Without it, we would dehydrate and eventually die. Our bodies are two-thirds water. Under drought conditions, crop production is down, which drives food prices up, and this affects your pocketbook, and availability of the food you and your family want and need. Beyond your health and wealth, Texas families enjoy many water recreational activities: fishing, boating, swimming, skiing, sailing, kayaking/canoeing, inner tubing, rafting, and just plain "hanging out at the beach." In fact, fishing, swimming, and boating are among the top ten outdoor recreational activities important to Texans, according to the Texas Parks & Wildlife Department. Water quantity can affect all these activities.



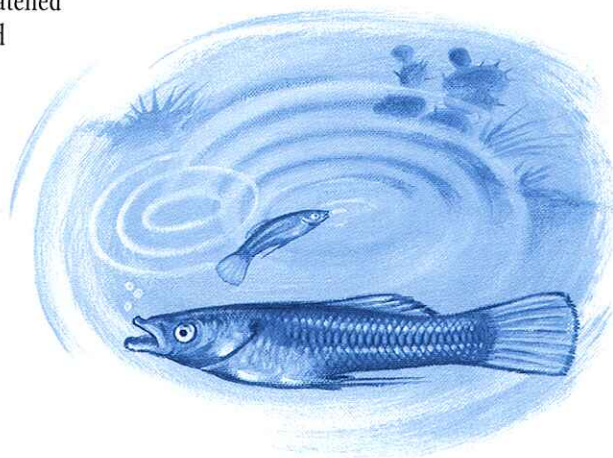
### **12. How does water affect fish and other wildlife? What are the environmental implications?**

Fish and other wildlife need water to survive, just like all living organisms – plants, animals, and microorganisms alike. More importantly, wildlife needs water in sufficient quality and quantity. Everything in nature is connected, and should be considered as a system. For instance, if we received inadequate rain, certain plants would die or their overall numbers would decline. As a result, plant-eating animals that depend on that particular plant would be affected, as would the omnivores and carnivores that depend on that plant-eating animal for survival. When drought is combined with human impact, like mining aquifers without adequate conservation precautions, water quantity and quality problems are compounded.

In West Texas, the number of desert spring fishes like the Comanche Spring Pupfish, Leon Springs Pupfish, Pecos Gambusia, and Big Bend Gambusia are declining. One reason for their decrease includes habitat loss from declining spring flows. Human impact appears to be taking its toll as more water is being pumped from aquifers than being replaced by rainfall. West Texas sees an average rainfall of 8 inches a year compared to East Texas that gets 56 inches annually. In addition, surface waters are being diverted from aquifer recharge zones, the area where the impermeable layer of rock on top of the confined aquifer reaches the surface for rainfall, stream water, and other water sources to enter. These recharge zones can be miles away from parts of the confined aquifer.



According to Linda Campbell, author of "Endangered and Threatened Animals of Texas," this continued mining of the aquifers could eventually cause the demise of spring systems throughout West Texas, and with them the extinction of a whole array of unique fishes, aquatic plants, and animals. If aquatic life cannot be sustained this could very well be an indication that our water quality and quantity are in jeopardy.



(See question 3, general questions and question 1, section one for more information on aquifers, and question 10 for more information on springs.)

*The Pecos Gambusia is a desert spring fish in decline due to loss of habitat as water is pumped from West Texas springs.*

### **13. How much water does wildlife need anyway?**

It is important to remember that prior to humans coming along the wildlife had ALL the water. Fortunately there is enough water for them to share with us. As humans use more and more water there WILL BE LESS fish and wildlife. It is not just a factor of how much water there is, it is a factor of when the water is there. Many species respond to changes in flow levels and timing in order to reproduce. There are studies underway that attempt to show how much water wildlife need. If you'd like to help on this conservation issue, contact the Lone Star Chapter Sierra Club, 512-477-1729, or visit the Texas Living Waters Project website at <<http://www.texaswatermatters.org>> for more information.

### **14. How clean is the "polluted" water from my home once it is discharged into rivers and streams?**

This depends on what kind of water system you are on and where you live. Cities tend to have wastewater treatment plants. The quality of the effluent-treated wastewater-- varies city by city. However, wastewater is never treated completely, and we always rely on the river, stream, or body of water that the effluent is released into to finish the job of cleaning it. This is why it is so important to have healthy stream and river systems.

Some regions in Texas, for example the Upper Rio Grande and Far West Texas areas, have particular concerns regarding their water quality being affected by wastewater discharge. For instance, testing by the EPA and the TCEQ have revealed increased levels in undesirable nutrients and fecal coliform bacteria in the Rio Grande river stemming from untreated wastewater flows from Ciudad Juarez, Mexico.

