

# HOW TO SAVE WATER AT HOME



A Step-By-Step Manual for the Do-It-Yourselfer



This book was originally produced for the City of Albuquerque, New Mexico by Cooney, Watson and Associates, Inc. with Design and Illustrations by Ken Wilson Design, Inc. It has been revised and reproduced by the Southwest Environmental Finance Center, a program of the Civil Engineering Department at the University of New Mexico.

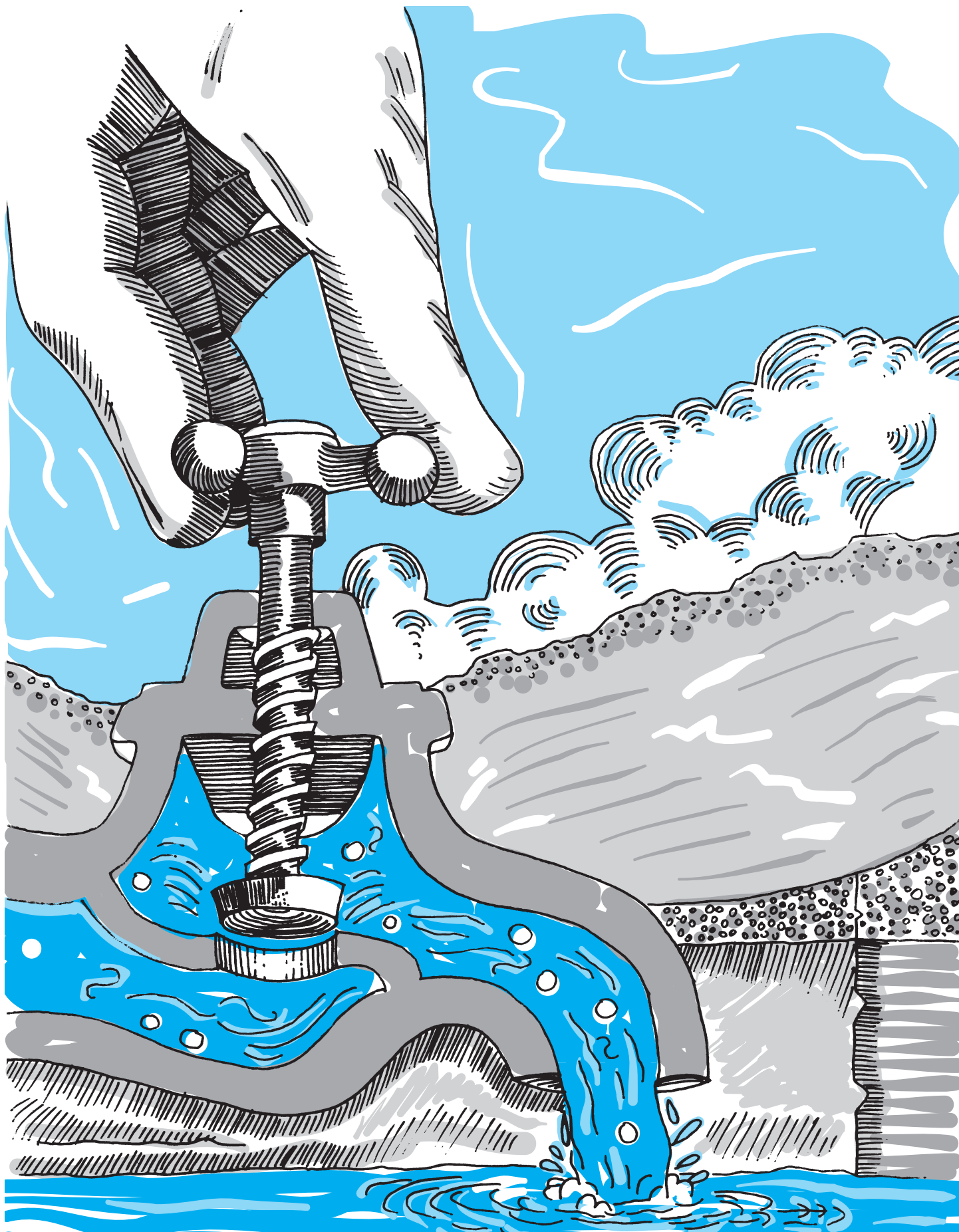
We wish to express our gratitude to Ken Wilson for permission to use his original designs, without which this project would not have been possible.



SOUTHWEST  
ENVIRONMENTAL  
FINANCE CENTER









# TABLE OF CONTENTS

<b>INTRODUCTION</b>	4	<b>The Kitchen</b>	29
<b>WHERE DOES YOUR WATER COME FROM?</b>	5	The Dishwasher	30
<b>HOW TO READ YOUR WATER BILL</b>	7	Faucets & Sinks	31
<b>HOW TO READ YOUR WATER METER</b>	8	Home Water Treatments	32
<b>10 NO-COST WAYS TO START SAVING WATER TODAY!</b>	10	<b>The Laundry Room</b>	33
<b>SAVING WATER INSIDE THE HOME</b>	12	Instant Hot Water Heaters	34
<b>The Bathroom</b>	13	<b>On the Roof:Evaporative Coolers</b>	35
Toilets	14	<b>General Information &amp; Helpful Hints</b>	37
Faucets & Sinks	22	Basic Plumbing Tools	38
Showers & Bathtubs	25	<b>SAVING WATER OUTSIDE THE HOUSE</b>	39
Bathroom Plumbing Basics	28	What Kind of Yard Do You Have?	40
		Smart Watering	41
		How Much Water Does Your Lawn Need?	42
		Evaporation & Transpiration	44
		Xeriscaping Basics	46
		Creating Your Water Zones	51
		Pools, Hot Tubs, Fountains	52
		Ten Ways to Cut Your Outdoor Water Use	53
		Water Saving Lawns	54
		Converting Your Yard	56
		Drip Irrigation Primer	62
		<b>WATER AUDIT CHECKLIST</b>	63
		<b>PLANT SOURCES</b>	65
		<b>RESOURCES</b>	75





# INTRODUCTION

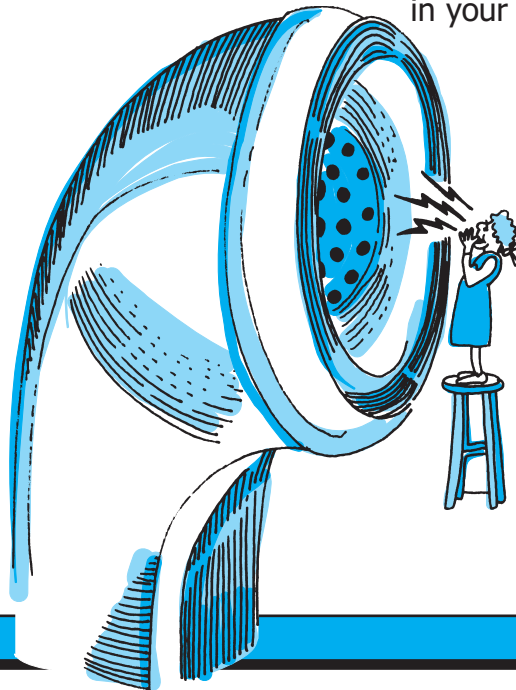
Water is one of our most precious resources. We simply can't live without it. Water is life. But because it flows so easily from our faucets, most of us don't appreciate what a valuable commodity it really is.

This book is filled with practical advice on how you can save water in and around your home — starting right now.

Some of these water-saving tips involve a small effort on your part; some involve more effort and expense. Others involve only a willingness to turn the water faucet off. But since residential use can account for a large part of a community's water consumption, it's important for all of us to make an effort to conserve water at home.

By following these water conservation steps and by learning to appreciate just how precious water is, we can easily reduce water use throughout our community. In doing so, we'll not only be saving water— we'll be preserving our quality of life for generations to come.

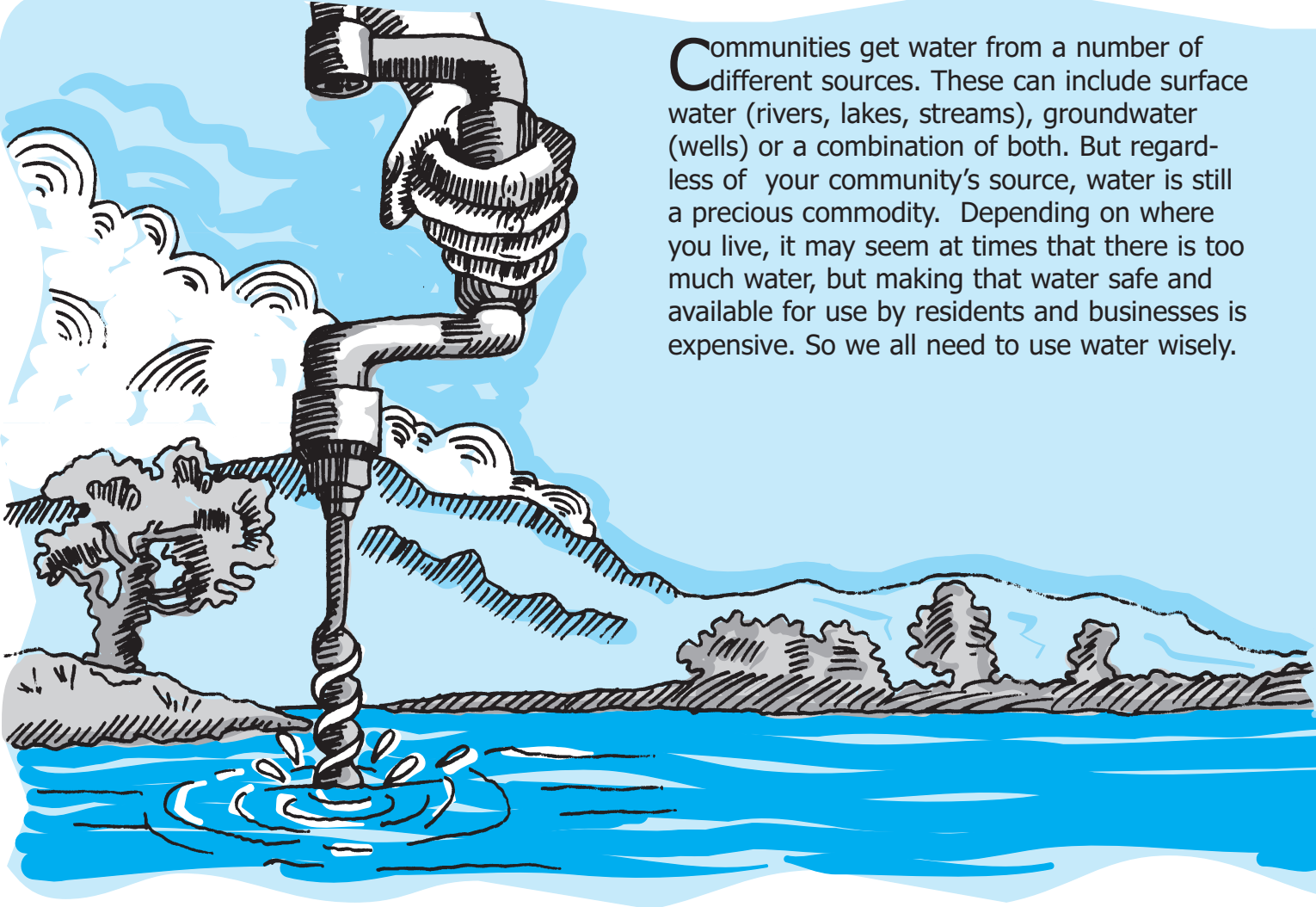
Many communities have water conservation departments or water hotlines. Others include water-saving tips on water bills or on their websites. Some have hotlines to report water waste. Ask your water utility for information and resources on how to conserve water in your community.





# Where Does Your Water Come From?

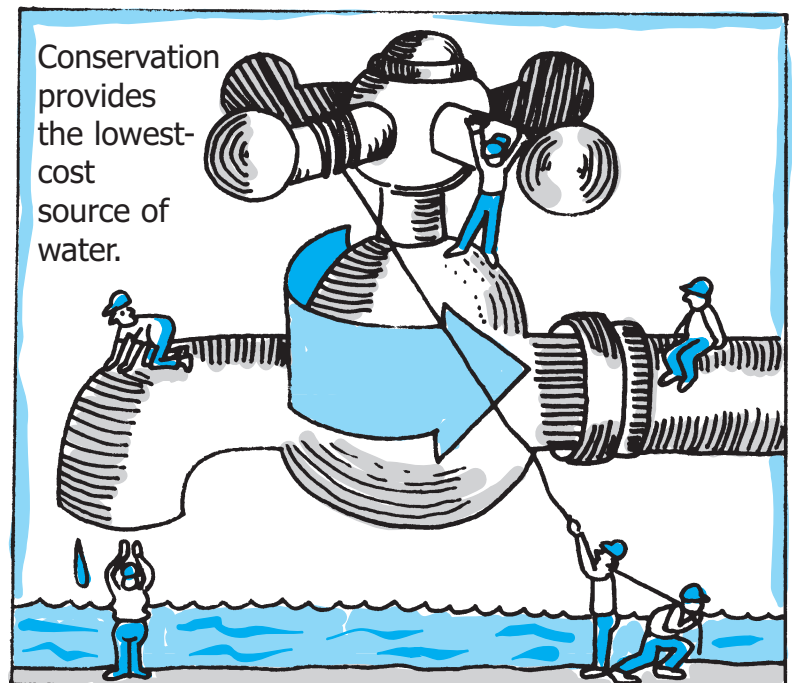
Communities get water from a number of different sources. These can include surface water (rivers, lakes, streams), groundwater (wells) or a combination of both. But regardless of your community's source, water is still a precious commodity. Depending on where you live, it may seem at times that there is too much water, but making that water safe and available for use by residents and businesses is expensive. So we all need to use water wisely.



## Conserving Water Saves Money

Conserving water saves you money every month on your water bill. Saving water is also a cost-effective investment for the future. Conservation now will help your community defer the costs of locating and developing more expensive water sources in the future.

Let's face it, without conservation efforts, our community's thirst for water will continue to grow. And, ultimately, that will increase everyone's water bill.



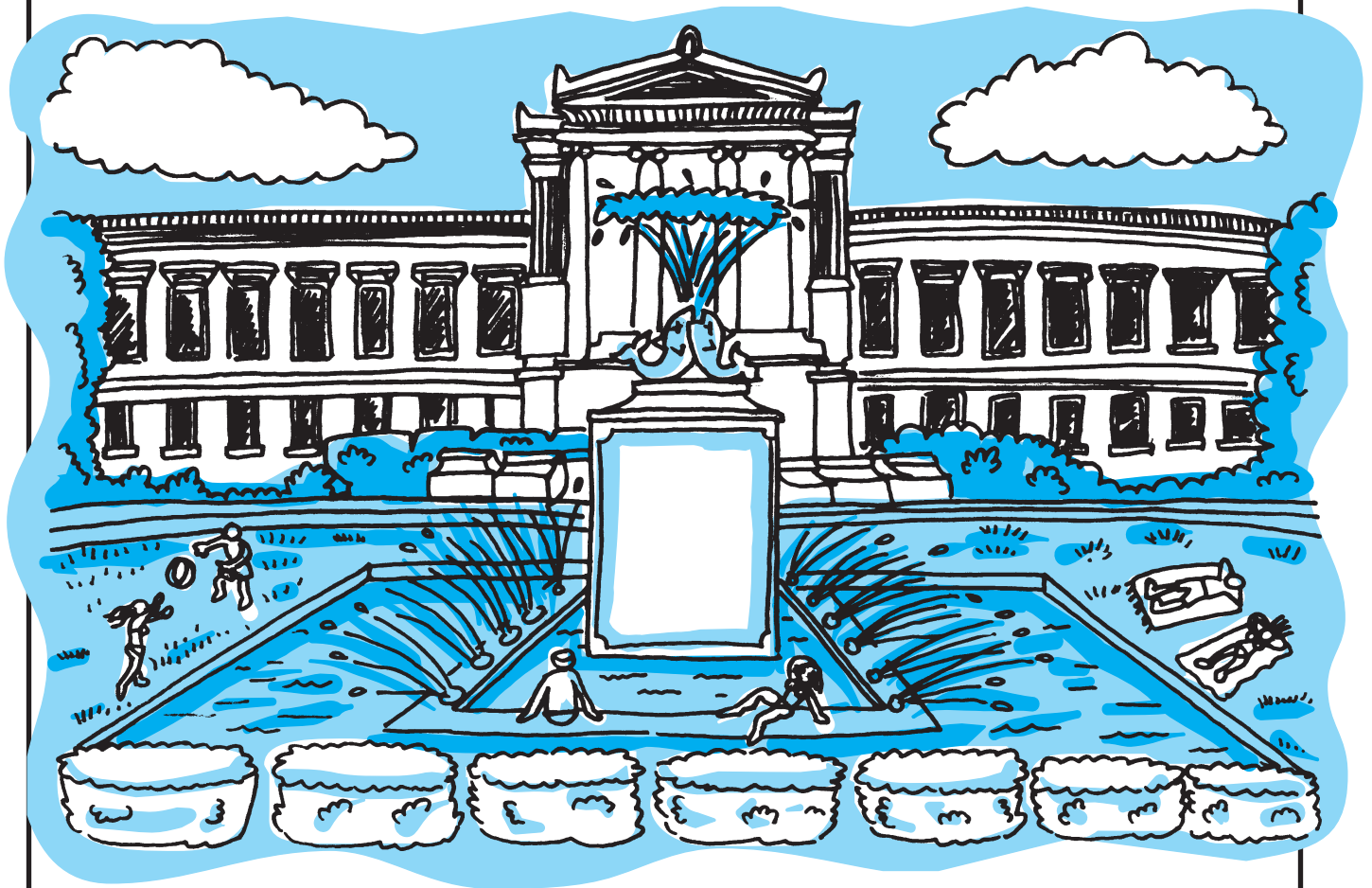


# Are You a Water Hog?

Many households are already water-wise. These folks are careful not to waste water. If you are one of those households, give yourself a pat on the back. Unfortunately, some households use far more water than the "average" household. These water hogs account for a disproportionate use of our total water supply.

Your water bill is the best indicator of how you're meeting your community's water challenges. It often includes information that lets you see exactly where you stand compared to the household average.

If you're a high water user, we urge you to look carefully at your water habits. Use this book to learn ways to save water--and then make water conservation a daily habit. It is possible to save water without making huge sacrifices. Even if you're among the water-thrifty households, you may find additional ways to save even more water.





# HOW TO READ YOUR WATER BILL

1. Your bill typically shows a "base charge," determined by the size of your water meter, plus a "commodity charge" for water. Some communities employ a Conservation Surcharge in the summer months.
2. Your monthly water consumption is usually shown in gallons, but may be in units or hundred cubic feet.
3. Many water bills feature a different water conservation tip each month.
4. A bar graph may show your use for the

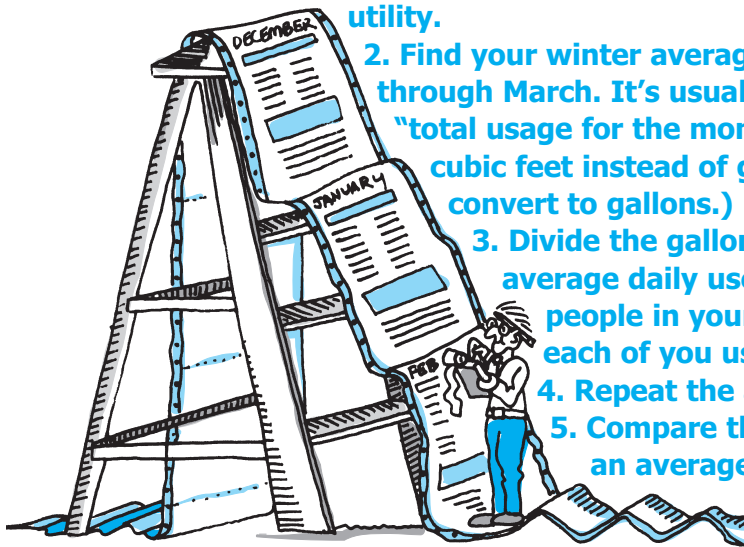
month, for the corresponding month the previous year and for the previous month. Some bills may show you how to compare your usage to an average customer's usage.

5. In some months, you may even get a personalized water-use message, telling you how you're doing. These are intended to educate and inform and, for some, to congratulate water customers on their low use.

## How Many Gallons Do You Use Per Day?

Use your water bill to find out your household's daily water consumption and your per person water consumption. You can also compare your summer use to your winter use. Here's how:

**1. Find a winter bill (November-April) and a summer bill (May-October). If you don't have your old water bills, you may be able get a printout of your water usage by calling your water utility.**



**2. Find your winter average in gallons for the previous December through March. It's usually listed on the bill as "Metered Usage" or "total usage for the month." (Note: if your bill is in units or hundred cubic feet instead of gallons, multiply this number by 748 to convert to gallons.)**

**3. Divide the gallons figure by 30.5 to get your household's average daily use. Divide this number by the number of people in your household. This is the number of gallons each of you uses each day.**

**4. Repeat the above steps for your summer bill.**

**5. Compare the winter and summer totals. In arid areas, an average residence uses approximately two to three times more water in the summer as in the winter.**

**6. To determine the annual amount of water used indoors, multiply your monthly winter average by 12. (about 90 % of the water use during the winter months is used indoors) Now subtract total indoor use from the total amount of water used over the entire year. This number may be on your bill, or you may have to add up all 12 of your monthly bills. The remaining amount represents outdoor water use, such as landscape. cooling, car washing, swimming pools, etc. This exercise should help you decide whether your greatest conservation potential is indoors or outdoors.**



# HOW TO READ YOUR WATER METER

Your water meter measures the amount of water used in your household. The readings from your water meter determine the amount you are charged every month on your water bill. You can read the meter yourself to verify your bill, monitor your water use, or experiment with how much water different landscaping procedures use.

Most water meters are located outside the house under a metal lid near the property boundary. In colder climates, the meter may

be located inside the house or garage.

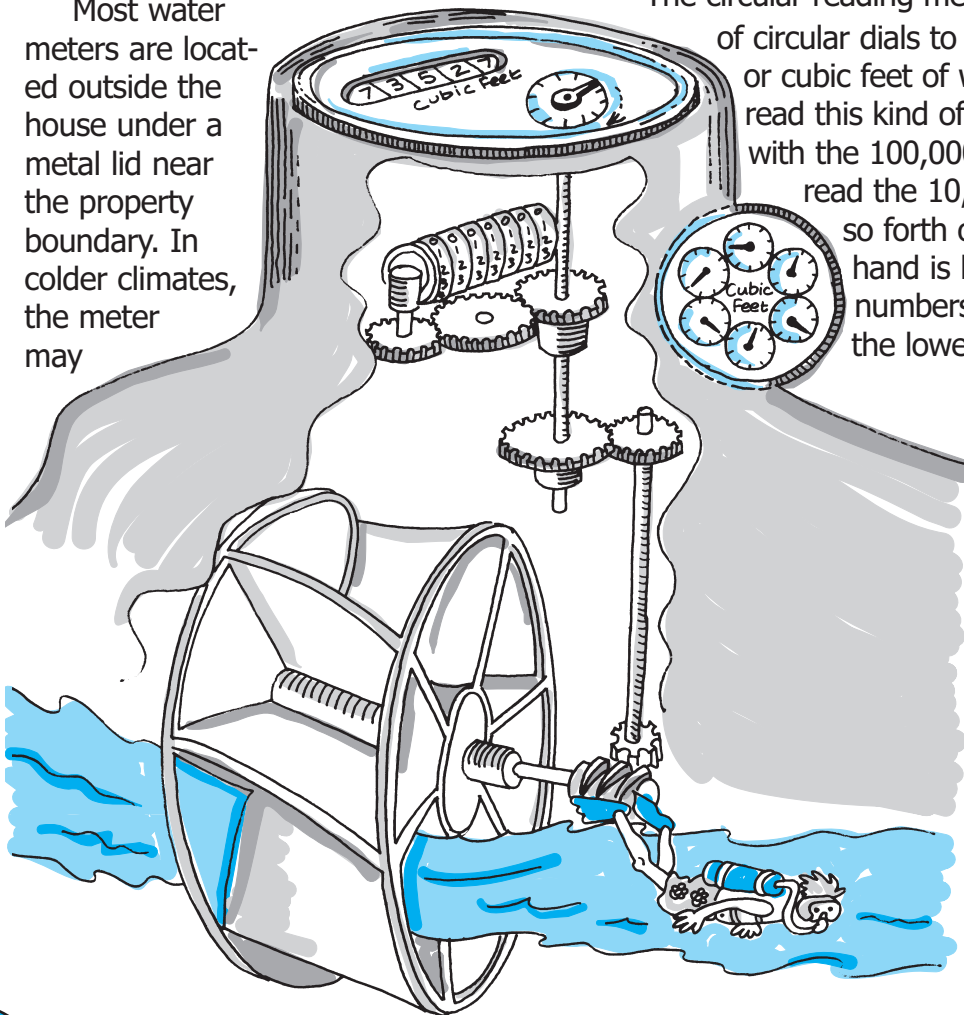
There are two basic kinds of water meters — straight reading and circular reading.

## Straight-Reading Meter (see illust.)

The straight reading meter records gallons or cubic feet of water in much the same way that a car's odometer records miles.

## Circular-Reading Meter (inset)

The circular reading meter uses a series of circular dials to record gallons or cubic feet of water used. To read this kind of meter, start with the 100,000 circle, then read the 10,000 circle, and so forth on down. If a hand is between two numbers, always read the lower number.



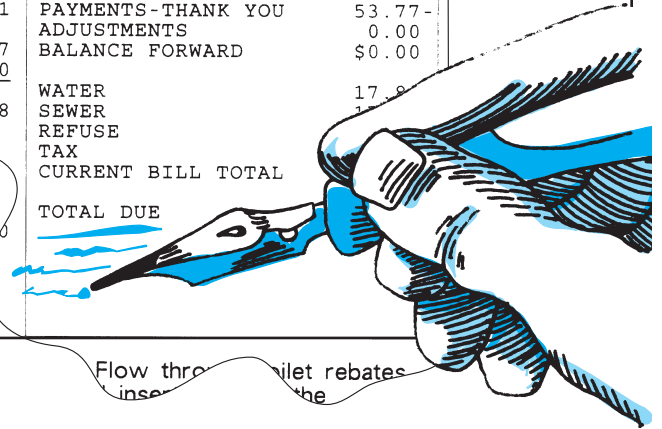


## HOW TO VERIFY YOUR MONTHLY READING

Water utility employees typically read your meter about the same day each month or quarter. The date the meter was read is usually on your bill somewhere, often in a box labeled "Service To".

To verify your monthly reading, read your meter on the same day of the month it was read the previous month. Subtract your previous reading from the new reading to obtain your monthly water use.

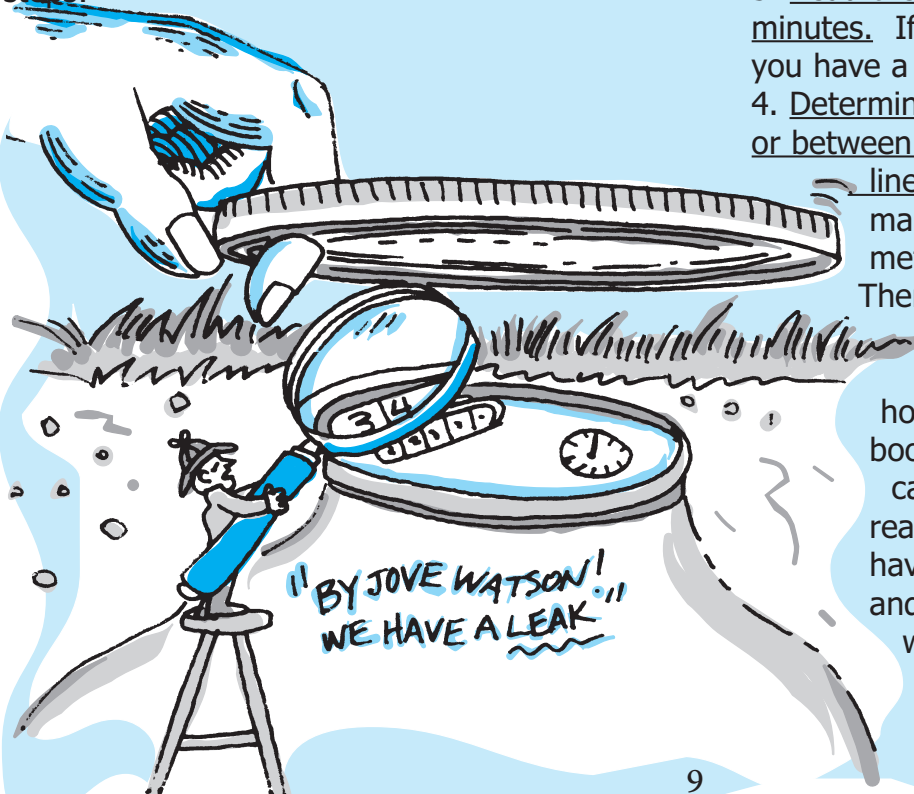
NE	SERVICE TO: 11/16/95
<b>TOTAL</b>	
21	PREV. BALANCE \$53.77
	PAYMENTS-THANK YOU 53.77-
.37	ADJUSTMENTS 0.00
7.70	BALANCE FORWARD \$0.00
17.28	WATER 17.28
	SEWER 17.28
	REFUSE
	TAX
	CURRENT BILL TOTAL
	<b>TOTAL DUE</b>



## Inspect For Leaks

Your water meter can be a valuable tool in detecting water leaks inside your house — and in the pipes underneath your house. Many water meters have a small, triangular leak indicator that can detect small flows. If no water is on, and the triangle is spinning, you may have a leak. Just follow these easy steps:

1. Make sure no water is running. Turn off all faucets and water-consuming appliances — even your automatic ice maker and evaporative cooler.
2. Read your water meter. Write down the current reading, including tenths of a gallon or cubic foot.
3. Read the meter again after 10-15 minutes. If the meter reading has changed, you have a leak.
4. Determine if the leak is inside the house or between the water meter and the main line in the street. Turn off your main water valve (located at the meter.) Record the meter reading. Then check it in 30-60 minutes. If the reading has not changed, you have a leak within your house. Use the information in this book to find and fix your leak(s), or call a licensed plumber. If the reading has changed, you probably have a leak between your meter and the main water line. Call your water utility to report it.







# 100

## NO-COST WAYS TO START SAVING WATER TODAY!

1. *Turn Off the Tap.* When brushing teeth or shaving, don't leave the tap running.

Water Savings: 2.5 gallons a minute.

2. *Sing Shorter Songs.* Don't spend more than 5 minutes in the shower.

Water Savings: 2.5 to 5 gallons a minute.

3. *Capture the Cold.* When you're running the water waiting for it to get hot, capture the cold water in a large bucket. Use this water on your plants.

Water Savings: 2.5 to 5 gallons a minute.

4. *Give a Good Turn.* Turn off faucets completely so they don't drip.

Water Savings: Up to 20 gallons a day.

5. *Check the Tank.* Put a plastic bottle or toilet bag in your toilet tank to displace water. It will use less water with every flush.

Water Savings: Up to 15 gallons a day.

6. *Flush Less.* Don't use your toilet for trash. Use a wastebasket.

Water Savings: 3.5 gallons per flush.

7. *Fill 'Er Up.* Wash only full loads in your dishwasher.

Water Savings: About 16 gallons per load.

8. *Learn the Levels.* Most modern washing machines allow you to set the water level for different sized loads. When washing a small load of clothes, use the proper setting.

Water Savings: Up to 20 gallons per load.

9. *Water Early.* Turn on your sprinklers early in the morning — before 10 a.m.

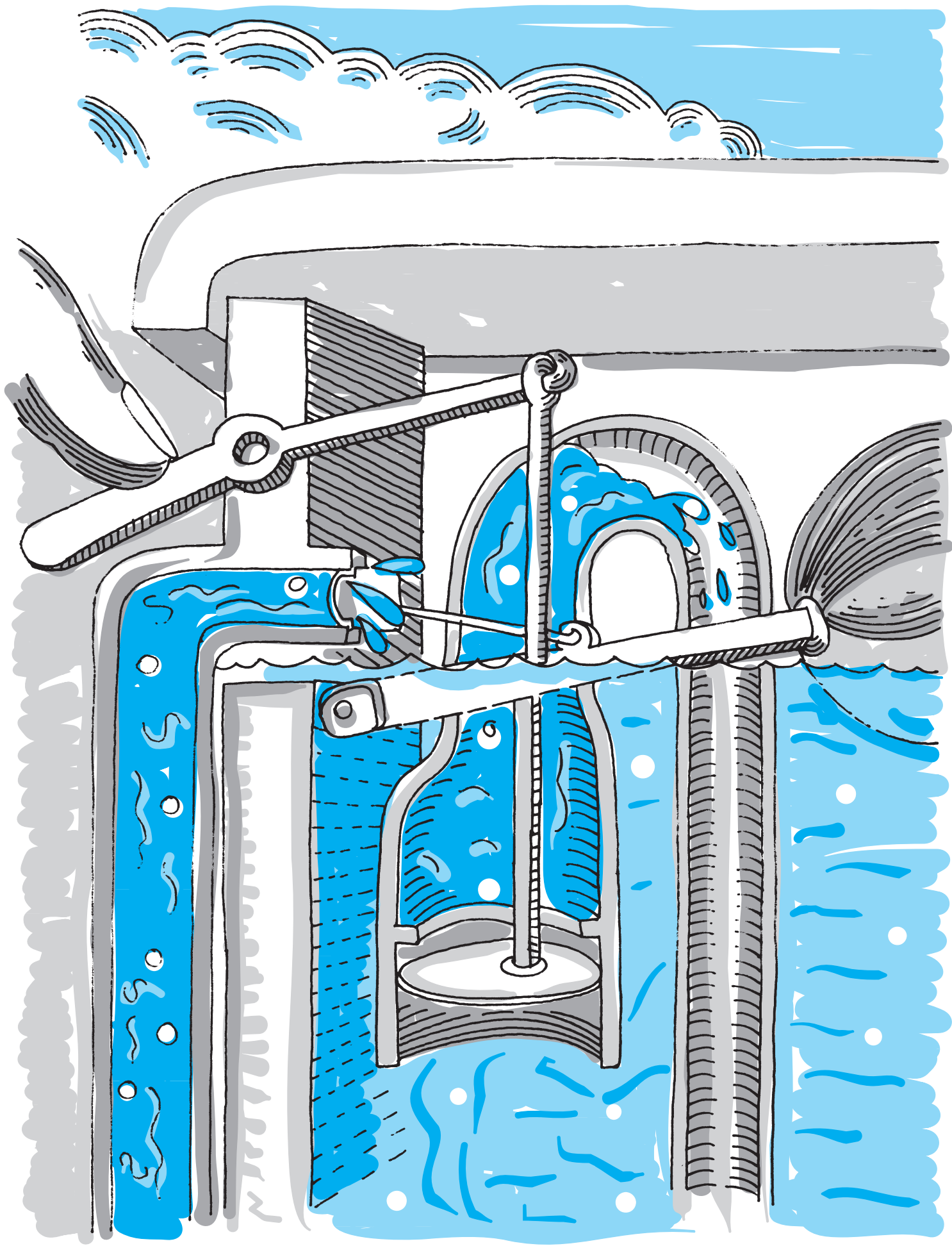
Water Savings: Significant reduction in water loss due to solar evaporation and wind.

10. *Don't Be a Hoser.* Sweep — don't hose — your driveway. And put a shut-off nozzle on your hose when you're washing your car.

Water Savings: 5 gallons per minute.

See the following pages for additional ways you can save water by fixing leaks and by installing water-saving devices inside and outside your home!







# SAVING WATER INSIDE THE HOME

Do you know how much water you use every day? Probably not. The average daily water use per person in the U.S. is 80-100 gallons per day. And if your family is typical, about 60% of the water your household uses every year is used indoors.

Even though each time you use water you're only using a small amount — whether to flush a toilet or brush your teeth — it all adds up. Saving a few gallons here and there, multiplied by the thousands of times you use water indoors every year, can result in a huge amount of savings.

## How Much Water Do Families Use Indoors?\*

**Toilets-** 990 gallons per month/  
33 gallons per day

**Shower-** 840 gallons per month/ 28  
gallons per day

**Baths-** 120 gallons per month/ 4  
gallons per day

**Faucets-** 780 gallons per  
month/ 26 gallons per day

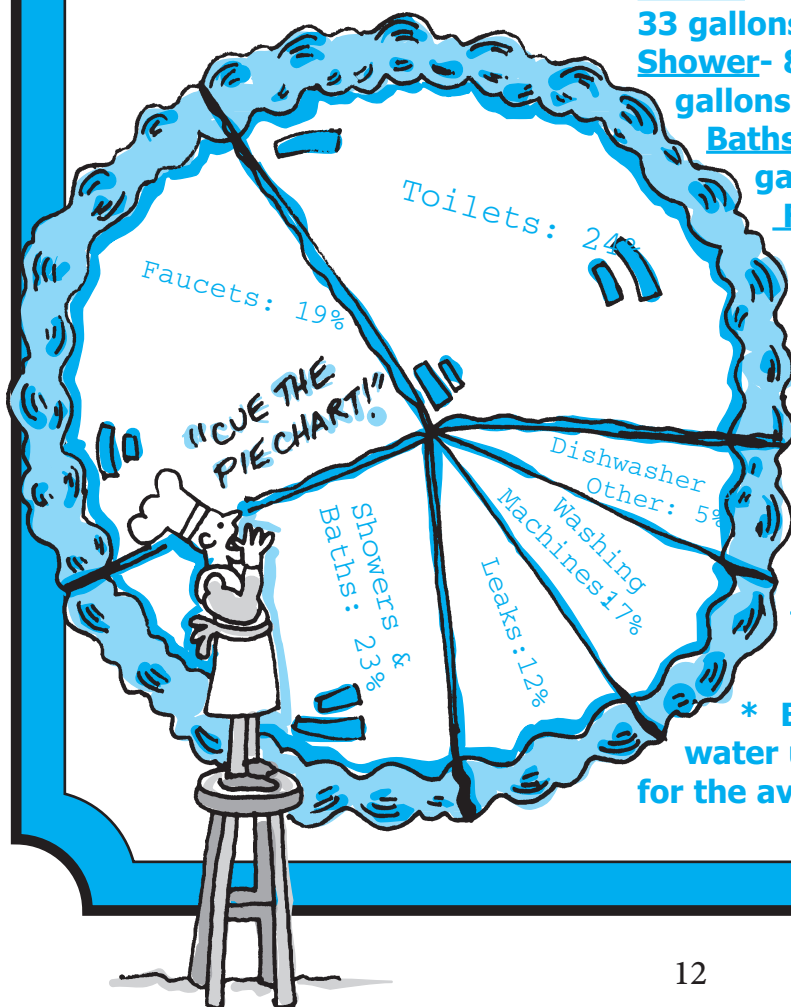
**Dishwasher-** 60 gallons  
per month/ 2 gallons per  
day

**Washing Machines-** 690  
gallons per month/ 23  
gallons per day

**Leaks -** 510 gallons per  
month/ 17 gallons per day

**Misc -** 150 gallons per  
month/ 5 gallons per day

\* Based on typical indoor  
water use of 138 gallons per day  
for the average American family.





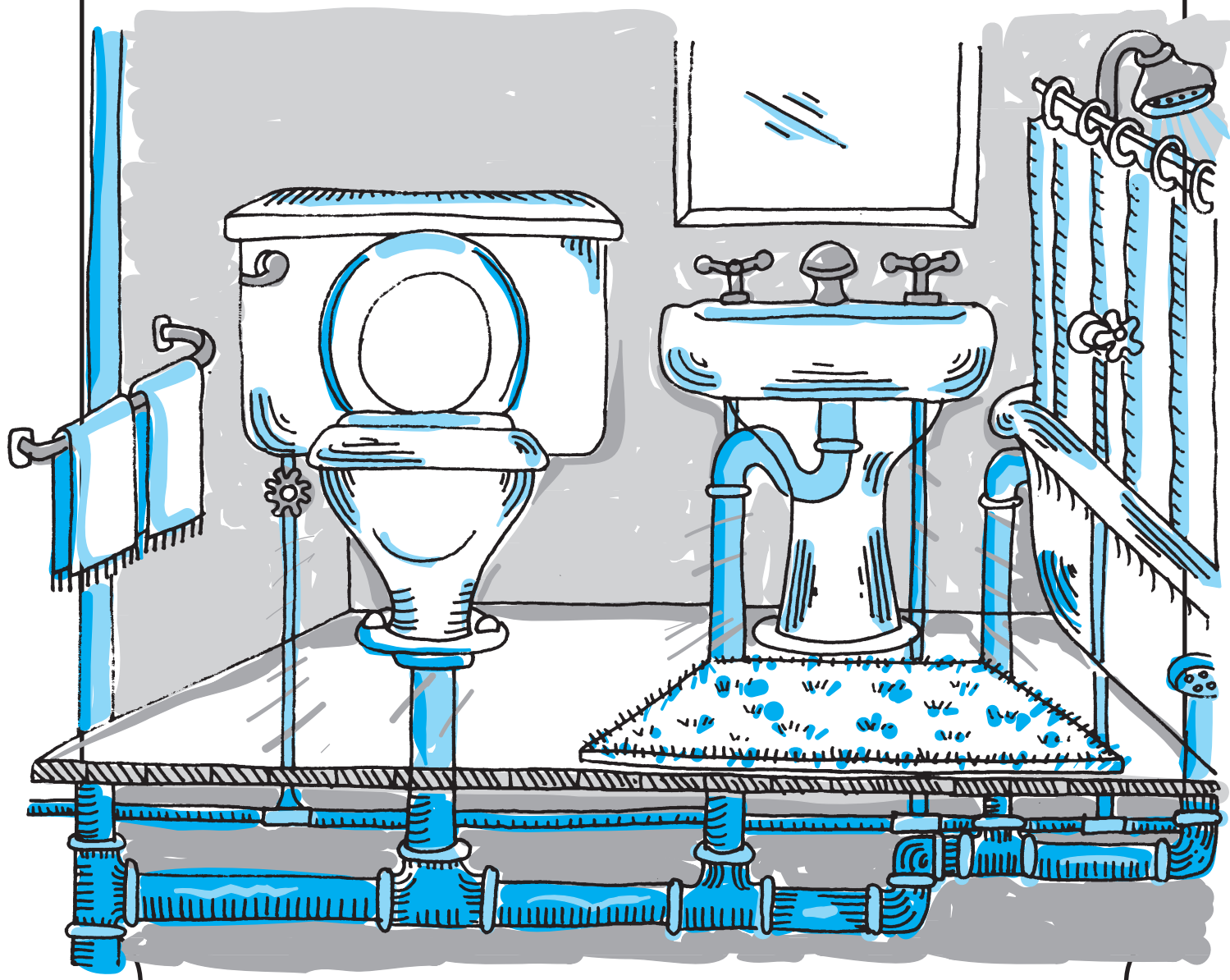
# The Bathroom

For such a small room, the typical bathroom certainly consumes a lot of water. That's because just about everything we do in the bathroom uses water. Bathing, showering, brushing teeth and flushing the toilet are all water-related activities.

In many households, water use in the bathrooms accounts for as much as 75 percent of all the water used indoors. But the good news is that since

this is where we use the most water, it's also where we can save the most water.

In the following section, we'll take a close look at how you can save water in the bathroom. You'll learn how to locate and fix most toilet leaks, how to fix a leaky faucet, and how to retrofit your toilet and faucets to achieve major water savings.





# THE TOILET

## A River Runs Through It

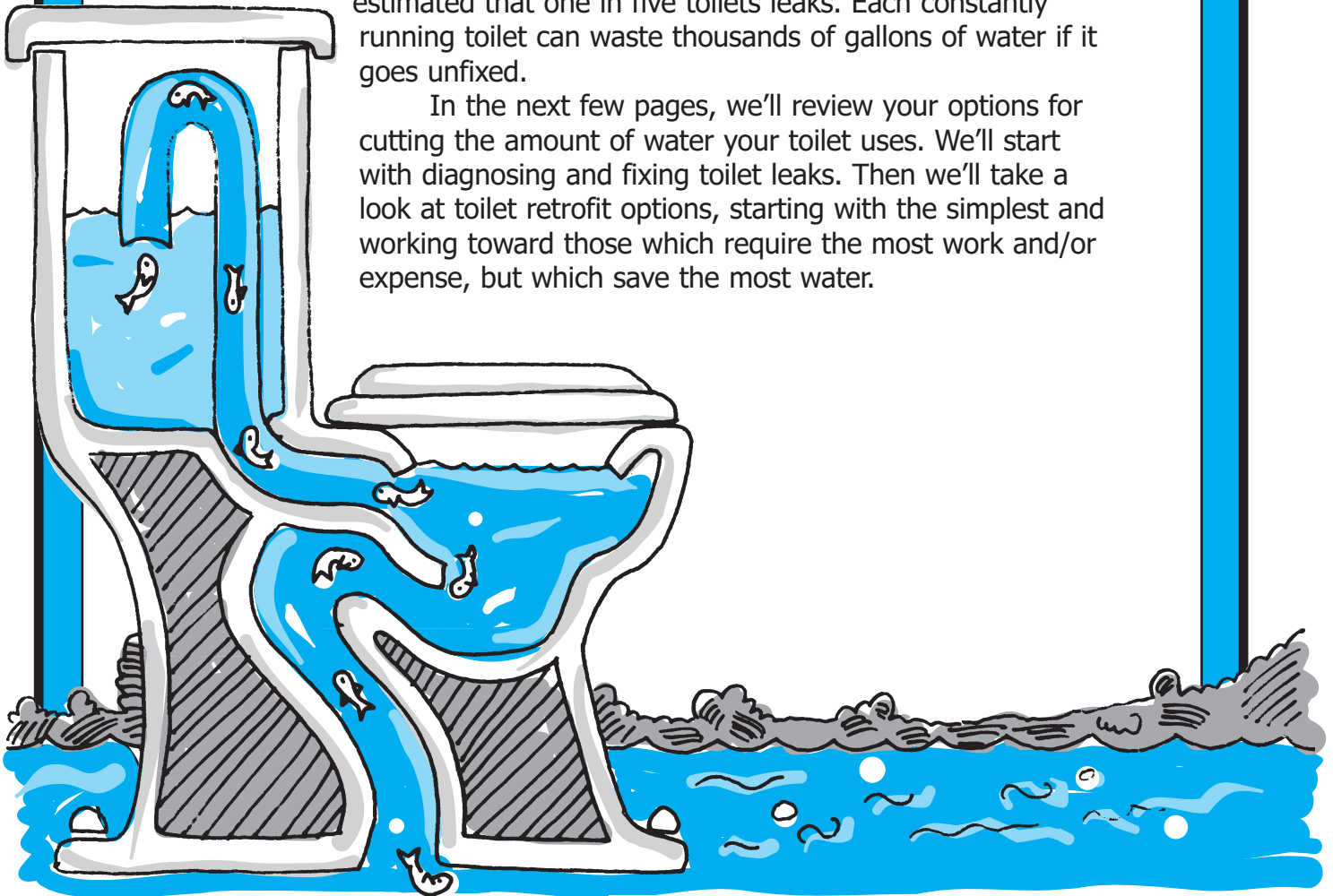
Nothing inside the typical house or apartment consumes as much water as the toilet(s). Imagine a small river running through your bathroom. That's your toilet. With every flush, gallons of drinking-quality water get washed away into the city's sewer system.

(Many people don't realize that the water used in the toilet is the same precious water that comes out of the faucet. But it is.)

Older toilets, those made before 1982, typically consume five gallons of water per flush. Newer toilets, installed from about 1982 through 1993, use about 3.5 gallons per flush. The newest toilets, the "ultra-low flush" or "u.l.f." toilets mandated by federal law as of January 1, 1994, get the job done by using only 1.6 gallons or less per flush.

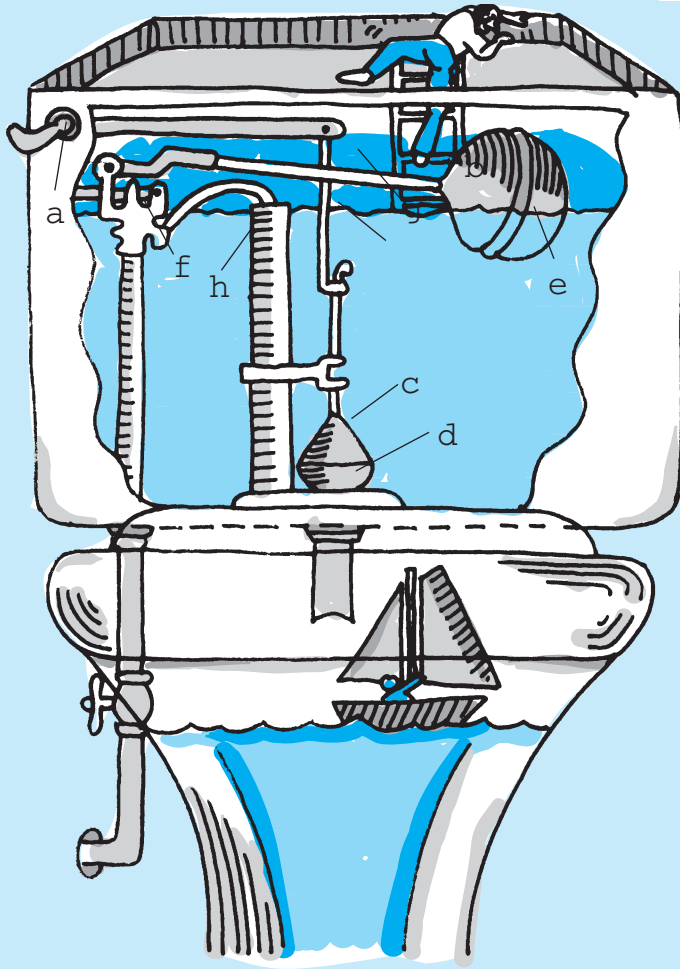
And that's when your toilet is working properly. A federal study once estimated that one in five toilets leaks. Each constantly running toilet can waste thousands of gallons of water if it goes unfixed.