### 15. How much water does my city use?

Use the table below to see how your county compared with Texas' other 253 counties. If your county is not listed, you can download a county profile from <http://www.texasep.org>.

*Note: One acre-foot is about the size of a football field covered with one foot of water, which is equal to 325,851 gallons.*

URBAN COUNTY	Total Water Use in 1997 (Acre-Feet) + Rank
Bexar (San Antonio, Kirby)	304,864 (16)
Cameron (Brownsville, Harlingen, San Benito, Port Isabel)	328,210 (13)
Dallas (Dallas, Irving)	495,381 (3)
Ector (Odessa, Penwell)	39,242 (77)
El Paso (El Paso, San Elizario, Anthony, Socorro)	266,931 (20)
Galveston (Galveston, Texas City)	96,100 (42)
Harris (Houston, Pasadena, Waller)	882,270 (1)
Jefferson (Beaumont, Port Arthur)	359,588 (10)
Lubbock (Lubbock, Shallowater)	274,803 (19)
Midland (Midland, Greenwood, Spaberry)	63,214 (59)
Potter (Amarillo, Ady)	62,251 (56)
Tarrant (Ft. Worth, Arlington)	283,626 (17)
Travis (Austin, Manor, Lakeway)	151,119 (32)

Original source: Texas Water Development Board, County Summary Historical Water Use.

### 16. How much water is lost due to leaky pipes in the water distribution system of public water suppliers?

The American Water Works Association recommends a goal of no more than 10 percent loss through leakage but some water supply systems lose as much as 20% or more of their water through leaks in their pipes. San Antonio has realized tremendous water savings by fixing their water infrastructure. Most people would be appalled to learn how much treated water is lost everyday due to leakage in public water systems.

### 18. How do droughts affect me and my water supply?

The most common way for residential water users to be affected by droughts is through water rationing. During a drought water supplies are low and water rationing helps to preserve the water we have on hand. Water rationing measures include decreasing the frequency of lawn and garden watering, washing cars less often, and filling swimming pools less frequently.

Water demand tends to increase during dry periods because lawns and gardens are stressed and it is usually quite hot with Texas summer temperatures often rising above 100 degrees. With no rainfall to replenish streams, rivers, lakes, and aquifers, water processing and distribution systems often cannot handle the increased demand during these times.



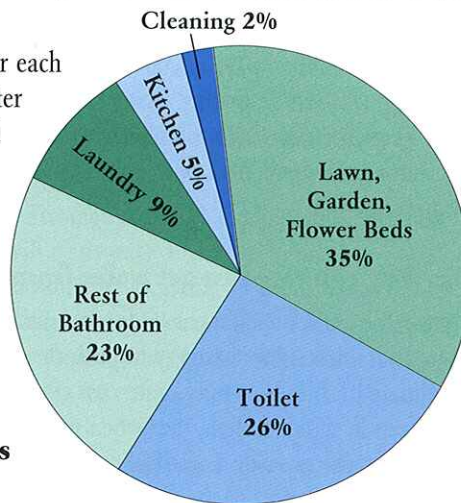
## WELL WATER FOCUS

Families, like the Longs in Wimberley, Texas, experience first hand the effect of multiple Texas droughts and increased water demands from growing rural populations.

"Even if you get a downpour, you use water in the house, and you're still pumping water out of the ground at the same rate. Often there doesn't seem to be a direct correlation. What we do notice, though, is that more folks are moving in, drilling well holes deeper and deeper (800 ft vs. 580 ft.), and the pumping time is less. I think it's increased use. When we moved here in '85 we had some drought conditions as bad if not worse than now. Yet the guy who lived here before didn't have a big elaborate tank. And then here we are, pumping deeper and with less pumping time, down to one and half minutes." – Wes Long, Wimberley

### 17. How much water do I consume per day? How much water is OK to use per day?

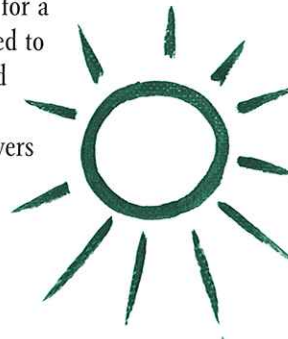
Americans, on average, use 60 gallons of water each day. By taking some measures to conserve water you can easily reduce your consumption by 30 percent. For instance, install a low-flow showerhead and a water-efficient toilet, choose a car wash that recycles water, water your lawn in the early morning or evening, plant water-saving plants, and cover your pool or spa to reduce evaporation. [Source: Edwards Aquifer Authority]



Source: Texas Environmental Almanac, Second Edition

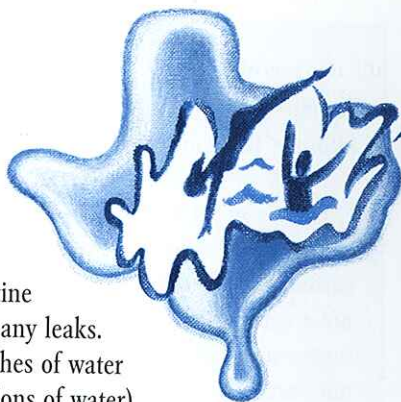
### 19. Why do we have water restrictions during the summer?