In the next few pages, we'll review your options for cutting the amount of water your toilet uses. We'll start with diagnosing and fixing toilet leaks. Then we'll take a look at toilet retrofit options, starting with the simplest and working toward those which require the most work and/or expense, but which save the most water.





# The Basic Toilet



As more water fills the tank, the float ball (e) will rise. Water will continue to fill the tank until the float ball lifts the float arm (g) high enough to turn off the ball cock. When the flush is completed, the water level in the tank should be about 1/2" from the top of the overflow pipe (h).

Simple, huh?

The newest variation on the familiar gravity-fed toilet mechanics is the "float-cup" ball cock. (One brand name of this type of device is Fluidmaster.) Float cups replace traditional float balls, but they perform the same basic function. When the float cup rises high enough along the ball cock shank, it will trigger the ball cock to stop letting water in the tank.

float-cup  
ball cock

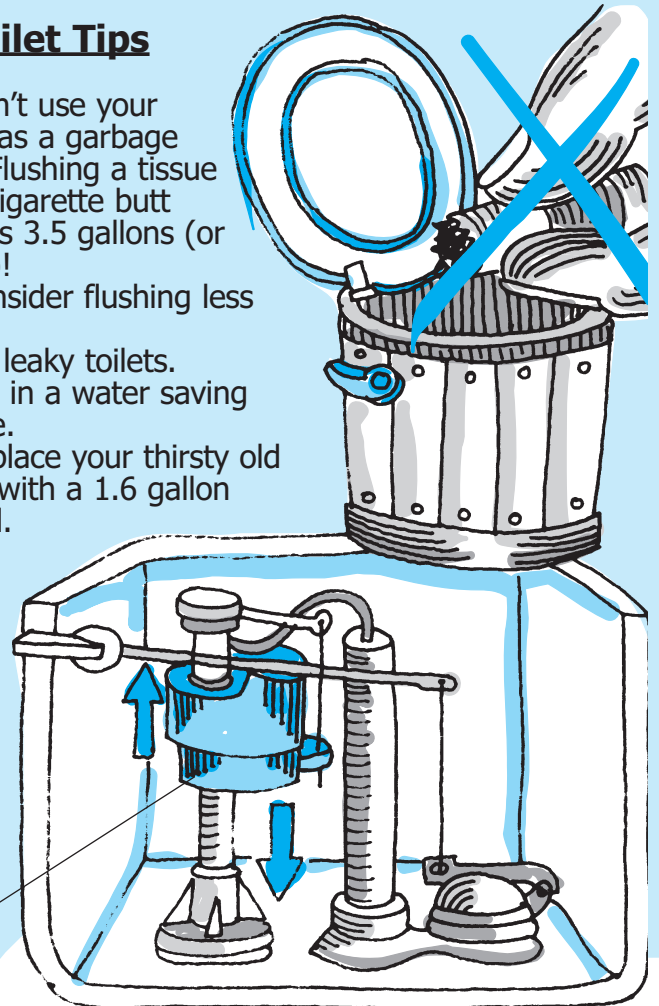
The gravity-fed "modern" flush toilet hasn't changed significantly in more than 100 years. It consists of a system of floats, levers, valves and rushing water which looks confusing at first, but is actually quite simple.

Here's how it works: When the flush handle (a) is pushed, the lift chain (b) (or lift wire, depending upon your toilet's design) raises the flapper ball (c) — which is sometimes called the flapper valve or the tank ball. When the flapper ball is raised, the water from the tank rushes down through the flush valve (d) and into the toilet bowl.

As the water rushes out, the float ball (e) drops down. This tells the ball cock (f) to start letting more water into the toilet tank. Meanwhile, the flapper ball (c) will fall back down onto the flush valve (d), ensuring that the water coming back into the tank through the ball cock assembly will stay in the tank.

## Toilet Tips

- Don't use your toilet as a garbage pail. Flushing a tissue or a cigarette butt wastes 3.5 gallons (or more)!
- Consider flushing less often.
- Fix leaky toilets.
- Put in a water saving device.
- Replace your thirsty old toilet with a 1.6 gallon model.





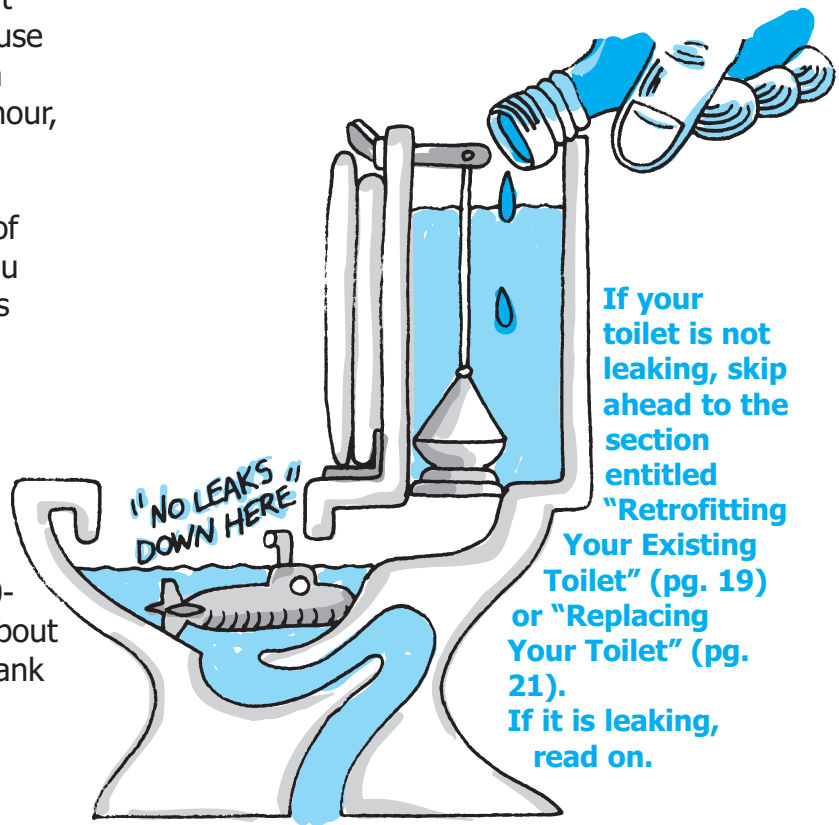
## FINDING TOILET LEAKS

Many people wouldn't know a toilet leak if it was hiding in their own bathroom. That's because not all leaking toilets make noise. Sometimes a leaking toilet silently wastes water, hour after hour, day after day.

If you hear water running constantly in the bathroom, or if you have to shake the handle of your toilet to get the water to stop running, you probably have a leak. But whether your toilet is making "leaking" noises or not, let's test it for leaks.

## TESTING FOR TOILET LEAKS

Testing for toilet leaks is quite simple. Just remove the lid from your toilet tank. Without disturbing the float or the flapper valve, put 10-15 drops of food coloring into the tank. Wait about 15 minutes. If any color has moved from the tank to the toilet bowl, your toilet is leaking.



## FIXING TOILET LEAKS

Here's how to identify and fix the most common toilet leaks. Keep in mind that if you're past your comfort level on any of these repairs — or you just want your toilet to stop wasting water — a professional plumber will be happy to help (for a price).

### WATER LEVEL IS TOO HIGH IN TANK

Some toilets have a water level adjustment screw, located on top of the ball cock. Try tightening this screw to lower the water level.

Worn out inner seals and bladder in the ball cock mechanism can cause water levels to rise too high. When this happens, the float arm can't rise high enough to turn off the ball cock,

causing precious water to spill over into the overflow pipe.

The best solution is to replace the ball cock/float arm mechanism. These parts are available at home improvement stores or through your local plumber.

To temporarily fix the problem, try grabbing the float arm with both hands and gently bending the side with the float ball downward. If you have a "float cup" instead of a float ball, just pinch the spring clip on the side of the float cup and slip the float cup a little lower. The incoming water should stop before it hits the top of the overflow pipe.

Be aware, however, that water may still continue to leak—and sometimes can't be heard. If the ball cock still doesn't close before the water runs down the overflow tube, the ball cock needs to be repaired or replaced.



## FIXING TOILET LEAKS

### WATER LEVEL LOOKS FINE, BUT THE WATER IS STILL RUNNING

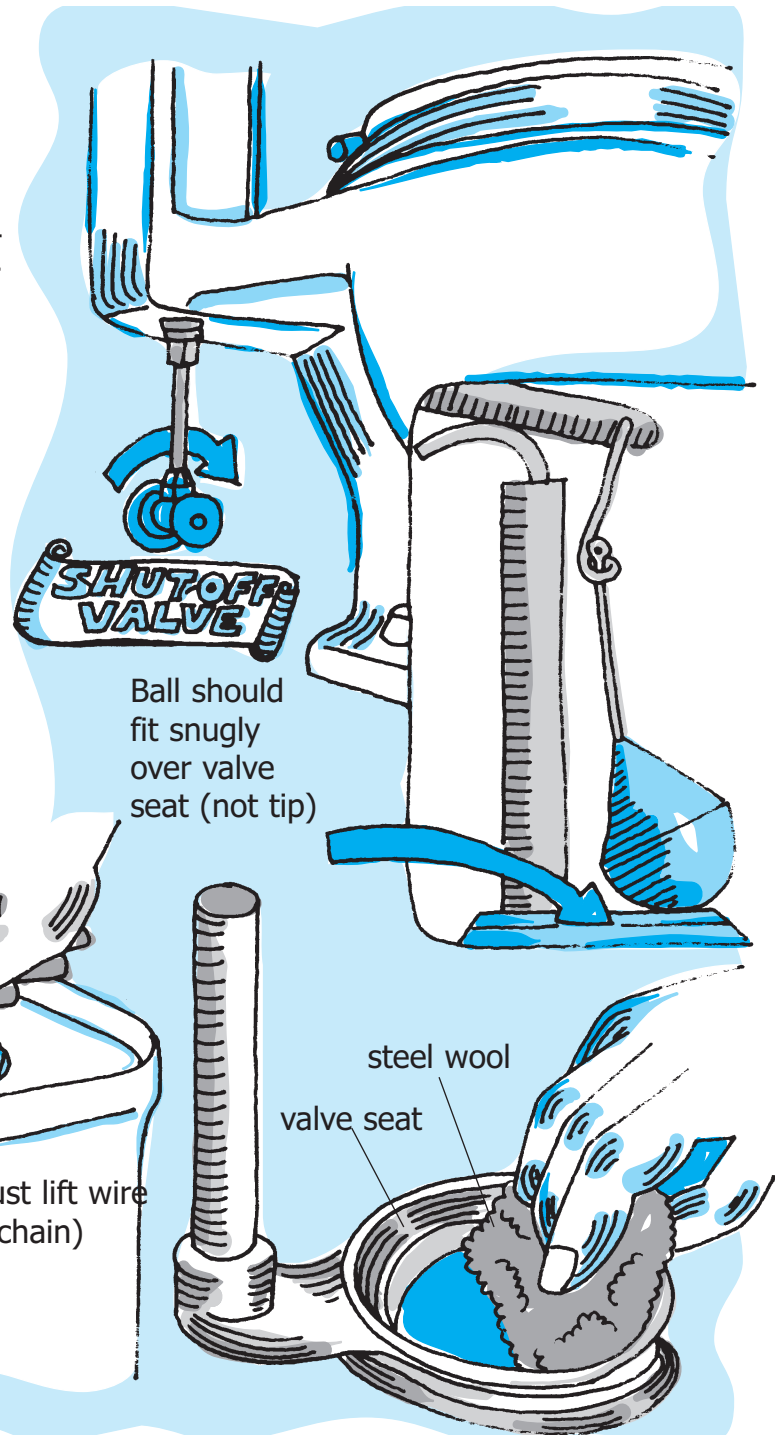
Check the flapper ball (or tank ball) to see that it's fitting properly on the valve seat. If it's not fitting properly, you'll need to adjust it. Start by turning off the water shutoff valve located just beneath the toilet tank. Then flush the toilet to let the water out of the tank. Watch to see if the flapper ball/tank ball falls straight onto the flush valve opening.

If your toilet has a tank ball mechanism and your tank ball is not falling straight, loosen the thumbscrew fastening the guide arm to the overflow pipe. Then reposition the arm and the lower lift wire so the tank ball is located directly over the flush valve.

While the tank is empty, check the valve seat for mineral deposits or corrosion. Clean it with fine steel wool or a plastic cleansing pad.

### YOU HAVE TO JIGGLE THE HANDLE TO KEEP IT FROM RUNNING

It may be a sticking guide-wire or lift chain. Check to make sure they're working properly. It might also be a loose flush handle. If so, simply tighten the nut that secures the handle to the inside of the toilet tank.





## FIXING TOILET LEAKS

### THE DARN THING IS STILL RUNNING

You may have to replace your tank ball mechanism with a newer (and less problematic) flapper ball mechanism. Or, if you already have a flapper ball mechanism, your flapper ball might need replacing.

Flapper balls and tank balls are made of rubber, and sometimes they simply wear out. If the flapper ball seems worn or uneven, it won't seal properly. It's time to install a new flapper ball. Flapper ball kits are available at hardware, home center and plumbing stores.

Turn off the water shutoff valve and flush the toilet to let the water out of the tank. Sponge out any remaining water. On older toilets, remove the old guide arm, lift wires and tank ball.

On newer toilets, remove the old flapper ball.

Slide the collar of the new flapper ball to the bottom of the overflow pipe and align the ball over the flush valve. Tighten the thumb-screw on the collar (if there is one). Then hook the chain from the ball through a hole in the trip lever directly above, leaving about 1/2 inch of slack.

While the tank is still empty, double check the valve seat for mineral deposits or corrosion. Clean it with fine steel wool or a plastic cleansing pad.

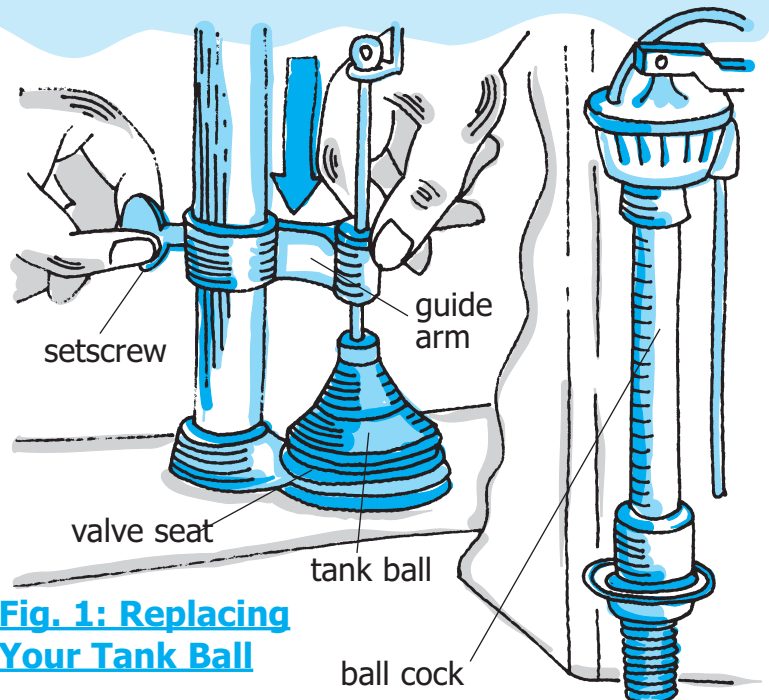
Turn the water back on and flush the toilet to see if the tank drains completely. If not, lessen the slack in the chain.

### NO LUCK. NOTHING HAS HELPED YET

It's probably the ball cock, which controls the flow of water into the toilet tank. Buy a toilet repair kit at a hardware store or home center and install it by following these instructions.

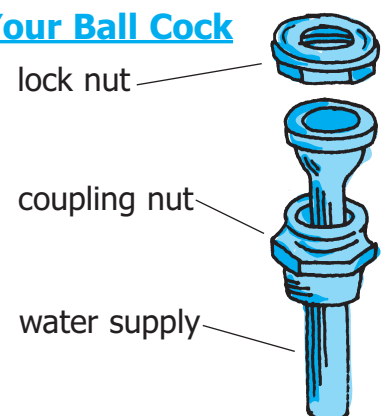
Turn off the water and drain the tank (see instructions above). Unscrew the coupling nut that connects the water supply tube to the toilet tank. Then remove the old ball cock by loosening the lock nut underneath the toilet tank. Replace the old ball cock with the new one from your repair kit. Screw the lock nut onto the ball cock shaft underneath the tank. Reconnect the water supply tube.

Don't forget to connect the refill tube to the new ball cock and run it into the overflow pipe. You're ready to turn on the water and flush away! Adjust the float ball as needed to get the right water level.



**Fig. 1: Replacing Your Tank Ball**

**Fig. 2: Replacing Your Ball Cock**

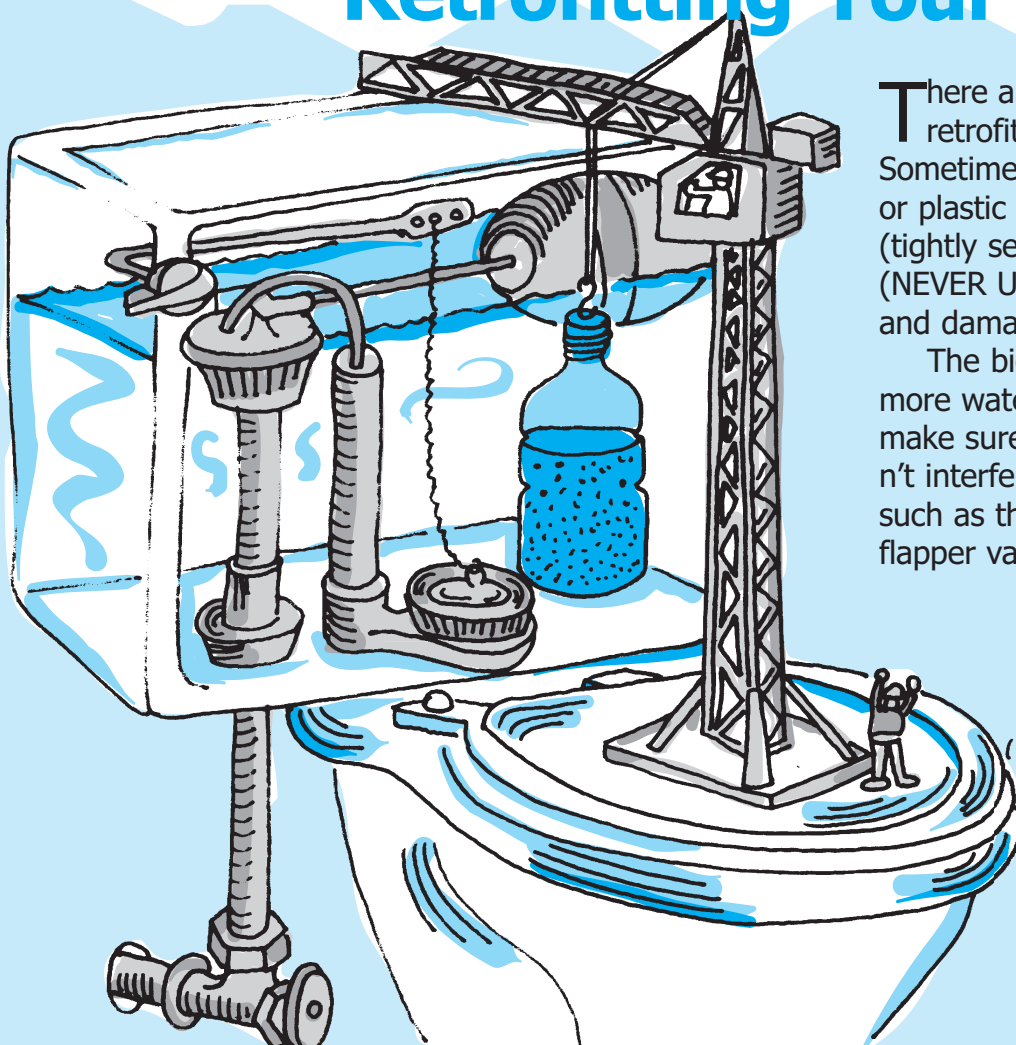


### When In Doubt...

**Refer to a good plumbing book or call a plumber .**



# Retrofitting Your Toilet



There are several simple ways to retrofit your toilet so it saves water. Sometimes you can use a plastic bottle or plastic bag filled with water and sand (tightly sealed) to displace tank water. (NEVER USE A BRICK! It can dissolve and damage your plumbing.)

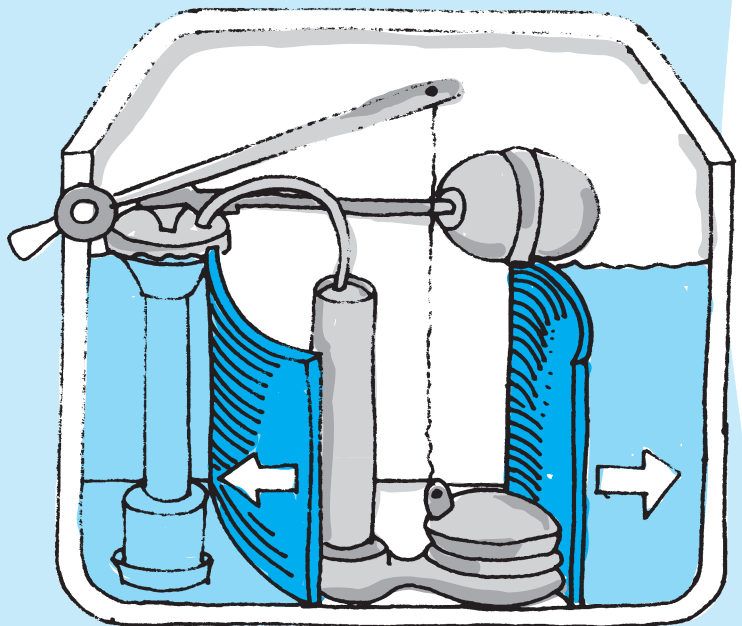
The bigger the bottle or bag, the more water savings per flush. Just make sure that the bottle or bag doesn't interfere with any moving parts, such as the float ball or flapper valve.

"WATCH THOSE MOVING PARTS UP THERE... EASY NOW"

Another option is to install a pair of flexible toilet tank dams. Toilet dam panels are typically constructed of flexible stainless steel surrounded by plastic or rubber. This enables you to bend the panels to fit almost all toilet tanks. Because they are flexed, the panels hold themselves in place.

To install a set of toilet dam panels, just remove the tank cover. Place a toilet dam panel on either side of the flush valve, as close together as you can without interfering with the flushing mechanisms. This will enable the dams to displace the greatest volume of water.

Adjust the panels as necessary. (In some toilets, you may only be able to use one dam.) The goal is to find an adjustment that combines adequate flushing with maximum water savings. Properly installed, toilet dams hold back about a gallon of water per flush.



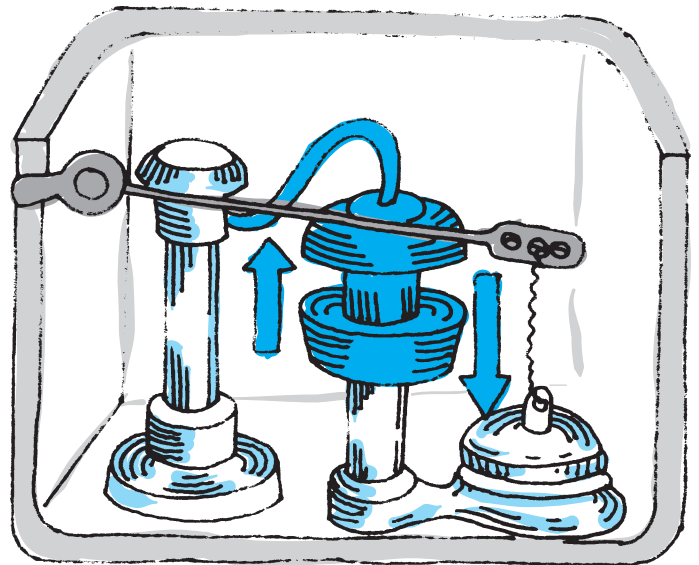


## NEW TOILET DEVICES

There are also additional devices that can be used to retrofit your existing toilet to conserve water. In general, these new devices enable an old, 3.5-gallon or 5-gallon toilet to perform its job while using about 50% less water.

The trick that many of these water-saving devices uses is both simple and ingenious. Although the toilet tank fills up with the same amount of water, the added device forces the flapper to close halfway through the flush — which means that only half the water is used. But the weight of the water that stays in the toilet tank generates sufficient “head pressure” required to create the strong flushing action needed to clear the bowl.

You can find retrofit water-conservation products at your local hardware store or home center. To install, just follow the instructions that come with the product.



**NOTE: Most water displacement devices work best in 5-gallon toilets, but water savings can also be achieved in 3.5 gallon models.**

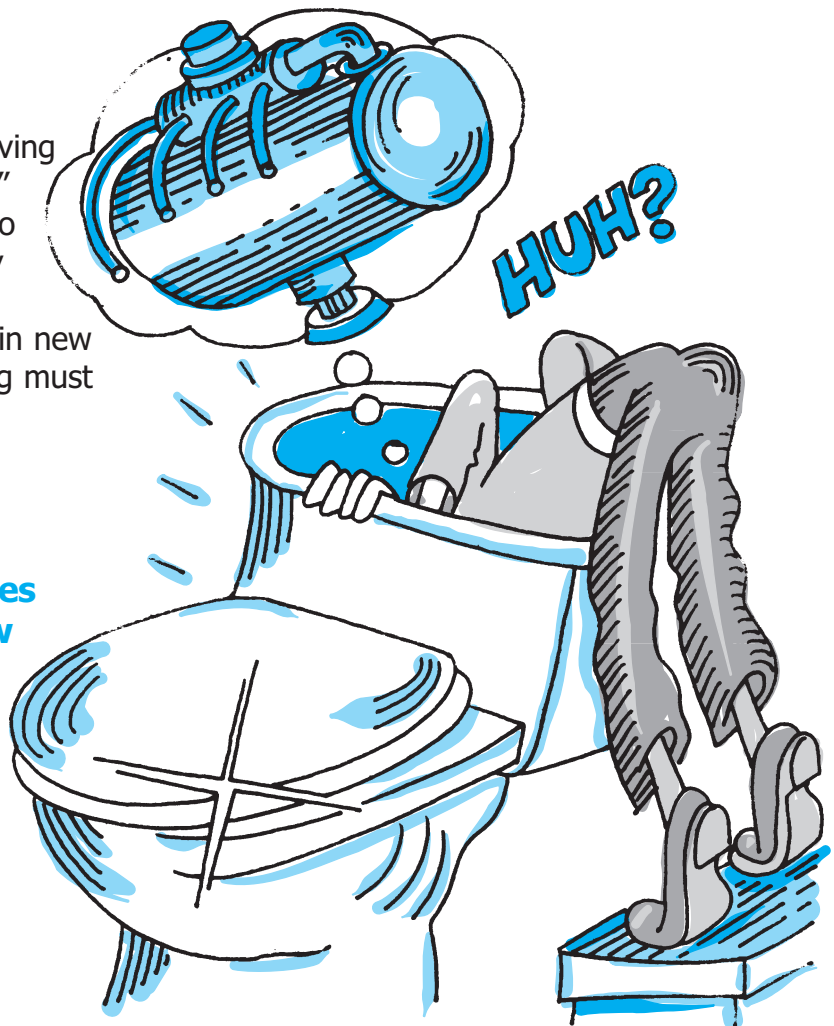
## REPLACING YOUR TOILET

If you are really committed to conserving water, consider “canning your commode.” Installing a low-flow toilet is a fast way to save thousands of gallons of water every year.

In most locations, all toilets installed in new housing or in remodelled existing housing must be low-flow (1.6 gallons or less) models.

### Do It Yourself?

**The local plumbing supply stores and home centers all sell low-flow toilets. Call a licensed plumber if you don't want to install a new toilet yourself.**





## REPLACING YOUR TOILET

### TYPES OF LOW-FLOW TOILETS

There are two basic types of low-water-use toilets: gravity-fed and pressure-assisted models.

Gravity-fed models are mechanically similar to conventional toilets. Like water-thirsty toilets, low-flow gravity-fed models use the natural force of water dropping from the tank to push waste through the bowl. Although these new toilets use 1.6 gallons per flush, their tanks may actually hold three or more gallons. The weight of this additional water pushes down on the water which is actually flushed. This improves the efficiency of the flush.

New low-flow models also have steeper bowls, which create more gravitational pull. In addition, the flush is aided by a rim wash, which sends water through an open slot (rather than through little holes near the rim.) All of these design changes enable these newer toilets to work effectively with much less water.

The newest design in toilets is the pressure-assisted model. Pressure-assisted toilets combine water and compressed air in a self-contained, cylinder-shaped vessel located inside the toilet tank. (Gone are the traditional flapper, ballcock and float arm.) When the toilet is flushed, the compressed air expands rapidly — reacting like a tightly coiled spring. This force pushes the water through the bowl at high velocity, and voilà— the job is done.

### How Much Do New Toilets Cost?

Your new, low-flow toilet can cost under \$100 for a basic, two-piece, gravity-fed model. If you want something fancier — a color other than white, a different bowl shape or a one-piece design — you can pay up to \$500 or more.

Pressure-assisted models start at about \$300 for a white, two-piece unit. A one-piece designer model can cost \$1,000 or more.

What about the cost of maintenance, you ask? The jury's still out. Pressure-assisted toilets have fewer moving parts, so presumably they may actually be easier to service than gravity-fed toilets. But because most homeowners are unfamiliar with the mechanics of the pressure-assisted models, they may be uncomfortable fixing it themselves when something does go wrong. And that means the cost of a plumber's house call.

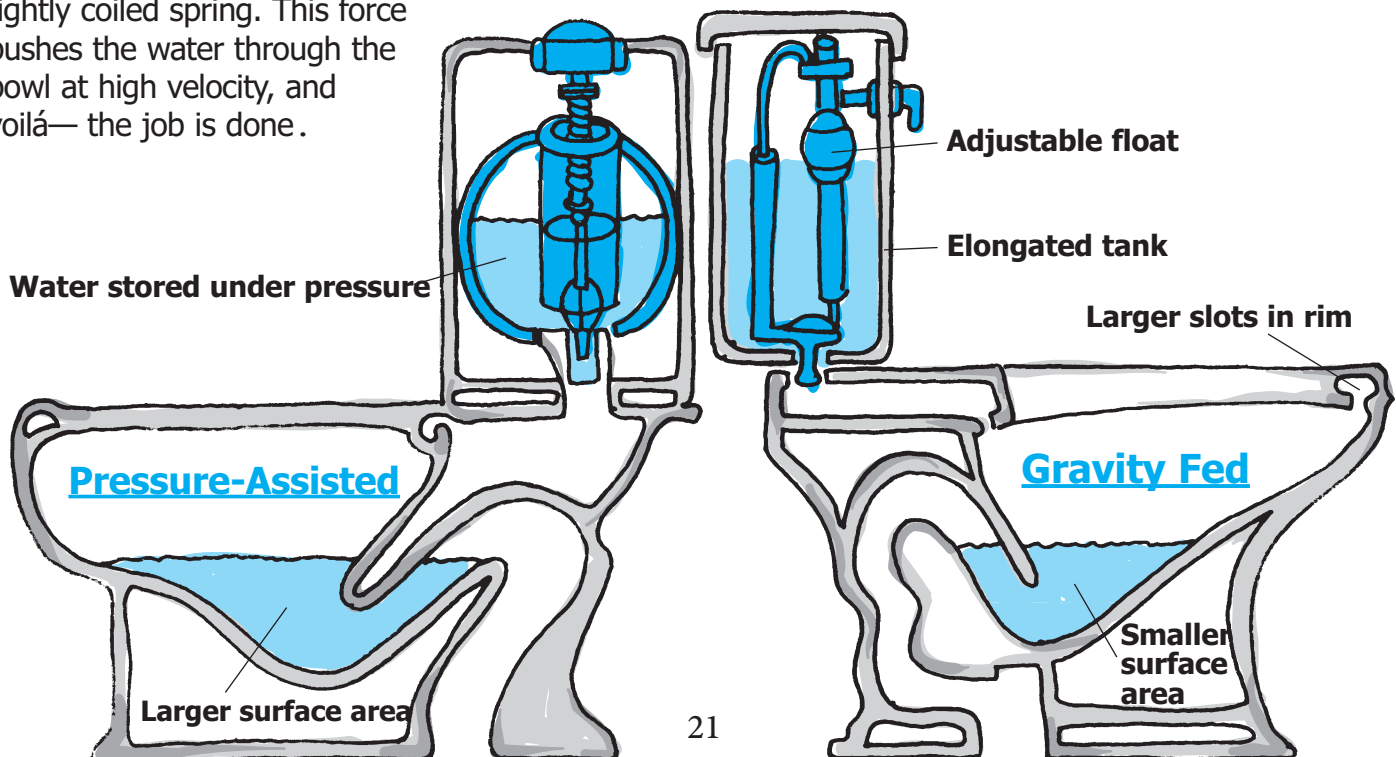
### How Much Water Do They Flush?

**Old Toilets: 91.3 gallons per day**

**New Toilets: 41.7 gallons per day**

**Water Savings: 55%**

**\*Based upon comparison of a 3.5 gallon toilet vs. a 1.6 gallon toilet in an average, four-person family.**





# FAUCETS & SINKS

Old faucets, like old showerheads, gush water at a wasteful rate. Today's faucets and faucet aerators (those manufactured after January 1, 1994) produce a maximum flow rate of 2.5 gpm. Because of their improved spray patterns, many fine bathroom faucet aerators use as little as 1.5 gpm.

If you have a old faucet that gushes water at 5 gpm, you owe it to yourself to install faucet aerators.

It couldn't be easier. Just unscrew your old aerator and replace it with a new one. If the old aerator is stuck, a pair of pliers should do the trick. To find the right replacement, take the old aerator to the hardware store.

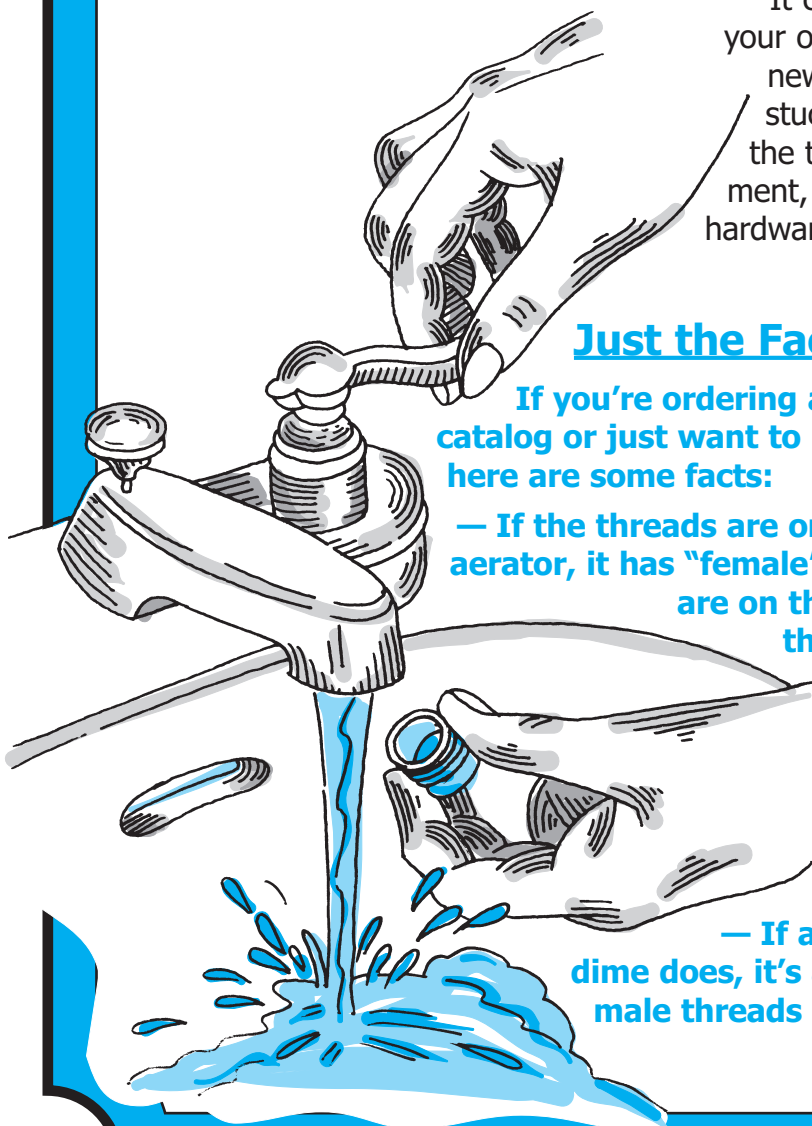
## Just the Facts

If you're ordering aerators online or from a catalog or just want to know more about them, here are some facts:

— If the threads are on the inside of your old aerator, it has "female" threads. If the threads are on the outside, it has "male" threads.

— If a nickel fits snugly into the threaded end, it's a standard-sized aerator (15/16" male threads or 55/64" female threads).

— If a nickel doesn't fit but a dime does, it's a small aerator (13/16" male threads or 3/4" female threads).





# Fixing Leaky Faucets:

## Use It, Don't Lose It!

**L**eaky faucets are a nuisance and a waste of precious water. Fixing a leaky faucet can be a little trickier than fixing a toilet — but it's still not rocket science. If, however, you feel uncomfortable with the operation, call a handy friend or a professional plumber.

Okay, now that we've gotten the disclaimer out of the way, we can begin! The first step in repairing any dripping faucet is to shut off the water supply valve on the pipe below the leaking faucet. (Look for an oval-shaped knob underneath the sink. There should be one for the hot water line and another for the cold water line.)

Found it? Turn the knob all the way to the right (clockwise) to shut it off. Good! If your faucet is still leaking, you've turned off the wrong water valve. Try the other one. (Note: when repairing a single-lever faucet, you'll need to turn off both the hot and cold water valves.) Then turn the faucet handle(s) on to drain the faucet.

Most faucet leaks are fixed by replacing the "seat" washer. You may also have to replace the packing washer (or the packing wicking, which comes in a long string and is wrapped around the spindle) inside the valve.

Plug the drain so small parts cannot fall in. It's also a good idea to protect the sink with a towel. Make sure you set parts aside in the exact order you remove them. It will make the task of reassembling much easier.

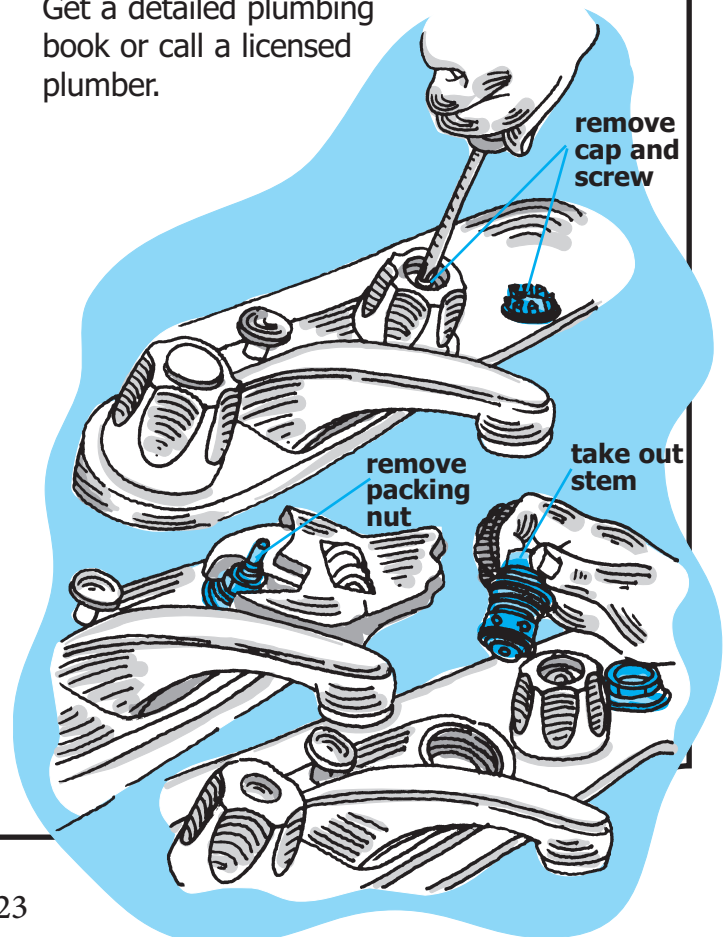
Remove the protective cap with a utility knife or flat-head screwdriver. With a

screwdriver, remove the handle screw and pull the handle straight up. Use an adjustable wrench to unscrew the packing nut.

Try to unscrew the stem by hand. If it's too tight, set the faucet handle back on the stem and turn it in the same direction you would to turn on the water. This should remove most stems.

Standard stem faucets use flat washers with holes for washer screws. Take off the washer screw and replace the old seat washer with a new one from a hardware or plumbing store. (Always use a brass screw to install a washer!) Then reassemble the parts and try your new, leak-free faucet!

If this simple washer repair doesn't fix the problem, you may need to replace the packing washer, the stem, or the stem seat. Get a detailed plumbing book or call a licensed plumber.





## FIXING LEAKING FAUCETS

### ANATOMY OF A TYPICAL FAUCET

Most two-handle water faucets are compression-type (also known as “stem”) units. Even though they may not look alike, they are similar in operation and repair. When you turn the handle to shut off the water, the stem moves down and an attached hard-rubber washer prevents water from flowing through the valve seat. (A packing washer around the faucet stem keeps water from flowing out the stem.)

When the faucet leaks, it’s most likely a worn out washer. In some cases, the stem might also need to be replaced.

### DIAPHRAGM STEM FAUCETS

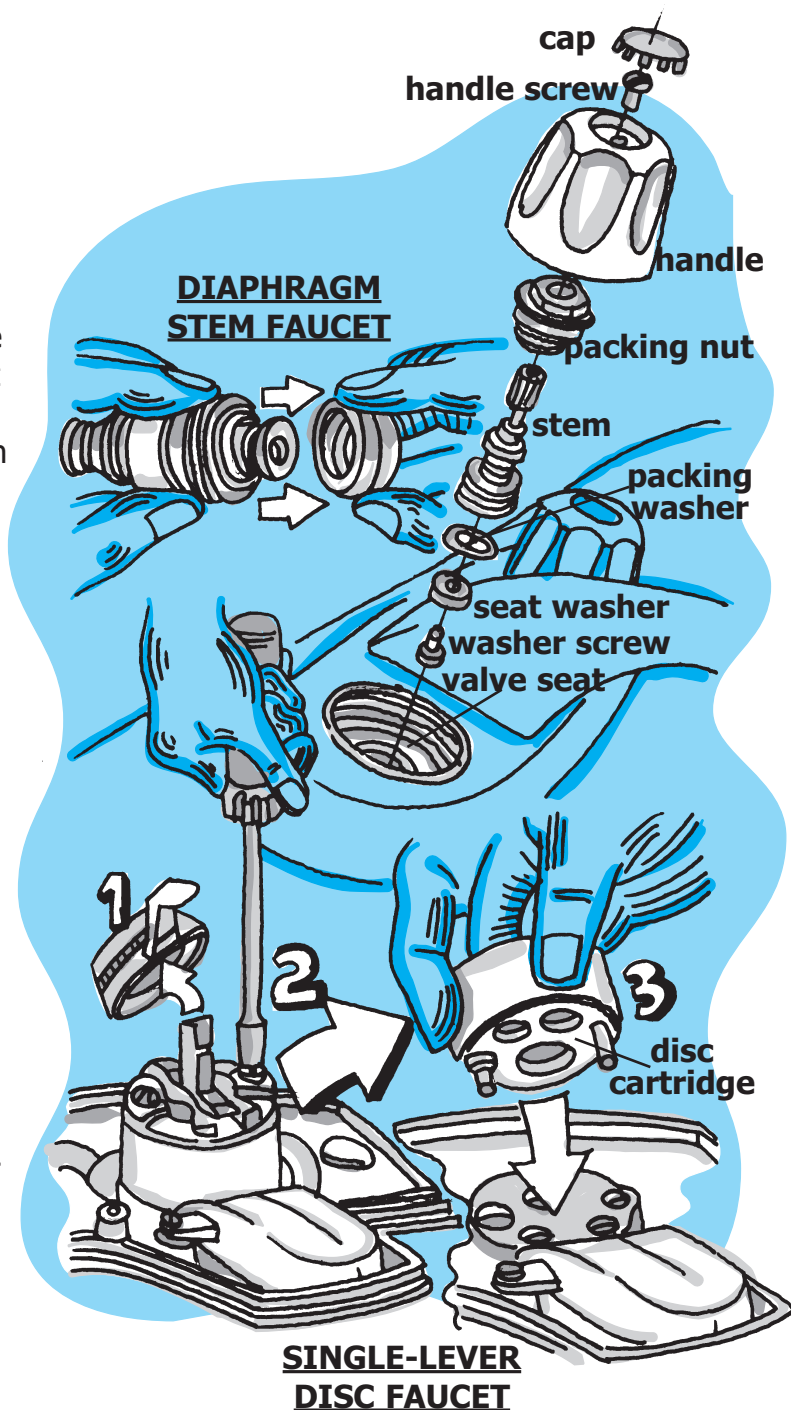
Different stem faucets require their own types of seat washers. In a diaphragm stem faucet, a rubber cap called a diaphragm does the work of the washer, covering the bottom of the stem. Remove the old diaphragm and replace it with a new one.

### REPAIRING SINGLE-LEVER FAUCETS

Many newer homes have washerless single-lever faucets. There are four basic types — disc, valve, cartridge and ball-and-cam. In addition, there are differences within each of these types.

When repairs are required, purchase a repair kit for your particular faucet model. The repair kit will include all the parts that need to be replaced plus instructions showing you how to do the job. Installing these replacement parts should result in a faucet which functions properly for several years without needing further repairs.

To fix a leaky washerless faucet you’ll need the proper replacement parts. Take the old parts to a hardware or plumbing store or know the manufacturer and model number of the faucet you’re fixing.



### Water-Saving Tips

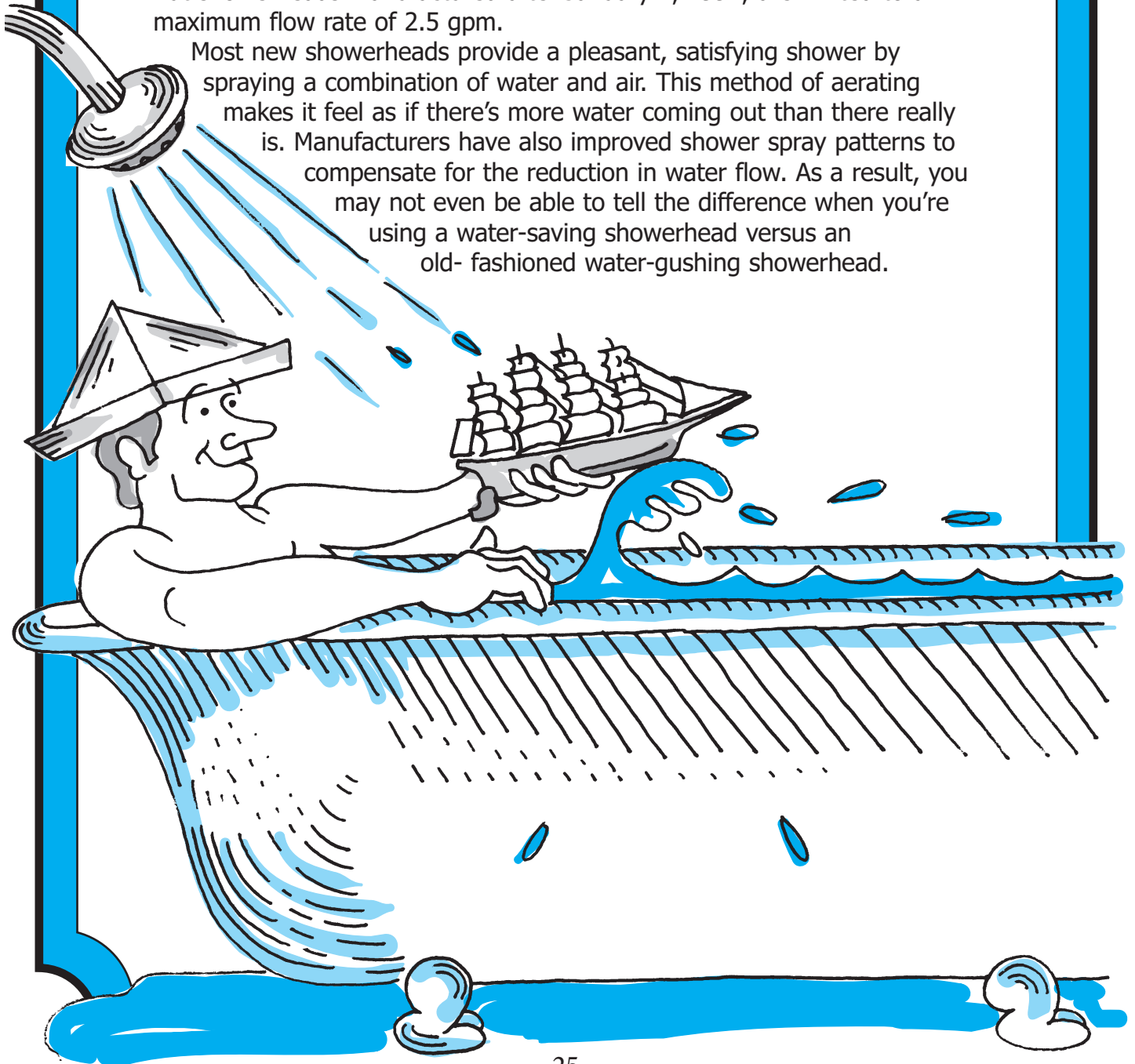
- Turn off the faucet while you brush your teeth. (Save 2 gallons or more every time you brush!)
- Turn off the tap while you shave. (Save 10 gallons or more!)