Water restrictions are generally due to treatment capacity. There is usually a huge spike in water use during the summer in Texas. This is largely due to people watering their lawns and gardens during the hot, dry summer. Water treatment plants cannot keep up with this huge additional demand. Shouldn't we just build more water treatment plants, then? The answer is no. It costs a huge amount of money to add additional treatment facilities just to cover increased demand for a few months. This is also the time of the year when we do not need to be taking additional water out of our rivers and streams. Fish and wildlife are generally the most stressed at this time of the year (just like us) and they need what little water is available in our rivers and streams. It just makes sense to cut back during times of additional use...your yard will survive too.



## 20. How much water does it take to have a swimming pool?

The average swimming pool takes 18,000-20,000 gallons of water to fill. This will cost you an average of \$80.00-\$100.00 on your water bill (Austin). Pools do not need to be refilled very often. After initially filling your pool you need to add water to it to replace water lost to evaporation, water splashing out, and routine maintenance. Make sure that your pool does not have any leaks. During the summer in Texas, pools can lose several inches of water due to evaporation every couple of days (about 120 gallons of water).



To figure out how many gallons of water it takes to fill your pool, use this equation:

$\text{Length (in feet)} \times \text{Width} \times \text{Average Depth} \times 7.5 = \text{Gallons of water to fill pool}$

## 21. I know about low flow showerheads, xeriscaping, and the best times of days to water plants, but what other things can I do to conserve water?

Besides the familiar ways of conserving water, you could research and try rainwater collection as a family project. Many families use this water, unfiltered, to supply lawns and gardens with water. Other families are relying solely on rainwater, and ditching their wells that have gone dry. Check with your city and county to see what tax incentives may be available to you.

## 22. Why can't we just get water from the oceans and desalinate it?

Cost is the main impediment to desalination. One of the biggest costs in desalination is energy. It takes a lot of energy to push the saline water through the membranes to desalinate it. It is becoming more cost effective in some areas, though.

Keep in mind, though, that when making the decision to go with desalination, you need to consider the possible negative environmental impacts of brine disposal. Brine is the super salty byproduct of the desalination process. Generally speaking, for a seawater desalination plant, the farther out to sea (or in the case of Texas, the Gulf of Mexico) you dispose of the brine the better, because the impact of the brine will be less in an area with high salt concentration. If the brine is disposed of closer to shore, in a bay for example, you run the risk of upsetting the delicate freshwater/saline water balance needed for the production of certain marine organisms such as shrimp and the smaller organisms that serve as their food supply. Transporting the brine farther out in the water for disposal (through a pipeline, for example) does increase the cost of disposal, however, which may effect the economics of doing desalination.

Seawater is not the only possibility for desalination. Our state has large quantities of brackish groundwater and some brackish surface water – water that is considered to be too saline to qualify as drinking water, but much less saline than seawater. There are several projects in operation in various parts of Texas that treat this brackish water to drinking



water standards and more projects getting underway, or on the drawing table. Because of the much lower saline content of this brackish water, it is more amenable to treatment and potentially less costly to treat. Brine disposal remains a significant issue that must be addressed even in treating inland brackish water, however.

### **23. Water is a precious resource. Why do we waste it?**

Most people just don't know any better, but by educating yourself and those you know, we're off to a good start. There is water everywhere and it appears to be a limitless resource; the reality is much different. For more information on water quantity and quality issues, or for suggestions on how you can get involved, and for copies of our other two water publications, contact the Lone Star Chapter Sierra Club, 512-477-1729. There are many water planning meetings around the state, and, quite possibly, not too far from where you live or work. For information on these meetings, see the website for the Texas Living Waters Project at <http://www.texaswatermatters.org>

## **RAINWATER HARVESTING**

### **24. What are rainwater catchment/containment/collection systems? Is it safe to drink water from them?**

Rainwater catchment systems are constructions of storage tanks, PVC pipes, and guttering used to collect water off of rooftops. The water will be as pure and clean to drink as your collecting pipes and storage tanks, assuming acid rain isn't an issue. To aerate water you could add a pump. Just be aware that small wildlife like squirrels may be able to get inside the tanks unless you have protective screens. Most families use the rainwater they collect for watering lawns and gardens, rather than for drinking.