# SHOWERS BATH & TUBS

The second-biggest water user in your bathroom (and perhaps in your house) is the waterfall you call the shower. Old-fashioned showerheads pour water out at 5 gallons per minute (gpm)— or sometimes even more. But showerheads manufactured after January 1, 1994, are limited to a maximum flow rate of 2.5 gpm.

Most new showerheads provide a pleasant, satisfying shower by spraying a combination of water and air. This method of aerating makes it feel as if there's more water coming out than there really is. Manufacturers have also improved shower spray patterns to compensate for the reduction in water flow. As a result, you may not even be able to tell the difference when you're using a water-saving showerhead versus an old-fashioned water-gushing showerhead.





# Conduct a "Shower-Smart" Test



There's a simple way to determine how much water your showerhead puts out. All you need for this test is a watch with a second hand and a one-gallon bucket.

1. Turn on the shower to your usual water pressure preference. (Be honest! If you usually take a shower with the water turned up to "full steam ahead," measure it that way!)
2. Hold the bucket under the stream of water and time how many seconds it takes to fill one gallon.
3. Compute the results based on this chart:
  - 10 seconds: 6 gallons per minute (gpm)
  - 12 seconds: 5 gpm
  - 15 seconds: 4 gpm
  - 20 seconds: 3 gpm
  - 24 seconds: 2.5 gpm
  - 30 seconds: 2 gpm

If your current showerhead's flow rate is 3 gpm or higher, it's time to replace it with a water-efficient, low-flow showerhead!

## How Much Can You Save?

Let's say you live in a water-wasting, four-person household. Everyone showers every day for 10 minutes with an older (5 gpm) showerhead. That's 50 gallons per shower, or 200 gallons per day for all four showers. Then you decide to become a water-thrifty family. Now everyone in your family takes a 5-minute shower with a low-flow showerhead. That's just 12.5 gallons per shower, 50 gallons of water per day!

Daily savings = 150 gallons

Annual savings = 54,750 gallons

### SING SHORTER SONGS

Do you know how much time you spend in the shower? If not, time yourself. You might be surprised at how long you spend in the shower—and how much water you use.

Try taking shorter showers. It doesn't take a genius to figure out that a 5-minute shower uses half the water of a 10-minute shower.

The combination of shorter showers and a low-flow showerhead can easily cut your water use in the shower by 75%!

### Shower Tip

When waiting for your shower water to get warm, collect the cold water in a bucket. Use this water for indoor or outdoor plants!





## INSTALLING A LOW-FLOW SHOWERHEAD

Low-flow showerheads are available at plumbing and hardware stores. They range in price from about \$15 to \$300, and many excellent models sell for \$30 or less. (Some even have a handy flip switch which enables you to turn off the water while you're soaping up!)

Installing your new low-flow showerhead is usually quite easy. Most of the time you can just twist off the existing showerhead and twist on the new one in its place.

If, however, your shower pipe has a ball joint, you'll probably need an adapter. (Ask the friendly person at the hardware store.) When installing the new showerhead, teflon tape or pipe joint compound should be applied to the exposed threads of the pipe neck and/or the wrench to provide a leak-proof connection.

NOTE: If the old showerhead is too tight to unscrew with moderate pressure, consider having a plumber replace it. (Excessive force may cause the line inside the wall to break.)



## BATHTUB TIPS

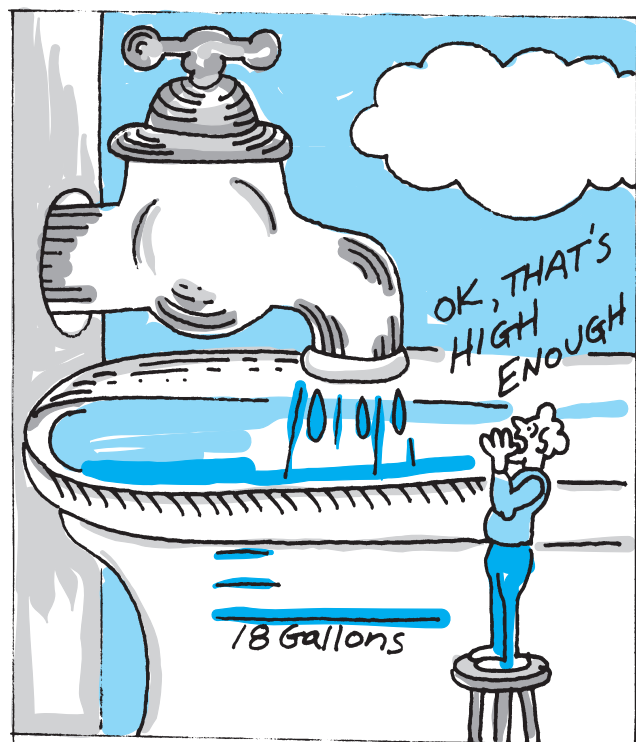
There are simple ways to save water in the bathtub, too. Start by filling the tub with less water. The average bathtub holds about 36 gallons of water. If you only fill it up halfway, you're saving 18 gallons. (That's the equivalent of a 7-minute shower using a low-flow showerhead.)

Close the drain before starting the faucet. The first gallon or two may be cold, but it warms by mixing with the hot water that follows.

Also, make sure your drain is watertight. An inch of hot water leaking out a badly sealed drain equals about 4.5 gallons.

### Energy-Smart Tip

**Saving water in the shower and bathtub also saves the energy it takes to heat it.**

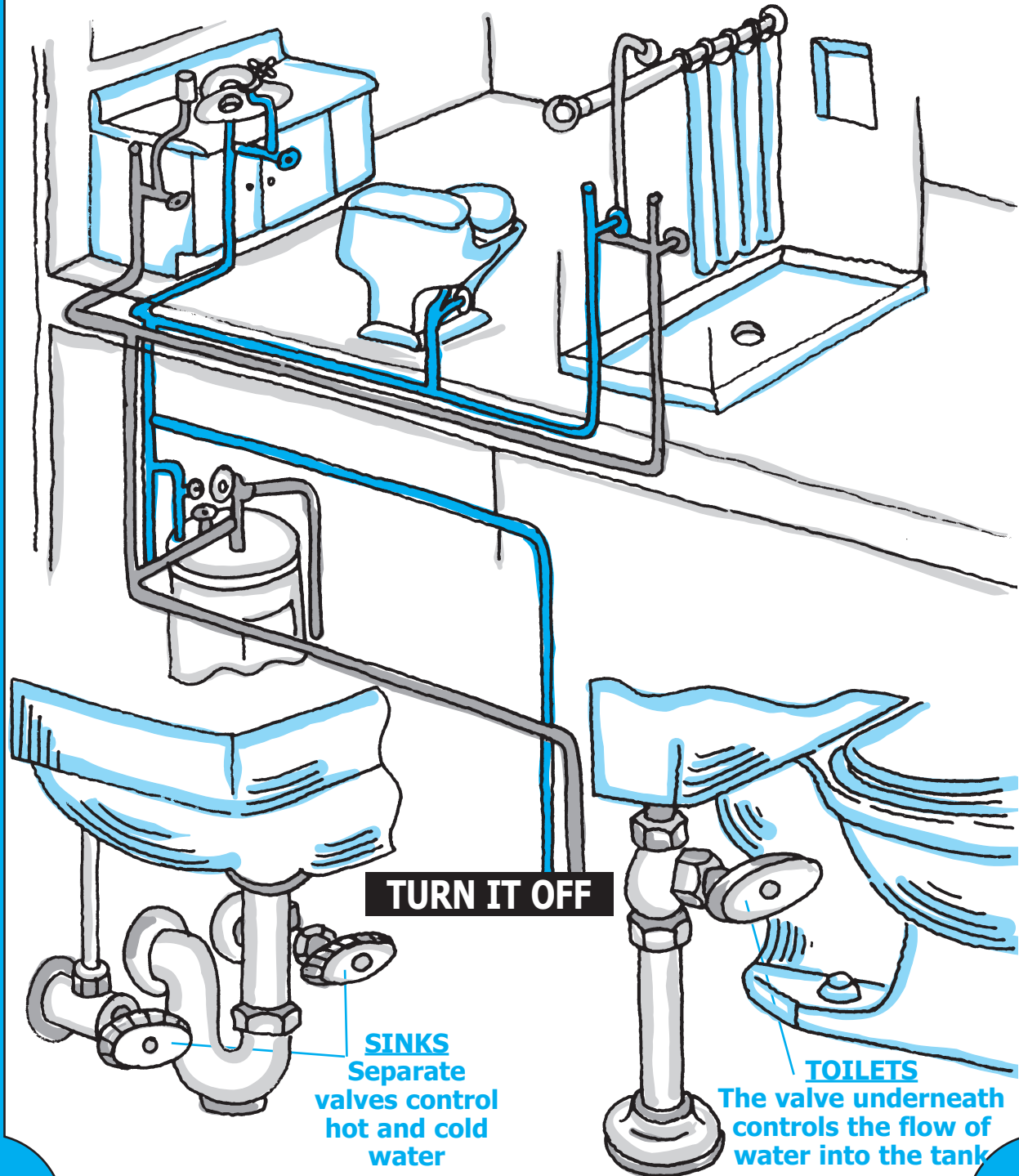




# BATHROOM

## PLUMBING BASICS

Here's how the basic water distribution system is set up for a typical bathroom.



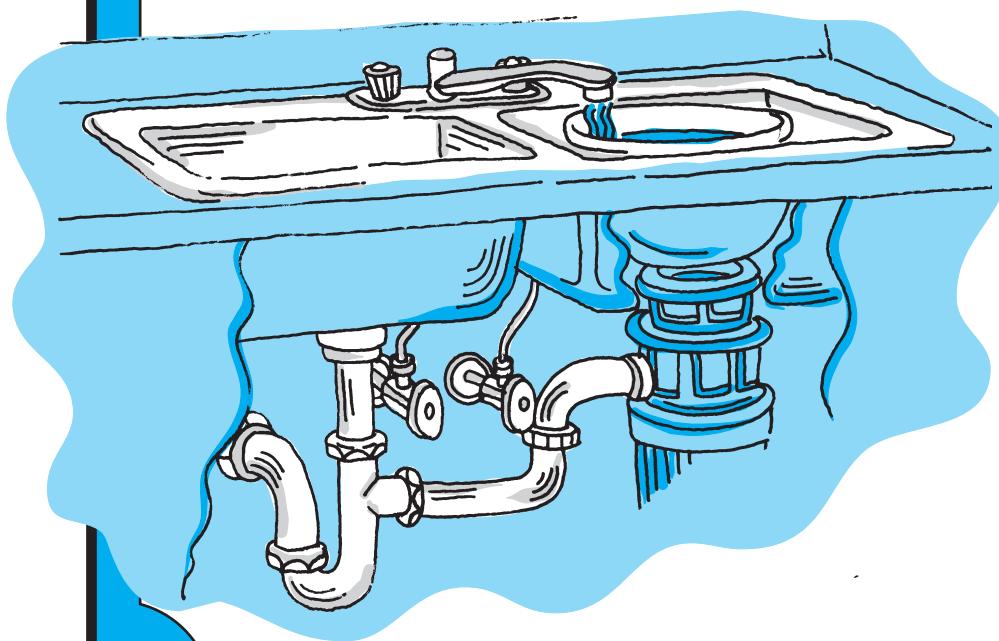


# IN THE KITCHEN

Just about every job you do in the kitchen uses water — from washing your hands and washing off your vegetables to washing the dishes after you've eaten. The kitchen ranks as the third-highest water-using room in the typical home (after the bathroom and the laundry room). There are still plenty of easy ways to reduce your kitchen water use. Here are just a few:

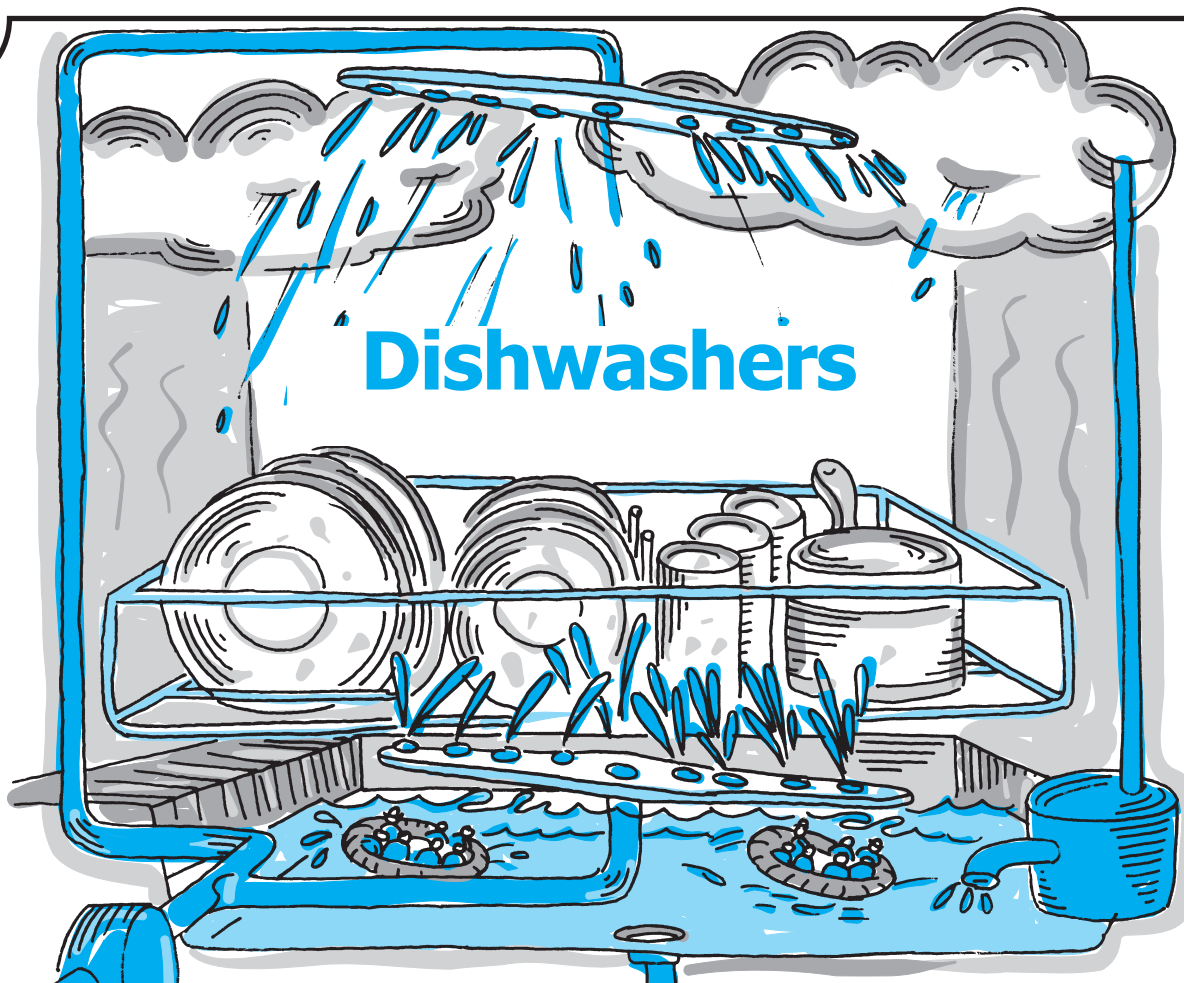
- When washing vegetables and fruits, don't just let the tap run. Instead, fill a bowl with water. After you're done, use this water for potted plants.
- Keep a container of water in your refrigerator. It's a much more efficient way to get a cold drink than turning on the faucet and letting the water run until it's cold!
- When defrosting food, fill the sink with enough water to cover the food item. (You'll probably have to weight it down with something.) Don't yield to the temptation of running hot water over your frozen item such as a can of frozen orange juice.

For more kitchen water-saving advice, read on.



**The typical kitchen's plumbing system looks like this. Water enters the house through a main service pipe. Kitchen sinks and dishwashers are fed by separate cold water and hot water piping. A separate set of drain pipes carries used water out of the house into the municipal sewage system.**





Dishwashers are wonderful, labor-saving inventions. When used properly, a dishwasher can also be a smart water-saving appliance.

Most dishwashers use about 16 gallons for a full wash cycle. That's fine if you've filled it up. But using the full wash cycle for a partially loaded dishwasher is a waste of good water. If you're washing less than a full load, adjust your dishwasher's cycle accordingly. Many modern dishwashers enable you to wash a small load or run a partial cycle—using only 9 gallons. Water savings: 44%!

If you're in the market for a new dishwasher, ask about the water consumption of various models. Choose one that is water-wise! It will not only save water—but it will save energy and money in the long run.

## WASHING DISHES BY HAND

Do you leave the water running while washing the dishes? With a conventional tap running (at 3.5 gpm), you'll use 30 gallons or more every time you clean up. But if you wash and rinse in a filled sink or dishpan (using a faucet with a 2.5 gpm aerator), you'll only use 5 gallons. Water savings = 25 gallons!





# FAUCETS AND SINKS

If you live in a typical household, about 6% of your daily indoor water use occurs at your kitchen sink. Even though that may not sound like a lot, there are many easy ways to save water in the kitchen. Best of all, they'll cost you little or nothing.

## FAUCET AERATORS

We've already discussed faucet aerators in the section entitled "The Bathroom," so we don't need to belabor the point. If you have an old-fashioned faucet that gushes 5 gallons per minute, install a new aerator.

The best kitchen faucet aerators supply 2.5 gpm, mixing air and water to give you enough volume and water pressure to get your kitchen-cleaning jobs done.

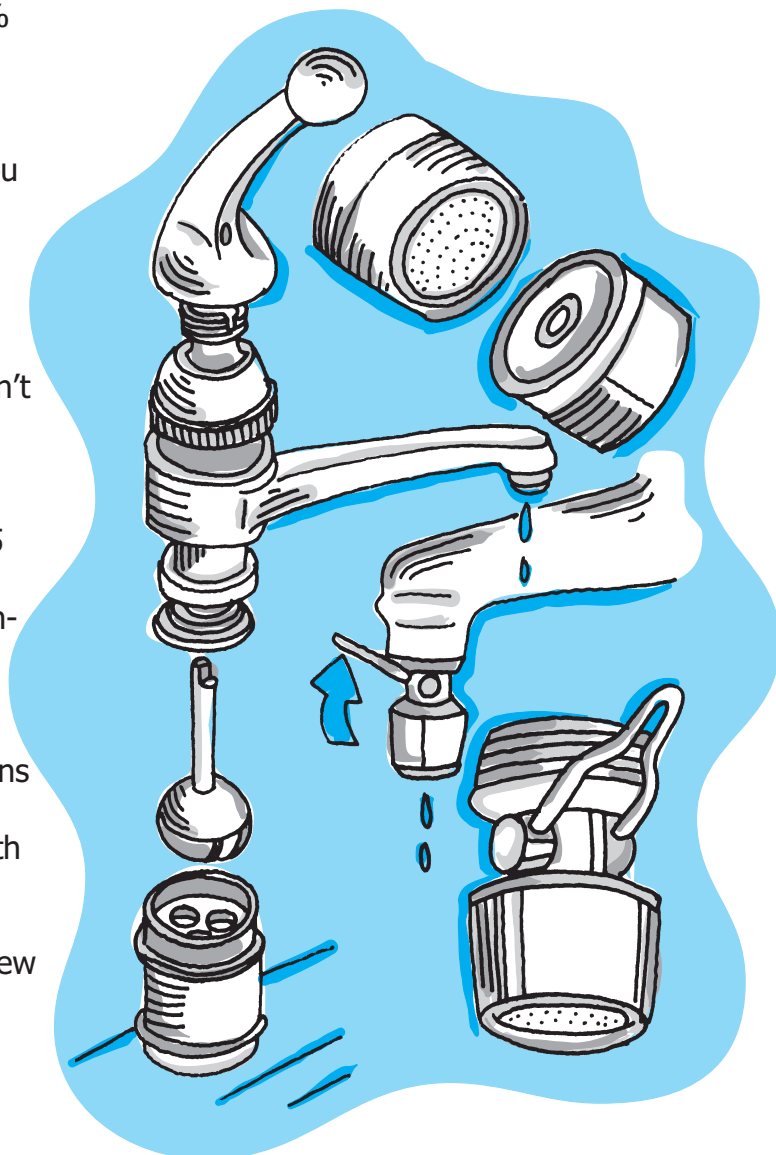
There are several types of kitchen faucet aerators. Spray taps resemble miniature showers, making washing and rinsing operations handier and more efficient. Combined spray tap/aerators combine the spray tap feature with a standard aerator, enabling you to select the spray pattern you want for a given job. On/off aerators feature a flip-lever (similar to many new showerheads) that enables you to quickly turn off the water, then instantly turn it back on at the same temperature setting. It's very handy!

Remember, installing a new aerator is simple. Just unscrew your old aerator and replace it with a new one. If the old aerator is stuck, a pair of pliers should do the trick.

## FIX LEAKY FAUCETS

A leaking faucet is a major water thief; it can waste up to 100 gallons per day! Fixing a faucet is usually easy (even for the "plumbing impaired") and can usually be done at very low cost.

Talk to your home store professional to get advice, and see the "Faucets and Sinks" pages in the Bathroom section of this book for specific advice about fixing faucets. Remember, when in doubt, call a plumber.



## Is Your Faucet Wasting Water?

**If you're not sure how much water your faucet delivers, here's a simple test:**

- 1. Get a watch or clock with a second hand and a container that can measure one gallon.**
- 2. Turn on the faucet at the pressure you would normally use.**
- 3. Time how many seconds it takes to fill the container to one gallon. If it takes less than 20 seconds, your flow rate is over 3 gallons per minute. Your faucet needs a new aerator! A low-flow kitchen faucet aerator uses only 2.5 gallons per minute — even with the tap wide open.**



# Home Water Treatments

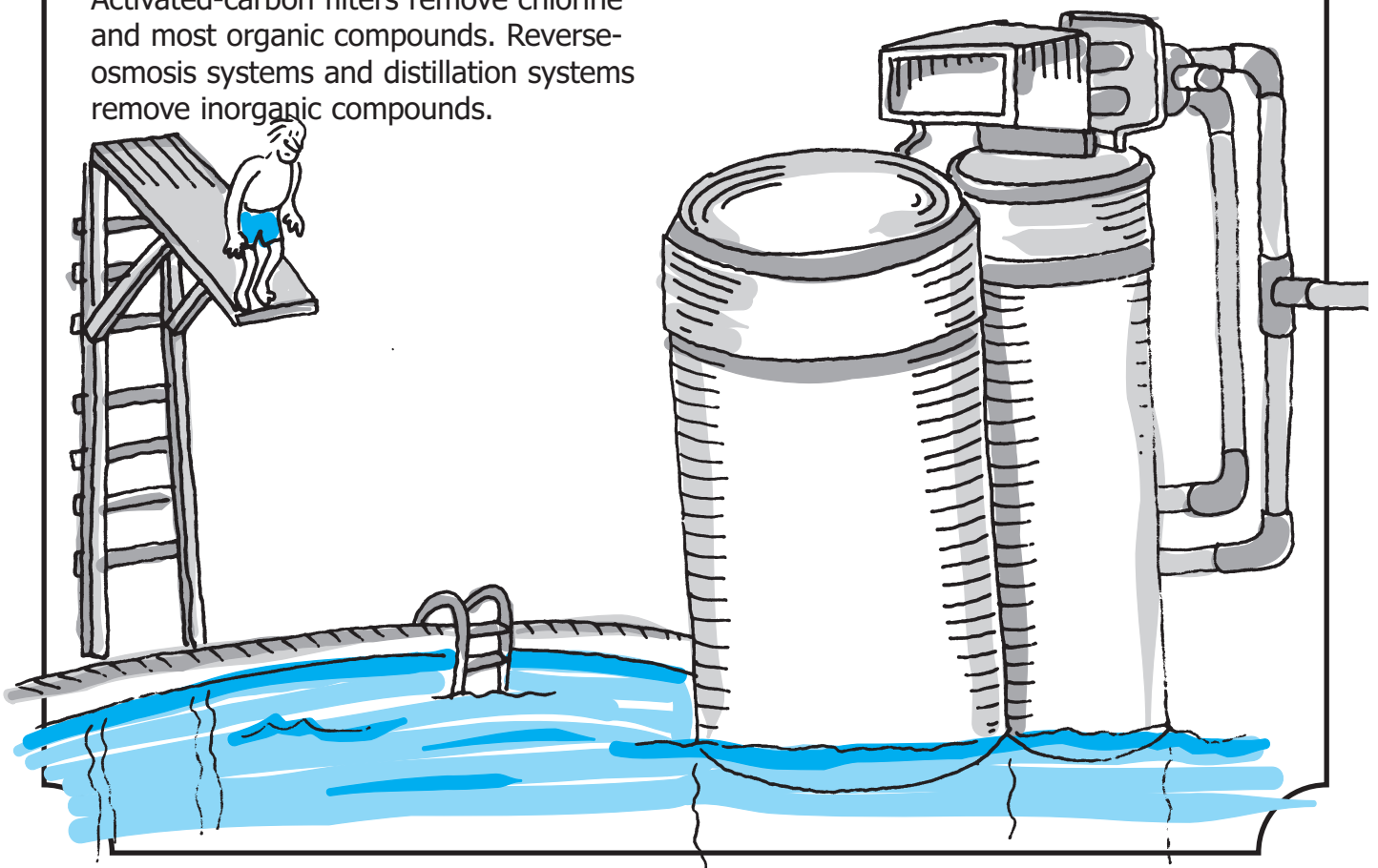
If your community's water supply meets or exceeds federal drinking water standards required by the U.S. Environmental Protection Agency (EPA), there is no need to further treat your tap water.