### **25. What are the top four things I should know before I start collecting rain?**

Top four tips for someone considering rainwater harvesting:

1. Decide what you are going to do with it (i.e. water yard, drink, laundry, etc.).
2. Expect it to be very simple to install since it just uses gravity.
3. Be aware that if you are harvesting on a small scale, you won't be drinking it.
5. Determine how to get the water out. You may want to add a pump so water will exit with enough force that you won't be watering your garden trickle by trickle.

### **26. Is rainwater collection worth it?**

Wes Long and his family in Wimberley, Texas think so. "What prompted me to do this was my terrible experiences with well water. Now I'm asking myself do I want to go all out and do rainwater collection at 100 percent? I just love this stuff."

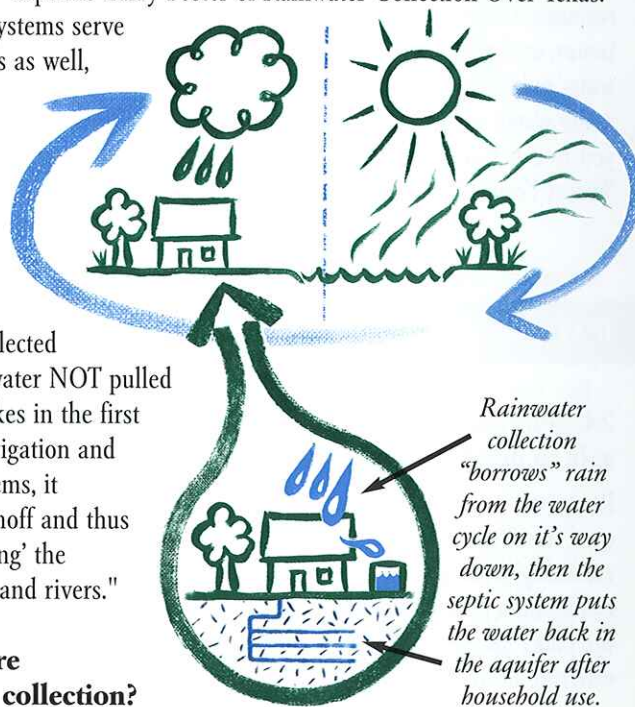
## 27. What's the biggest problem with rainwater collection?

Cost of storage. If you are not drinking the water, it costs approximately \$500, broken down as follows: \$200-250 for tank, \$50 for PVC pipe, \$150 for pump, \$20 for guttering.

## 28. If a large number of folks are using rainwater containment systems then wouldn't this reduce the amount of water available to refill rivers and streams?

"A good way to think about a rain collection system is to think of it as a way of borrowing water on its way to the ground," explains Larry Foster of Rainwater Collection Over Texas.

"In Texas most rain collection systems serve residences that have septic fields as well, thus, any water used in the home is 'borrowed' only until it enters the aquifers via the septic field. For larger commercial systems or governmental systems, i.e. the J.J. Pickle School at The University of Texas, the rain collected and used for cooling towers is water NOT pulled from the rivers, streams, and lakes in the first place. Where rain is used for irrigation and landscaping, as with septic systems, it returns to the soil as normal runoff and thus here again we are only 'borrowing' the water on its way to the streams and rivers."



## 29. Where do I go for more information on rainwater collection?

Although there are many sources, the following two publications are good resources.

1. "Rainwater Collection For the Mechanically Challenged," by Suzy Banks with Richard Heinichen, Tank Town Publishing, Dripping Springs TX, ISBN 0-9664170-0-3. Or call 1-512-894-0861 to have a copy sent to you. Cost is \$17.50/copy + postage.
2. "Texas Guide to Rainwater Harvesting, Second Edition," Texas Water Development Board in cooperation with the Center for Maximum Potential Building Systems. Cost is free, and can be downloaded from < <http://www.twdb.state.tx.us/assistance/conservation/Rain.htm>>.

For rainwater collection supplies, there are approximately 30 different Texas businesses and two are listed below as examples:

- ◆ Rainwater Collection Over Texas / P.O. Box 953 Dripping Springs, TX 78620, 512-288-7151, [raincollect@earthlink.net](mailto:raincollect@earthlink.net), [www.rainco.net](http://www.rainco.net)
- ◆ Tank Town, 1212 Quail Ridge, Dripping Springs, TX 78620, 512-894-0861, [tanktown@aol.com](mailto:tanktown@aol.com), [www.rainwatercollection.com](http://www.rainwatercollection.com).



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Additional copies of this book may be obtained from the  
Lone Star Chapter Sierra Club by calling 512-477-1729,  
or by emailing at [lonestar.chapter@sierraclub.org](mailto:lonestar.chapter@sierraclub.org)



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