Even so, many homeowners and renters have elected to install home water treatment systems or water softeners/conditioners. (Water treatment systems are designed to remove chemical impurities, while water conditioners simply remove minerals which can leave hard water stains on glass and metal surfaces.)

There are several types of water treatment systems. The most common water treatment systems are (1) activated-carbon filter, (2) reverse-osmosis and (3) distillation. Activated-carbon filters remove chlorine and most organic compounds. Reverse-osmosis systems and distillation systems remove inorganic compounds.

From a water conservation standpoint, reverse-osmosis systems and water softeners waste surprising amounts of water. Older reverse-osmosis systems use 3 or more gallons of water to produce one gallon of drinking water. The rest goes down the drain. What's worse, some poorly designed units keep running water down the drain after the storage tank is full. This can waste up to 40 gallons a day— or up to 15,000 gallons per year. Water softeners consume from 15 to 120 gallons for every 1,000 gallons processed.

When purchasing or leasing a home water purification system or water softener, choose one that wastes the least water during processing.





# THE LAUNDRY ROOM

**B**elieve it or not, this tiny room is the second-biggest water user in your home. Getting clothes clean is a water-intensive job, but there are many ways to reduce your use.

Conventional large-capacity washing machines manufactured before 1994 use about 50 gallons of water per full load. Post 1994 conventional machines use about 40 gallons per full load. A new breed of high-efficiency machines appeared on the market in about 1996 that uses just 25 gallons of water to wash a large capacity load.

In addition to cutting water use as much as 50 percent, high-efficiency machines often get clothes cleaner with less fabric wear and spin clothes faster to reduce drying time. Although these machines can be more expensive, the annual savings of detergent, energy and water make them a cost-competitive choice.

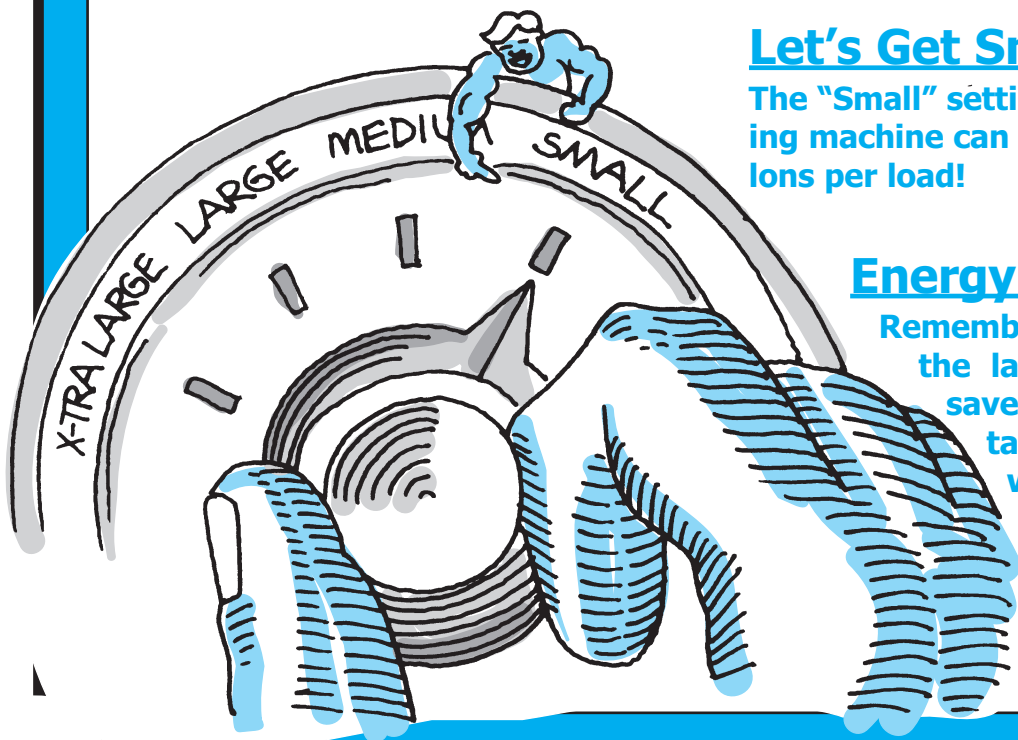
Whatever style of machine you use, wash only full loads or adjust the water level setting appropriately.

## Let's Get Small

The "Small" setting on your washing machine can save up to 30 gallons per load!

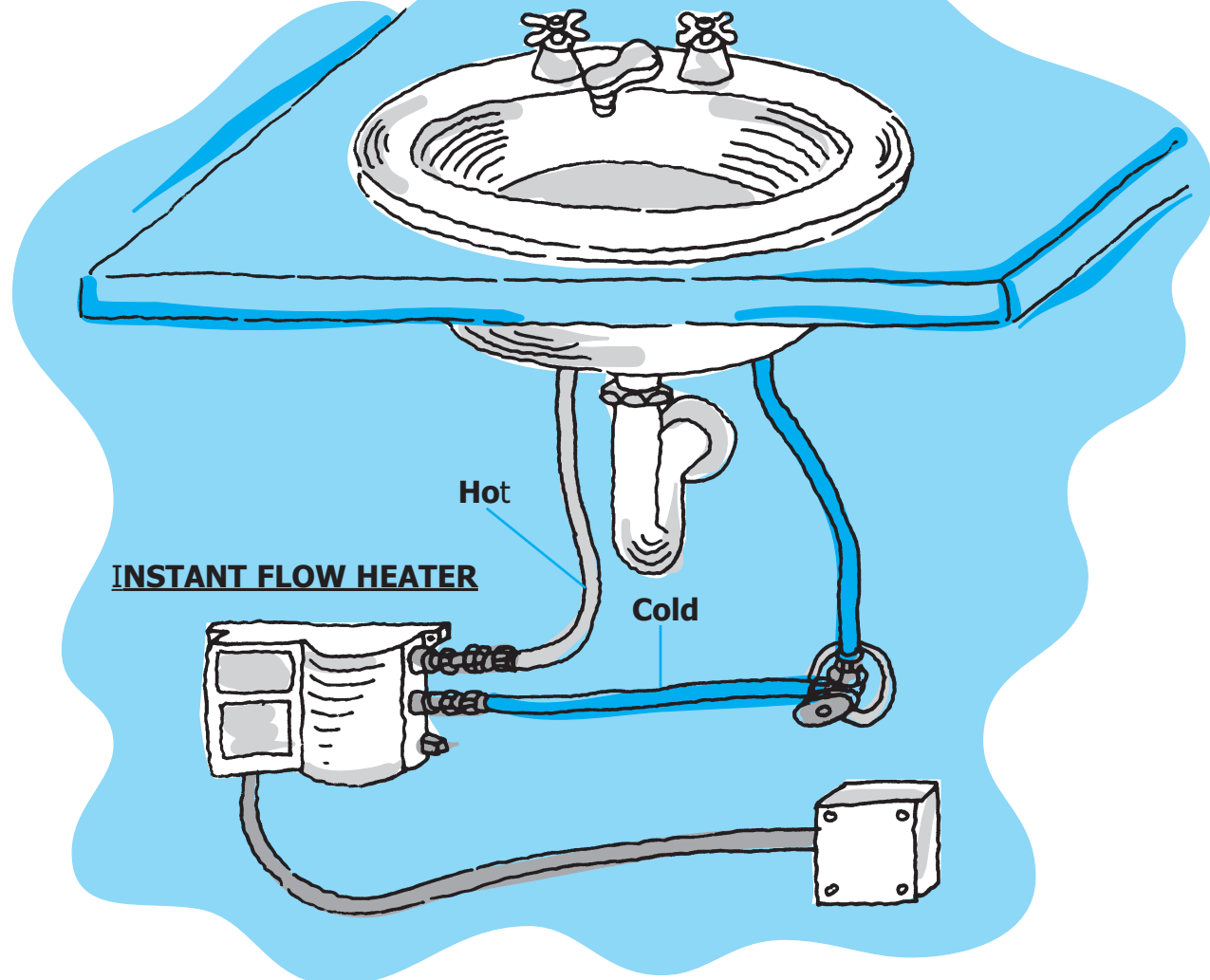
## Energy Tip

Remember, saving water in the laundry room also saves the energy it takes to heat up the water. That means a savings on your gas/electric bill!





## "Instant" Hot Water Heaters



In some homes, the water heater is located far away from the most-used faucets and showerheads. This results in having to waste water by running the faucet for a few minutes until the water gets hot. You can catch the cold water the low-tech way — in a five-gallon bucket — and use it to water plants. But there are other solutions.

Consider an "instant" hot water dispenser, a tankless water heater or a hot water circulation pump.

Instant hot water dispensers are most commonly installed in the kitchen to immediately prepare hot beverages, soups and other foods. The dispensers have a spout separate from the sink's faucet and

a small holding tank with a heating element from which to obtain hot water.

Tankless hot water heaters (also known as "point-of-use heaters") are designed to be installed under the bathroom or kitchen sink. They provide a small amount of hot water upon demand.

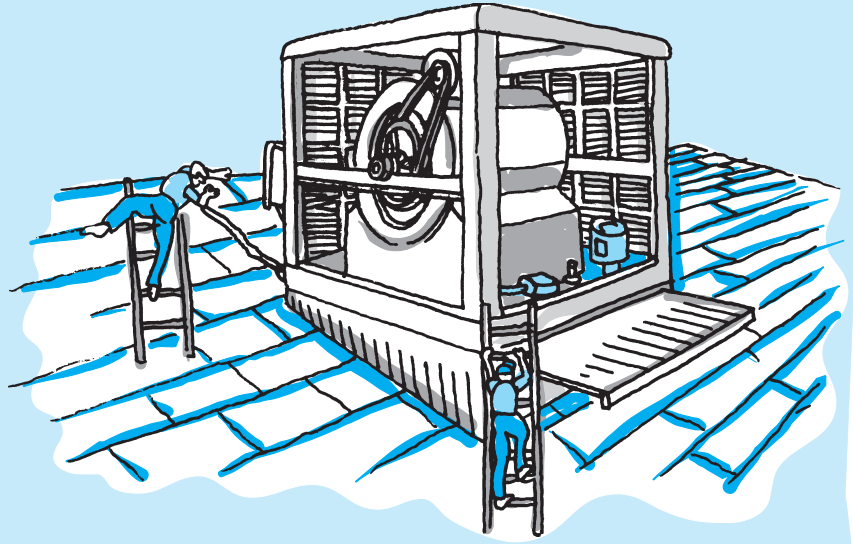
Hot water circulation pumps continually cycle hot water from the main water heater to the farthest faucets and back. This ensures that hot water is always available from every faucet. (Circulation pumps are most practical when designed into new construction.)



# On the Roof: Evaporative Coolers

If you live in an arid region of the U.S., you may have an evaporative cooler. There's good news and bad news about the evaporative coolers (also commonly known as "swamp coolers") that dot roofs. The good news is they are remarkably energy efficient. An evaporative cooler uses only one-third the energy of a refrigerated air conditioner. The bad news is they use far more water than air conditioners. That's because they cool by evaporating the water that flows through the pads.

Limited research shows evaporative coolers use between 50 and 200 gallons per day in the summertime — depending on home size, home construction, cooler location and efficiency. Diligent swamp cooler maintenance and efficient use will save water and keep you more comfortable during the summer months.



## When Should You Turn It On?

**If you want to save water, don't be so quick to turn on the cooler. You'll use 50% less water if you turn on your cooler when the outside temperature is 85 degrees rather than turning it on when it's 79 degrees.**

To make sure your "swamp cooler" is making the most of the water it uses, use the basic guidelines below for servicing and operating your cooler.

### **COOLER OPERATING TIPS**

1. Turn the water pump on for a few minutes before turning the fan on. This will saturate the cooler pads with water, making your cooler more efficient when you turn on the fan.
2. Open a window a crack in rooms that you want to cool.
3. Use ceiling fans to circulate air.
4. During the evening, operate your cooler fan without the water pump. Cool air will be brought down into your house without using any water.
5. Install a thermostat so your cooler can be water-wise and energy-wise.



## SPRING CLEANING

1. Uncover your cooler and remove the panels. Clean out any debris in the water pan.
2. Check the tension of the fan belt. When you press it with your thumb it should move about an inch. Lightly oil the bearing on the blower assembly and the motor (if it has an oil receptacle).
3. Install new cooler pads according to the manufacturer's recommendation.
4. Reconnect the water line and turn on the water supply. Check the float valve to make sure it's operating properly. If the cooler tray overfills with water, adjust the float arm by bending it downward.
5. Switch on the cooler and inspect the motor and recirculating pump. Make sure the cooler pads are being evenly saturated with water. Inspect the cooler tray to make sure there are no split seams or rusted areas which could cause a leak.

## SUMMER CHECK-UP

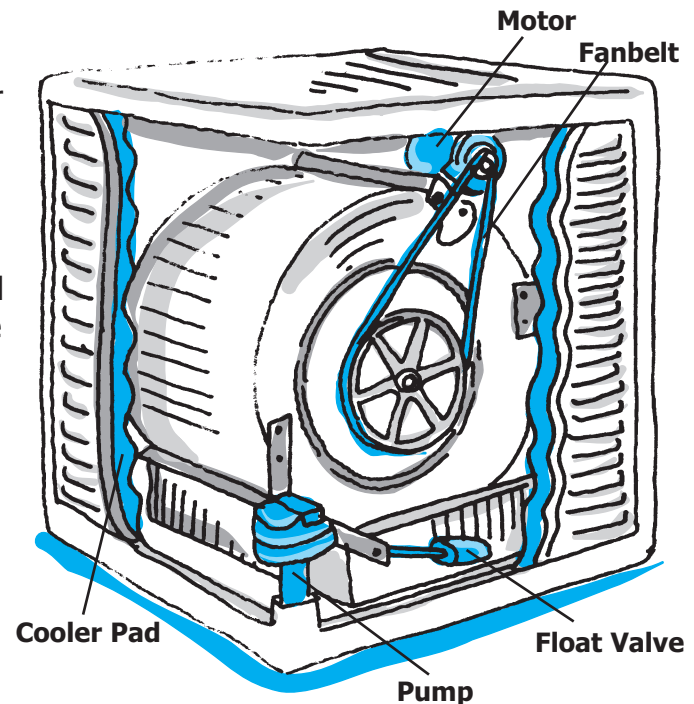
1. Check the water level in the bottom tray. It should be about one inch below the top of the tray (and below the top of the overflow pipe!). If the water level is too high or too low, adjust the float arm.
2. Make sure the float valve is operating properly. A sticking valve will cause the water to run continuously, which will cause the water to overflow the tray. If you constantly hear water running, or if water from your cooler is running off your roof, your float valve may not be working properly. Adjust your float arm. If this doesn't fix the problem, install a new float valve or call a plumber.
3. Check all other working parts, including the pump, motor and fan belt.
4. Check the condition of the cooling pads. The cleaner the pads, the more efficient the cooler. If the pads have a heavy accumulation of mineral deposits, replace them.
5. Some coolers have a "bleed-off valve" to drain the recirculating water to prevent excessive mineral buildup. Make sure it's adjusted properly to drain no more water than is necessary. Check the manufacturer's recommendations for best results.

## FALL SHUTDOWN

1. Add some vinegar to the bottom tray to dissolve any buildup of minerals.
2. Turn off the water supply and drain the water from the bottom tray. Gently scrape out mineral buildup and cooler pad fibers with a wire brush or a putty knife. Remove the cooler pad holders and inspect the water trough for clogged holes. Clean clogged holes with a brush or screwdriver.
3. Dry the bottom tray and inspect it for cracks. To help prevent rusting, coat the tray with submarine sealer.
4. Disconnect the water line from the cooler to prevent the lines from freezing.
5. Cover the cooler to protect it and to prevent cold air from entering your house in the winter.

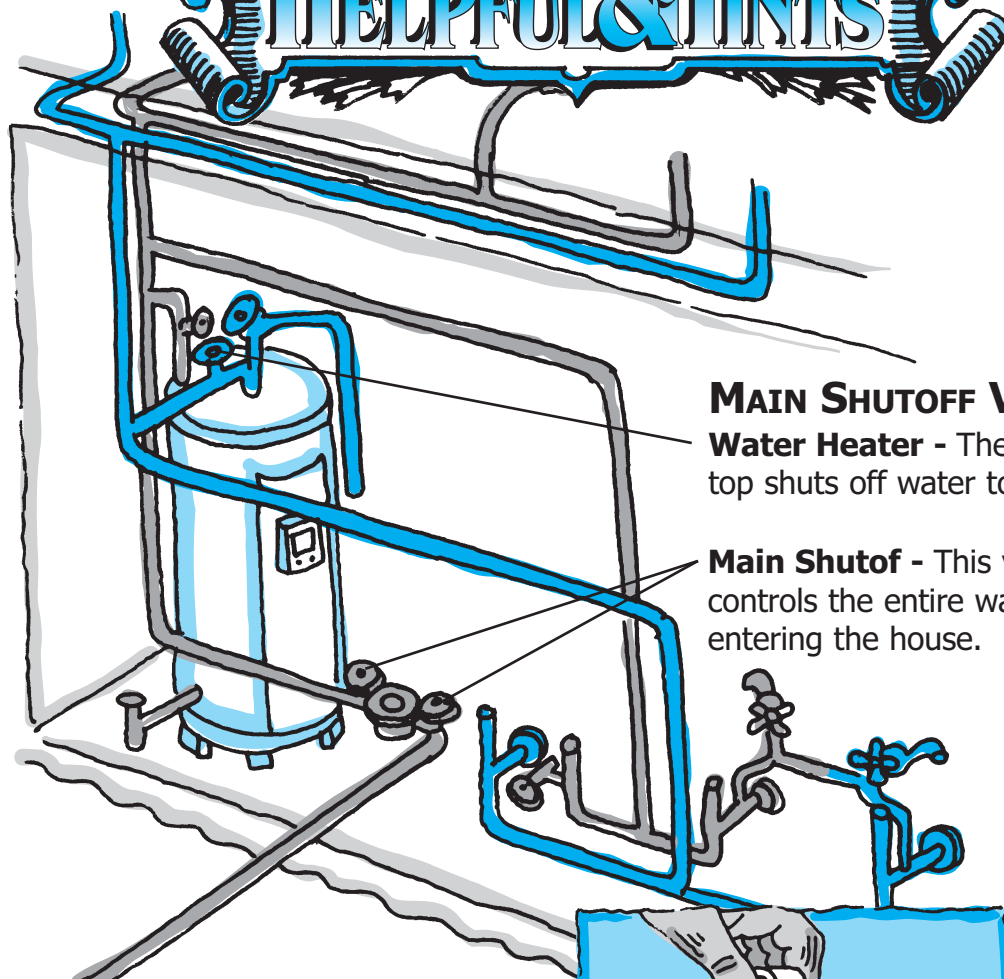
## "Swamp" Cooler Water Use

A study done in Phoenix revealed some interesting facts about cooler water use. The average evaporative cooler used 64.7 gallons per day. Coolers accounted for 12.4% of total household water use in the summer.





## GENERAL INFORMATION Helpful & Hints



### MAIN SHUTOFF VALVES

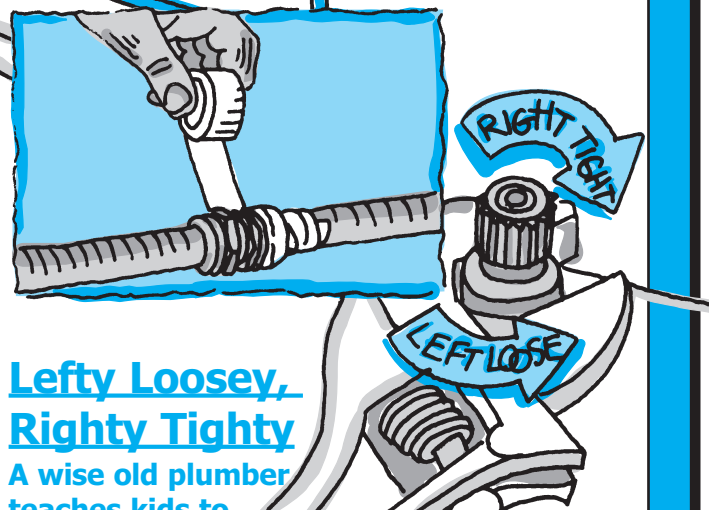
**Water Heater** - The valve at the top shuts off water to the unit.

**Main Shutoff** - This valve controls the entire water supply entering the house.

### MENDING LEAKY PIPES

Most pipe leaks are caused by frost damage or corrosion. If you ever need to fix a leaky pipe (temporarily until a plumber arrives), follow these steps:

1. Shut off the water supply.
2. If the leak is small (about the size of a pinhole), insert a toothpick into the hole.
3. Tape over the leak with waterproof tape. (Electrical tape or something similar will work.)
4. Call a plumber for a permanent solution!



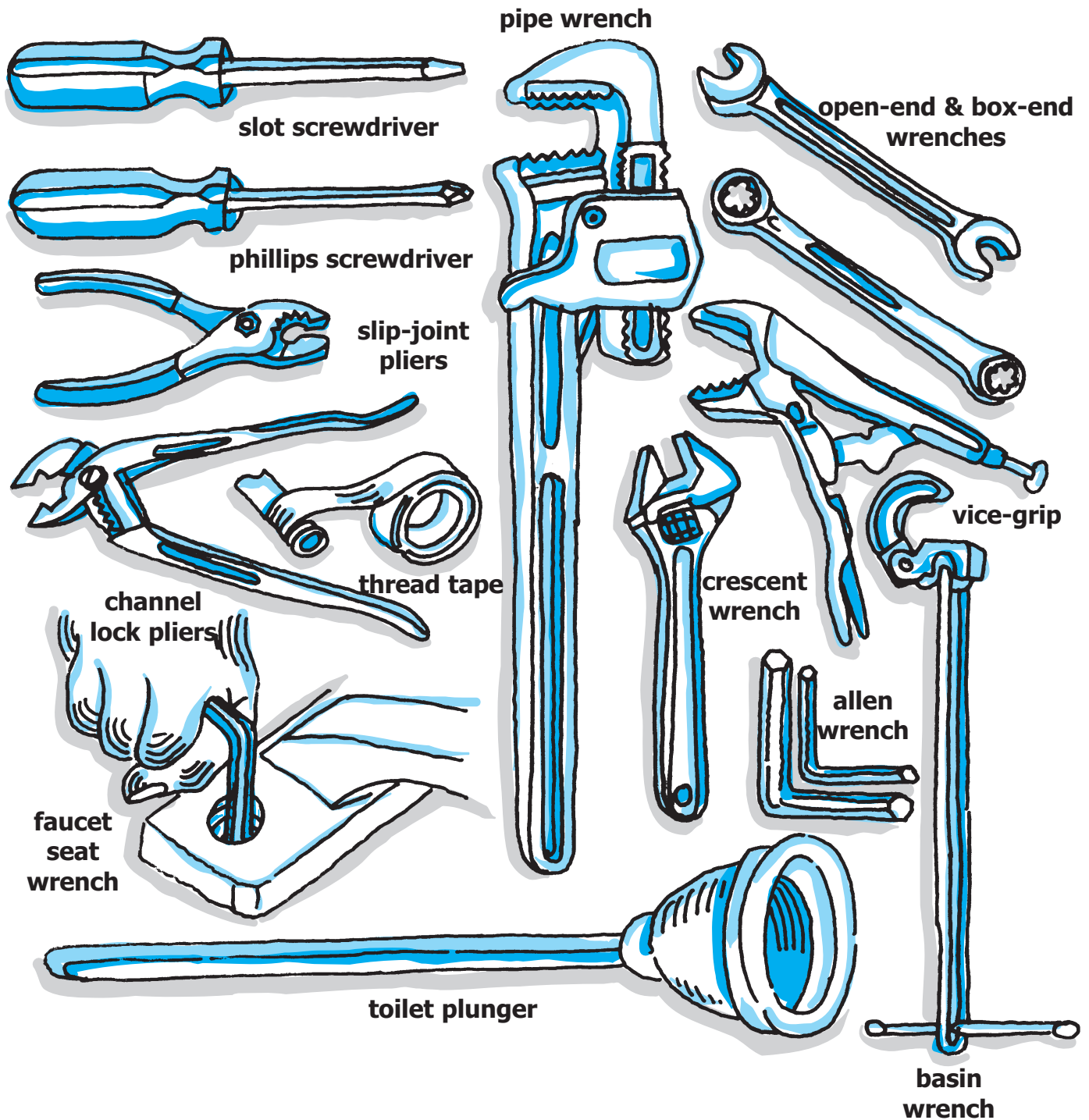
### Lefty Loosey, Righty Tighty

A wise old plumber teaches kids to know which way to turn a screw or nut with this simple saying: "lefty loosey, righty tighty." To loosen most screws, nuts, valves or pipe fittings, turn counterclockwise ("lefty loosey"). To tighten, turn clockwise ("righty tighty").



# Basic Plumbing Tools

Here's an assortment of basic tools that you may need to perform the water-saving plumbing repairs covered in this book.





# SAVING WATER OUTSIDE

Now that you've mastered the art of saving water inside, it's time to turn your attention to the great outdoors.

The average American family of four uses 400 gallons of water per day, and about 30 percent (on average) of that is devoted to outdoor uses. More than half of that outdoor water is used for watering lawns and gardens. Nationwide, landscape irrigation is estimated to account for almost one-third of all residential water use, totaling more than 7 billion gallons per day. Billions of gallons are used to water plants that, quite frankly, are inappropriate for the climate in which they are planted. Millions more evaporate into the air, particularly in arid regions. And millions more are simply wasted washing automobiles and cleaning sidewalks and driveways.

Water use varies greatly depending on geographic location and season, largely as a result of differences in climate. Water withdrawals for irrigation and landscaping are highest in the drier regions of the West and Southwest, where population growth is often greatest.

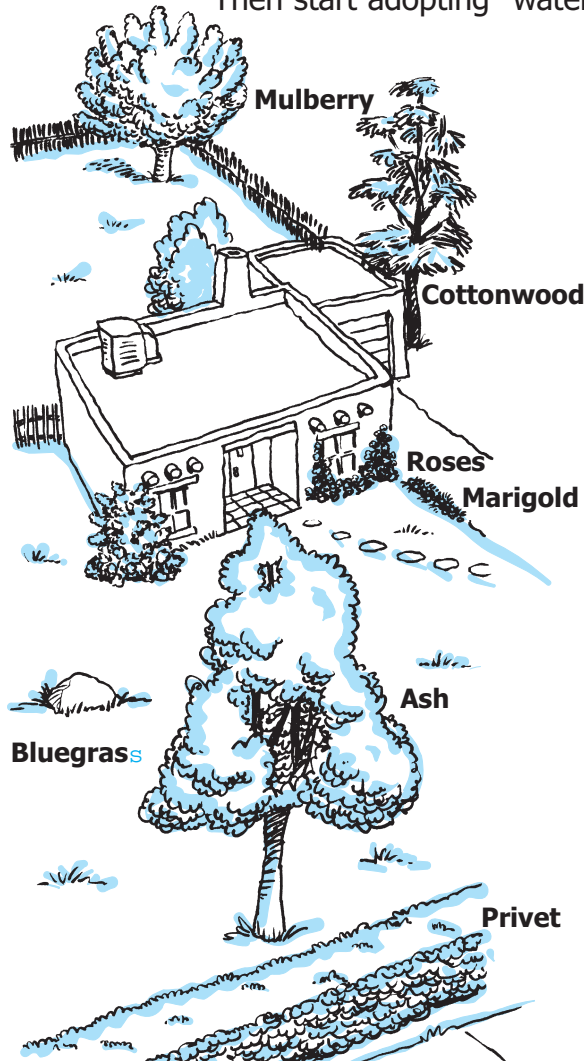




# What Kind of Yard Do You Have?

Take a look at the two "typical" landscapes shown here and see which category best describes your current yard and outdoor water use. Be honest.

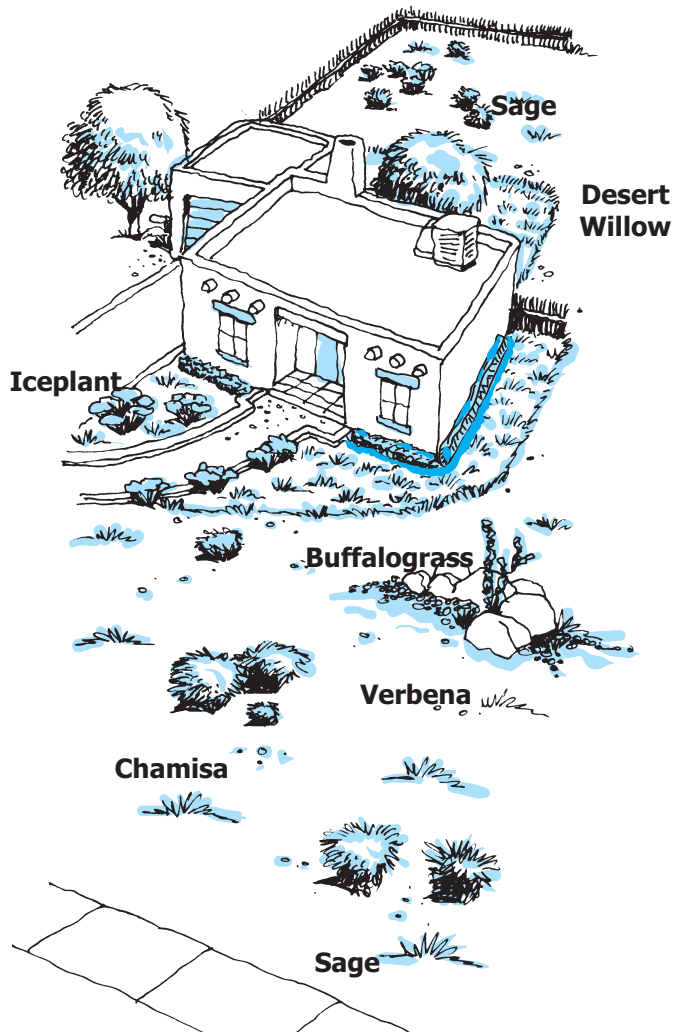
Then start adopting "water-wise" landscaping practices!



## WATER-WASTEFUL YARD

Water Use: 88,000 Gallons Per Year

The so-called "Midwest Yard" is common throughout many parts of the country. This kind of landscaping makes perfect sense in Kentucky, Ohio, Illinois and other states which get 40 inches of rainfall a year. But in drier parts of the country, a Midwest Yard requires significant supplemental water to stay healthy and green. Even if you live in the midwest, you can benefit from growing low water use plants and using efficient irrigation.



## WATER-WISE YARD

Water Use: 29,000 Gallons Per Year

A "Southwestern Yard" takes advantage of low-water-use plants. Using the principles of xeriscaping (water-saving landscaping with native and drought-tolerant plants), a Southwestern Yard uses one-third the water of a thirsty Midwest Yard. Best of all, a carefully planned Southwestern Yard is lush and beautiful. Even if you don't live in the southwest, you can still save water (and money) by converting your yard using xeric principles.



# Smart Watering

Almost everything you'll need to know about watering your yard

Saving water outdoors isn't rocket science. It's really quite easy. To begin, all we have to do is pay attention to where the water is going.

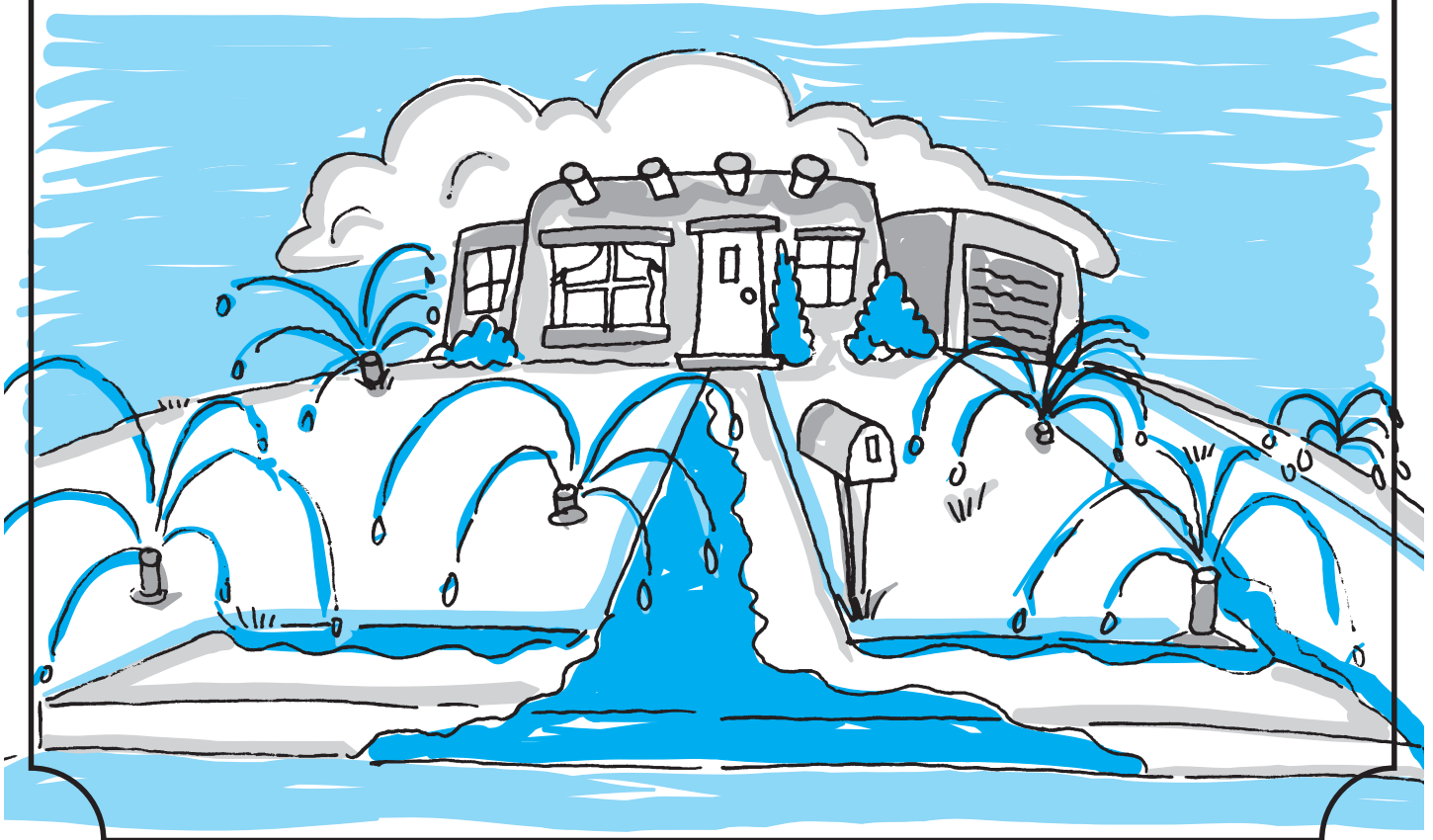
The way you water your lawn and plants has a huge impact upon how much water you use. Likewise, the water devices you use (hoses, sprinklers, drip irrigation, etc.) have a huge impact on how efficiently you use water.

Of course, the easiest and smartest way to save water is simply to avoid water waste.

## **RUNOFF Is A WASTE!**

Runoff results from putting water onto the ground faster than it can be absorbed. We've all seen water pouring down the gutter when a homeowner forgot to turn off his or her sprinklers. Runoff can also be caused by watering pavement instead of plants.

Both of these examples of carelessness are a blatant waste of water — and are illegal in many places!





# How Much Water Does Your Lawn Need?

The lawn is often the thirstiest part of a typical yard. To keep most varieties of grass (also known as “turf”) green and lush, it must be watered regularly during the hot summer months.

But believe it or not, many lawns actually receive too much water! Many people water their lawns too often and for too long, over-saturating plants. It’s usually not necessary to water grass every day. Some studies show that typical lawn sprinklers apply water at rates from one half to five inches per hour. Unfortunately, the typical lawn can only handle about a half an inch per hour before becoming saturated. So, leaving your sprinklers running longer usually doesn’t help your lawn a bit — and usually increases runoff waste.

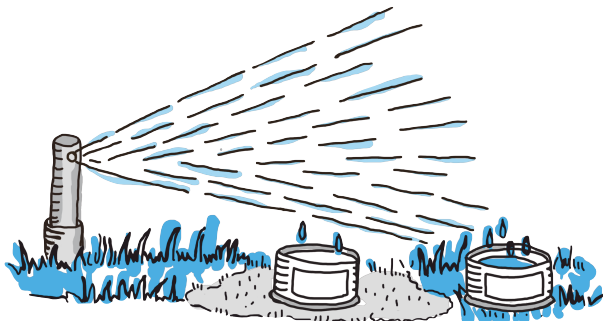
Using the cycling method, run your sprinklers for a short time. Turn them off for 30-60 minutes, and then water again. This method gives the first dose of water a chance to reach the roots— where it does the most good. After this water has soaked in, the second dose of water actually helps push the first dose of water deeper into the soil.



How do you know when to water? Try the shoe test. Walk across your lawn. If grass springs up after being walked on, it doesn’t need to be watered.

## Missed A Spot

Miss a spot? All sprinkler systems have weak spots that often cause us to grossly overwater. If you have a brown spot, try the two can test. Place two identical containers, one on the brown spot and one on a nearby lush spot. Run the sprinklers and compare the amount of water in each container. If the amounts are similar, the spot may be disease, insect or chemical damage. If the water is the problem, try to improve your sprinkler system’s coverage. Or, periodically hand-water dry spots instead of increasing your sprinkler times. This could save thousands of gallons a year.

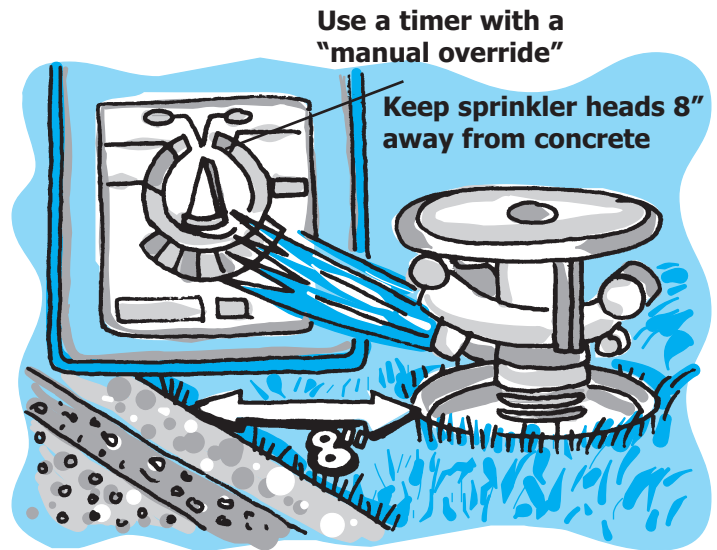




## SPRINKLER TIPS

Sprinklers are the most common way to water turfgrass. But some sprinklers, sprinkler systems and sprinkler operators are more efficient than others. Here are some tips that can help you get the most efficient watering from your sprinklers:

- Move sprinkler heads at least 8 inches away from concrete. Locating a sprinkler head too close to pavement will result in unnecessary water waste.
- Use sprinklers that produce droplets, not mist. By emitting water droplets, more water will be delivered to your lawn. Water mist tends to blow away in the wind. Pop-up sprinklers are designed to operate best at 25 psi.
- Use a low-angle spray. Keeping the water low will reduce wind-blown water waste.
- Put your sprinklers on a timer. This will make sure your sprinklers come on at the perfect time for watering — and shut off before you've overwatered! Adjust your timer often to compensate for changing weather conditions.
- Override your timers when it's raining. Make sure your timers have a "rain switch" feature which temporarily interrupts the watering schedule if weather conditions make irrigating unnecessary.



## CONDUCT THE "CATCH CAN" TEST!

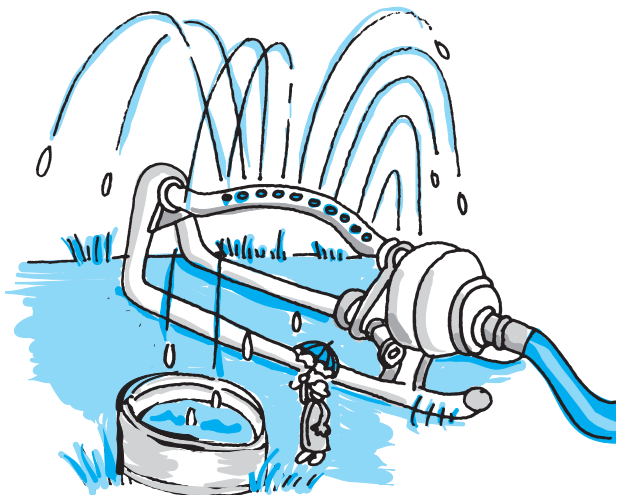
Most homeowners have no idea how much water comes out of their sprinklers. Nor do they know how evenly the water is dispersed. A simple test, using six tin cans of equal size, can give you valuable information about your sprinkler system.

Place the six cans around the yard and turn your sprinklers on for 10 minutes. Then check the depth of water collected in each can. If each can has the same amount of water, your sprinklers are delivering an even amount throughout your yard — and that's exactly what you want. However, if some areas are receiving more water than others, you may need to adjust or replace some or all of your sprinkler heads.

Now pour all the water from the six cans into one can. Measure the depth of that water. The result is the "inches per hour" that your sprinkler system delivers.

By knowing how much water your sprinklers emit, you'll be better able to determine how often to turn your sprinklers on each week and how long to run them each time.

Even expensive sprinkler systems miss some areas. Water those brown spots by hand.





# EVAPORATION & TRANSPIRATION

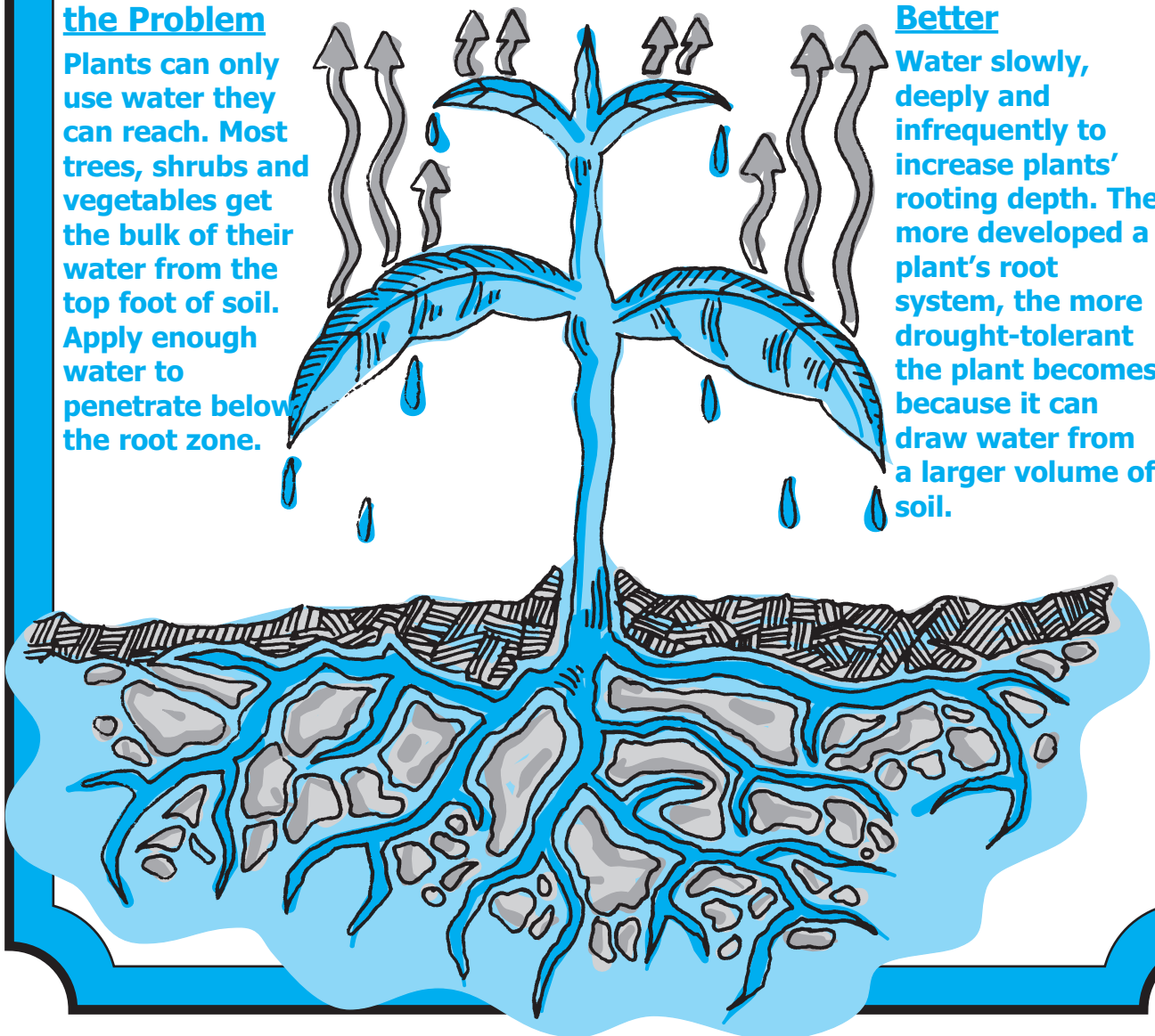
Evapotranspiration is a big word that refers to how much water leaves the soil and plants in our yards due to temperature, humidity, solar radiation and wind. High-water-use plants have a high evapotranspiration rate (ET rate) — which means that they use water very quickly. As much as 50% of all the water that plants take in is expended through evapotranspiration.

## The Root of the Problem

Plants can only use water they can reach. Most trees, shrubs and vegetables get the bulk of their water from the top foot of soil. Apply enough water to penetrate below the root zone.

## Deeper is Better

Water slowly, deeply and infrequently to increase plants' rooting depth. The more developed a plant's root system, the more drought-tolerant the plant becomes because it can draw water from a larger volume of soil.





## 5 Ways to Save Water on Established Lawns

Follow these easy tips and you'll cut your water use considerably.

**1. Mow Less Often.** Mowing puts grass under additional stress — and the grass needs more water to cope with this stress. Mowing less often makes for a happier lawn. (The person who mows your lawn might also be happier.)

**2. Mow Higher.** Longer leaf surfaces promote deeper rooting and shade the plant's root zone. As a result, the grass needs less water. A good rule of thumb is to never cut off more than 1/3 of the leaf blade when mowing. And let the clippings fall on the lawn for instant, water-saving mulch.

**3. Water (and Mow) Early.** Watering early means less water is lost due to evaporation and wind. Greater water penetration in the cool morning hours ensures deeper soil penetration. Mowing early when it's still cool reduces the stress on grass.

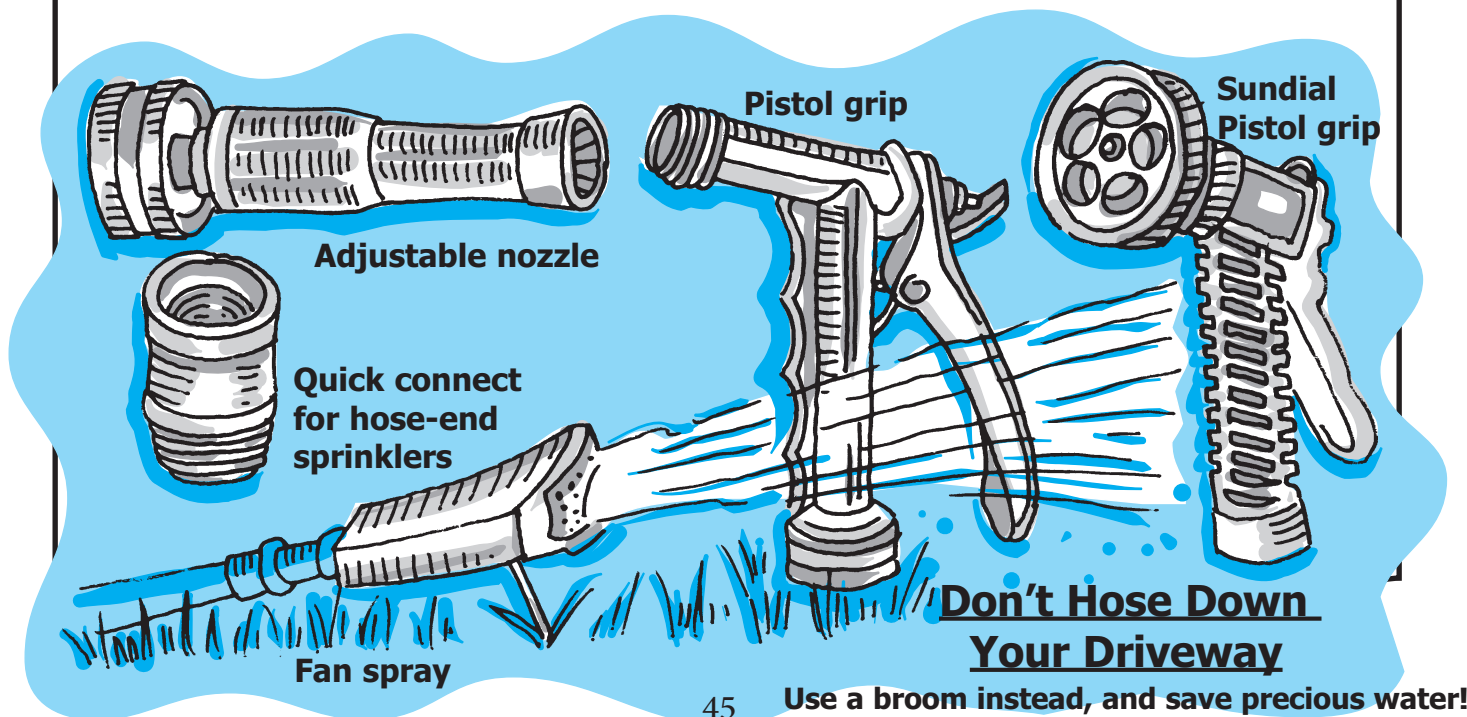
**4. Fertilize Properly.** Water is not a substitute for good fertility. In fact, too much water can actually sink nutrients out of reach of plant roots, making a lawn look yellowed. For cool season grasses, such as bluegrass and fescue, fertilize in the spring and fall. Warm season grasses, such as bermuda and zoysia, should be fertilized in the summer

**5. Mow with Sharp Blades.** Dull mower blades tear grass blades, creating unnecessary stress on your lawn.

**6. Accept Less From Your Lawn.** During periods of drought, grass will normally go dormant. When water becomes available again, grass may regenerate. During dry spells, accept that your grass won't look perfect. (And try to reduce foot traffic on dry turf areas.)

## Hoses, Nozzles and Tools

Shut-off nozzles are an excellent way to avoid unnecessary water waste. Several types of hose nozzles are available at local hardware stores, nurseries and home centers.





# XERISCAPING BASICS

No doubt you've heard quite a bit about "xeriscaping" lately— even if you're not sure just what it means. Xeriscaping is a complicated-sounding word for a very wise and simple concept. In a nutshell, xeriscaping is water-efficient landscaping that's appropriate to the natural environment.

In arid regions, xeriscaping means using plants that don't require much water. The word xeriscape is derived from the Greek word xeros, which means dry. The goal of xeriscaping is to create a visually attractive landscape that uses plants selected for their water efficiency.

Xeriscapes can save tremendous amounts of water. An established, properly maintained xeriscape needs only one-half (or less!) of the water of a traditional landscape. Some xeric plants require almost no supplemental watering once they are established. An established xeriscape also requires less maintenance than a traditional landscape.

In addition to saving water, a well-designed xeriscape can:

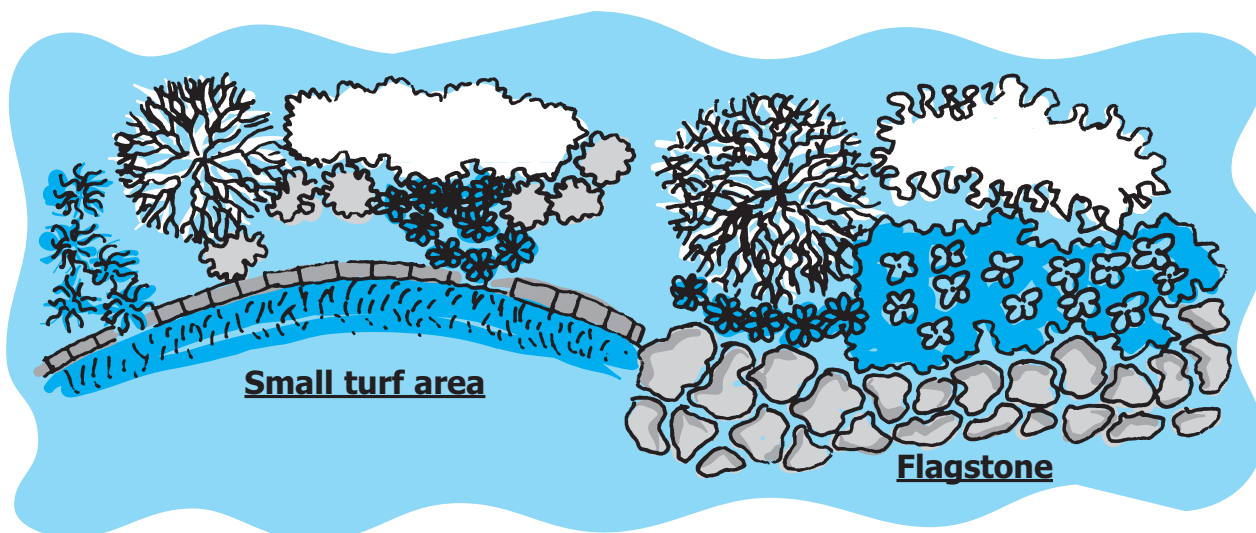
- Cut maintenance in half.
- Reduce pesticides, fertilizers and solid waste.
- Attract desirable wildlife such as butterflies, songbirds and hummingbirds.
- Expand watering and maintenance intervals, which simplifies vacations and travel.





# The Seven Principles of Xeriscaping

Applying xeriscape principles to your home landscape will save water—but that's just the beginning! You'll also enjoy the beauty and diversity of native and other water-wise plants. There are many delightful varieties of grasses, flowers, shrubs and trees that are adapted to your climate. Follow these seven principles and you'll be on your way toward successful xeriscaping.



## 1. PLANNING AND DESIGN

Any beautiful landscape starts with a good design, and a delightful xeriscape is no different. Before you move a shovelful of dirt or plant a single flower, start with an overall plan for your xeriscape.

The physical characteristics of the site should be considered. Also consider your needs and your aesthetic preferences. Here is just a sampling of the issues you should think about when planning your landscape:

**Function** — Do you need an active recreation area? If so, for what activities? A small turf area may be what you need. Do you need an “outdoor living room?” If so, consider expanding your patio area with additional shade structures and low-water-use trees and shrubs to provide privacy.

Also consider the views you want to protect or screen. It's important to know

the mature size of the plants and trees you select to ensure that you get the views or privacy you desire.

**Sun** — What portions of your property receive morning sun? What portions receive hot, afternoon sun? Where are the shady spots? The amount and time of sun exposure will affect the types of plants you select.

**Time** — How much time do you want to spend maintaining your landscape? If you'd rather enjoy your yard than work in it, choose low-maintenance plants!

Whether you're an avid do-it-yourselfer and plan to design your own yard, or choose to use the services of a landscape design professional, a properly designed xeriscape can meet your needs and provide beautiful — and water-wise — surroundings.



# PRINCIPLES OF XERISCAPING

## 2. SOIL IMPROVEMENTS

You may need to add soil amendments before you plant. This will enable your soil to better absorb water. The water-retention abilities of most soil is improved with the addition of organic matter (such as compost).

However, if you are landscaping with native plants, you may not need to add anything to your soil. Many well-adapted xeric plants actually prefer not to have too rich a soil. For these hardy natives, all you'll need to do is loosen the soil a little before you plant.

## 3. APPROPRIATE TURF AREAS

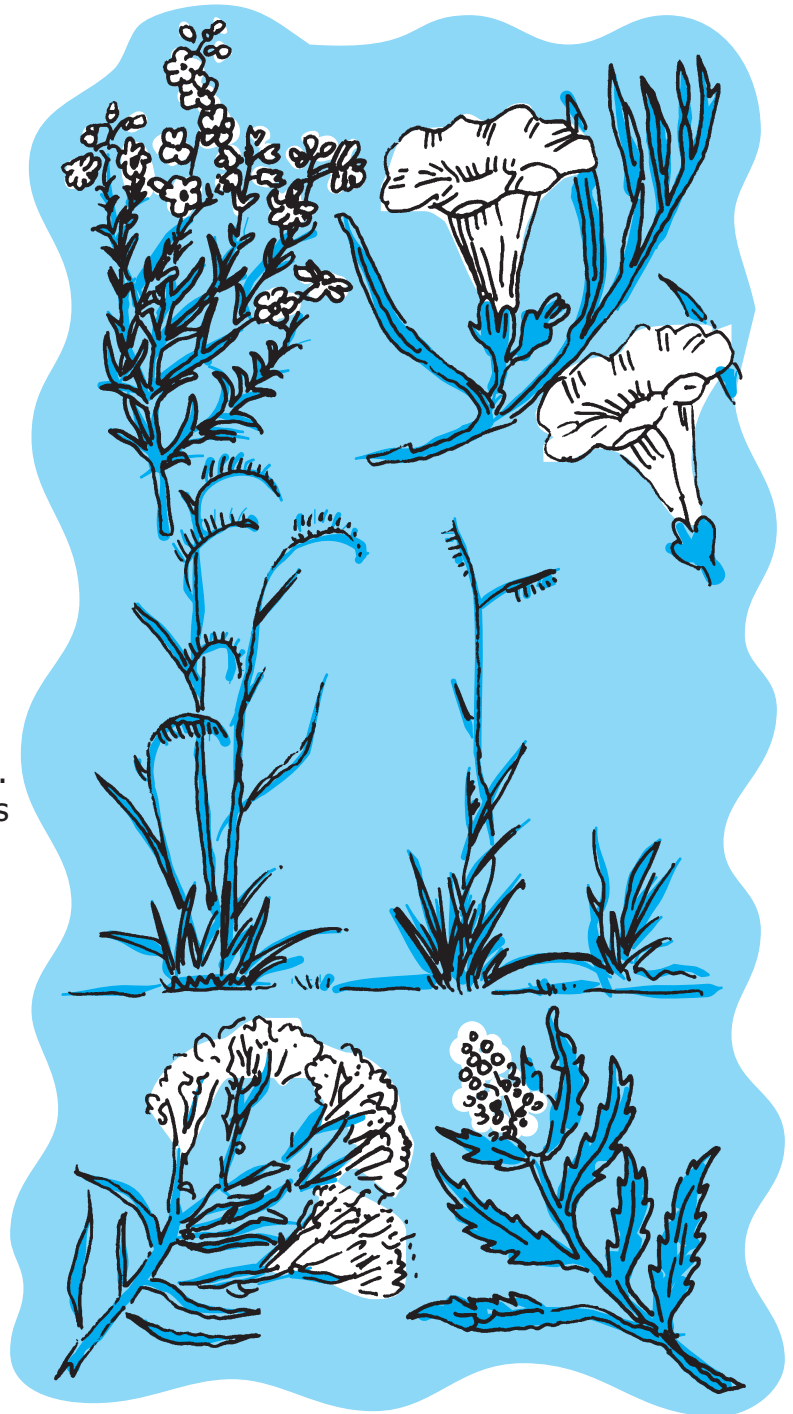
Kentucky Bluegrass is a "cool season" grass that requires a minimum of 31 inches of rainfall per year to stay lush and green. If your area gets that much rainfall appropriately spaced throughout the growing season, then Kentucky Bluegrass might be a reasonable choice for you. In dryer areas consider drought-tolerant grasses such as Buffalo-grass and Blue Grama.

However, even in wetter areas we need to rethink our landscaping. Your area might have plenty of rainfall for Kentucky Bluegrass, but do you really want to mow a football field-sized area of grass every week? Instead of using a lawn to cover large areas of ground, choose your lawn size to fit your family's needs. If you don't need a large turf area, try planting a smaller lawn. Consider planting water-wise groundcovers and shrubs instead.

## 4. LOW-WATER-USE PLANTS

Choose native and low-water-use plants whenever possible. A wonderful variety of water-wise plants can grow in every region of the country. Some of these plants are perfect for adding year-round greenery and texture. Other native plants are great for adding a splash of seasonal color.

Xeriscaping uses the concept of "zoning" — grouping plants with similar water needs together. Plants that need very little water are



grouped together in a zone, while thirsty plants and lawns are grouped together in another zone.

## 5. EFFICIENT IRRIGATION

Proper and efficient irrigation saves water. For the most efficient use of water, irrigate turf



## PRINCIPLES OF XERISCAPING

areas separately from other plantings. Design irrigation zones so low-water-use plants receive only the water they need.

Choosing the right kind of irrigation can also save water. Turf lawns are best watered by sprinklers. Trees, shrubs, flowers and ground-covers can be watered efficiently with low-volume drip emitters, sprayers and bubblers.

Remember, too, that even the best-designed irrigation system must be maintained to retain its optimum efficiency! Fix leaks and make sure the sprinkler heads are clean and unobstructed.

### 6. MULCHING

Mulches are soil coverings that minimize evaporation, cool the soil, reduce weed growth and slow erosion. Mulches can also provide visual interest to a landscape while offering a protective cover until plants mature.

Organic mulches (bark chips, wood grindings, composted cotton burrs, etc.) are commonly used in planting beds. Inorganic mulches (such as gravel and decomposed granite) can be used to add texture and color under trees and around shrubs.

Never use plastic sheeting underneath rock or bark. It prevents the soil from breathing and encourages shallow plant roots. A better alternative is permeable landscape fabric.

### Xeriscaping Is Not "Zeroscaping"

**In their rush to save water, some homeowners landscape with lots of rock and a few sparse plants. This kind of landscaping has been called "zeroscaping" — and it is not the same as xeriscaping.**

**True xeriscaping is lush and beautiful. It uses a wide variety of native and other water-efficient plants to create color, interest and an oasis-like feeling.**

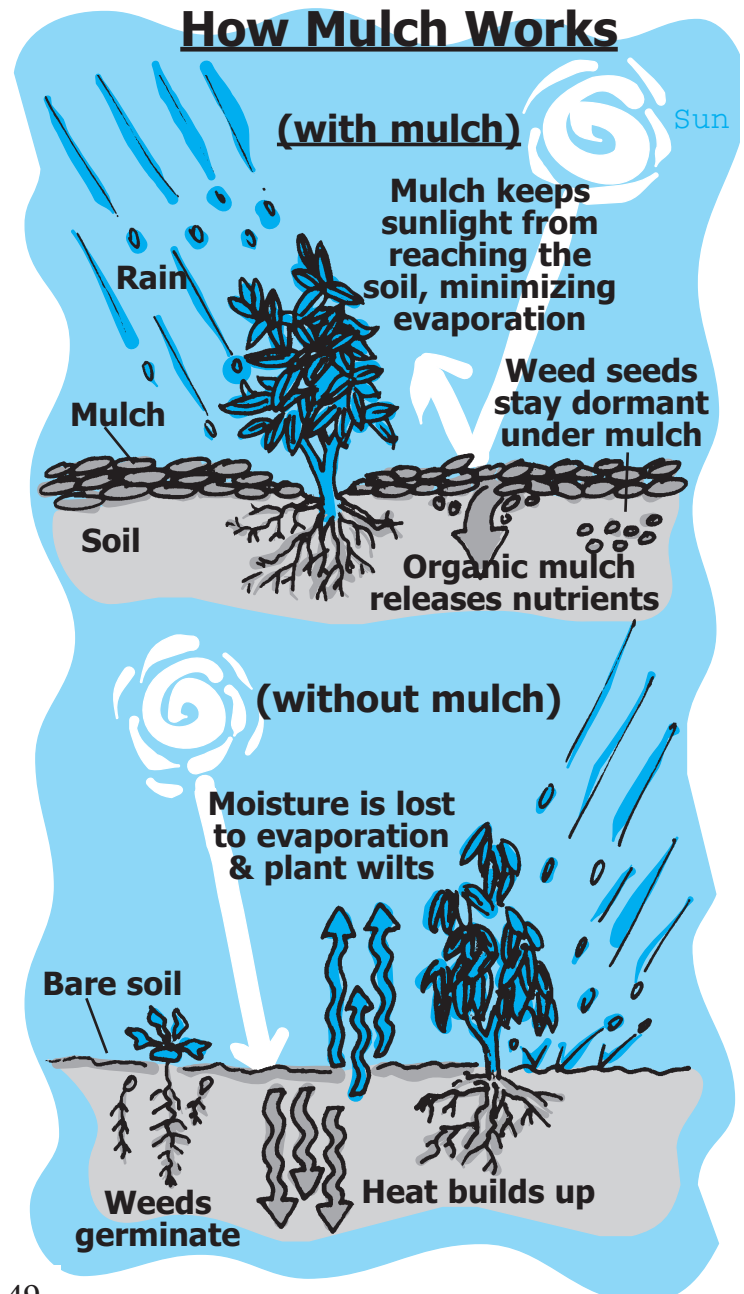
**Zeroscaping, because it uses so much rock and very few plants, tends to be hot and much less interesting. Xeriscaping is the natural — and water-wise — way to beautify your landscape.**

### 7. PROPER MAINTENANCE

Even though successful xeriscapes are low maintenance, they aren't completely maintenance free. To ensure that your xeriscape stays beautiful and water-wise, you'll need to periodically fertilize, prune, weed, mow and control pests.

To ensure continued water savings, keep irrigation systems properly adjusted. A well-planned and properly maintained xeriscape requires even less work as it matures. And that gives you more time to enjoy your yard.

### How Mulch Works





# Rainwater Harvesting

Rainwater harvesting captures, diverts, and stores rainwater for later use. Implementing rainwater harvesting is beneficial because it reduces demand on existing water supplies and reduces run-off, erosion, and contamination of surface water.

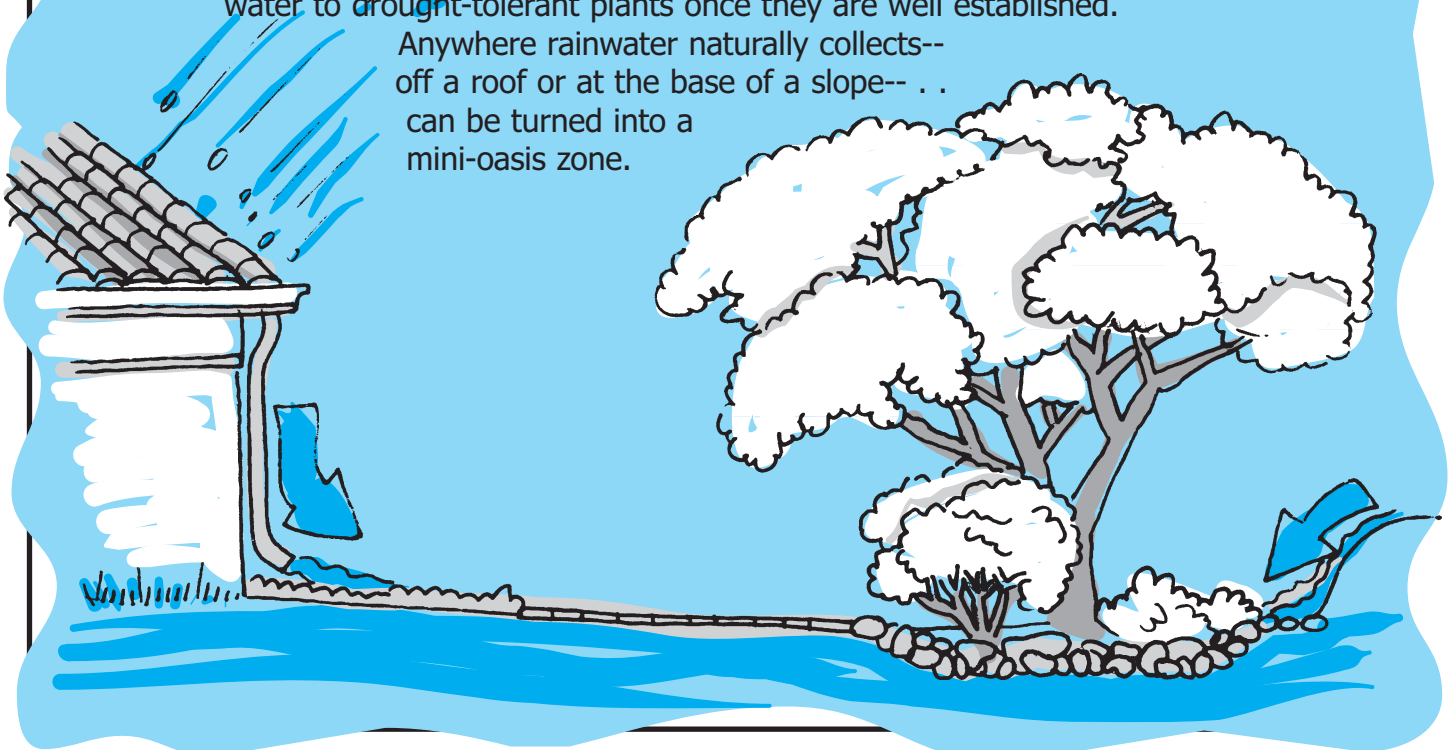
Collected rainwater can be used for nearly any purpose that requires water, including landscape use, stormwater control, wildlife and livestock watering, in-home use, and fire protection. But for most homeowners, the water collected is most often used for garden or landscape irrigation.

A rainwater harvesting system can range in size and complexity, from simply channeling runoff to where it is needed, to catchment, storage, treatment and distribution. The most common home systems consist of barrels placed under downspouts. The water collected is stored for landscape uses when rain is scarce.

## Water Harvesting Tips

Rainwater can be directed toward your native and xeric plants with land contouring. (Just take a shovel and shape the soil into earthen basins around all trees and shrubs.) By using our natural rainwater efficiently, you may never have to provide supplemental water to drought-tolerant plants once they are well established.

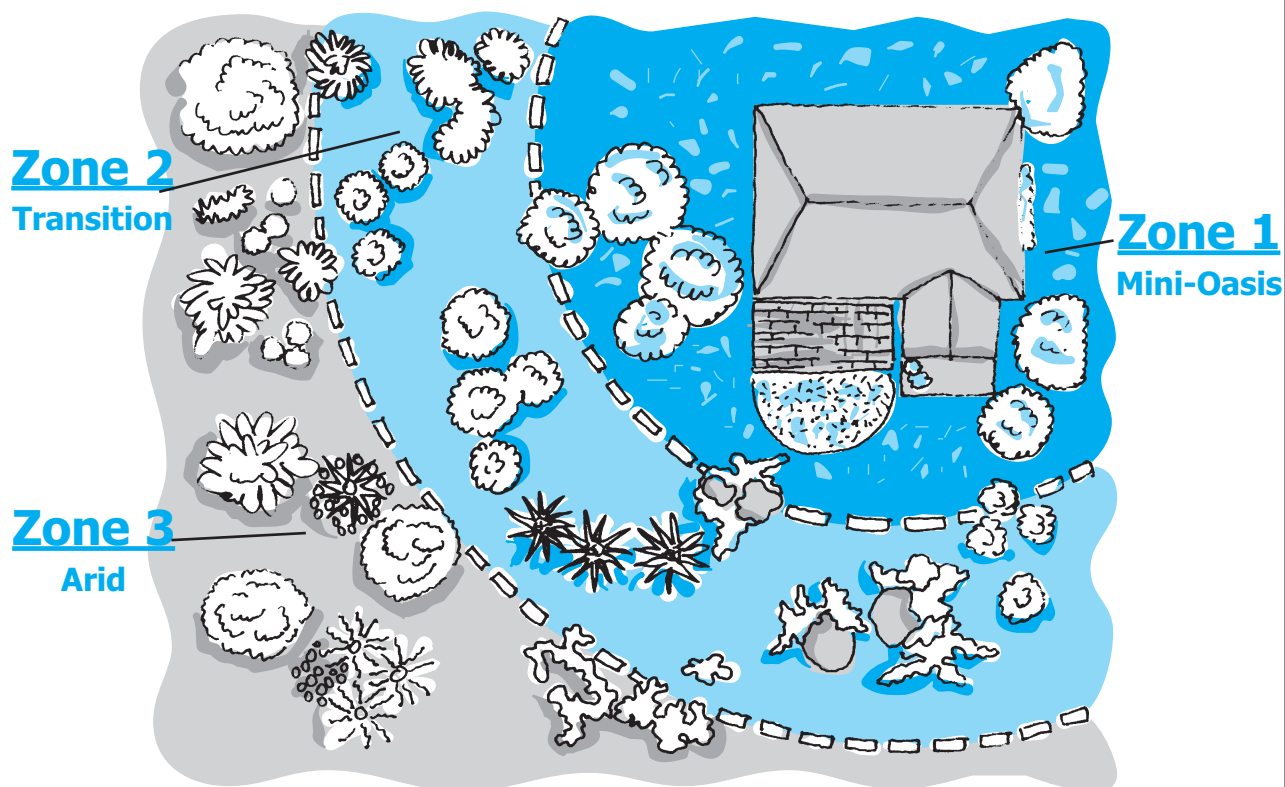
Anywhere rainwater naturally collects--  
off a roof or at the base of a slope-- . .  
can be turned into a  
mini-oasis zone.





# Creating Your Water Zones

Xeriscaping does not necessarily mean getting rid of all high-water-use plants. But it does mean putting these thirstier plants closer to your home where you can enjoy them the most. By putting plants into specific zones based upon the water needs of the plants and the functions you want your yard to serve, you can create a water-efficient landscape that is both beautiful and functional.



## ZONE 1: MINI-OASIS

The area nearest to your house is where the highest-water-use plants should be placed, creating the most lush zone. The mini-oasis zone includes your lawn area (if you have one) — which is typically the highest water-use area in any landscape. This zone also includes the shady north and east sides of your home— typically the coolest parts of a site. The mini-oasis zone can also include areas that receive rainfall runoff from rooflines and downspouts.

## ZONE 2: TRANSITION

The transition zone is used to blend lush areas with the drier parts of a landscape. The intermediate zone in your yard makes use of low- and moderate-water-use plants. Choose plants that need infrequent supplemental watering (once a week or less).

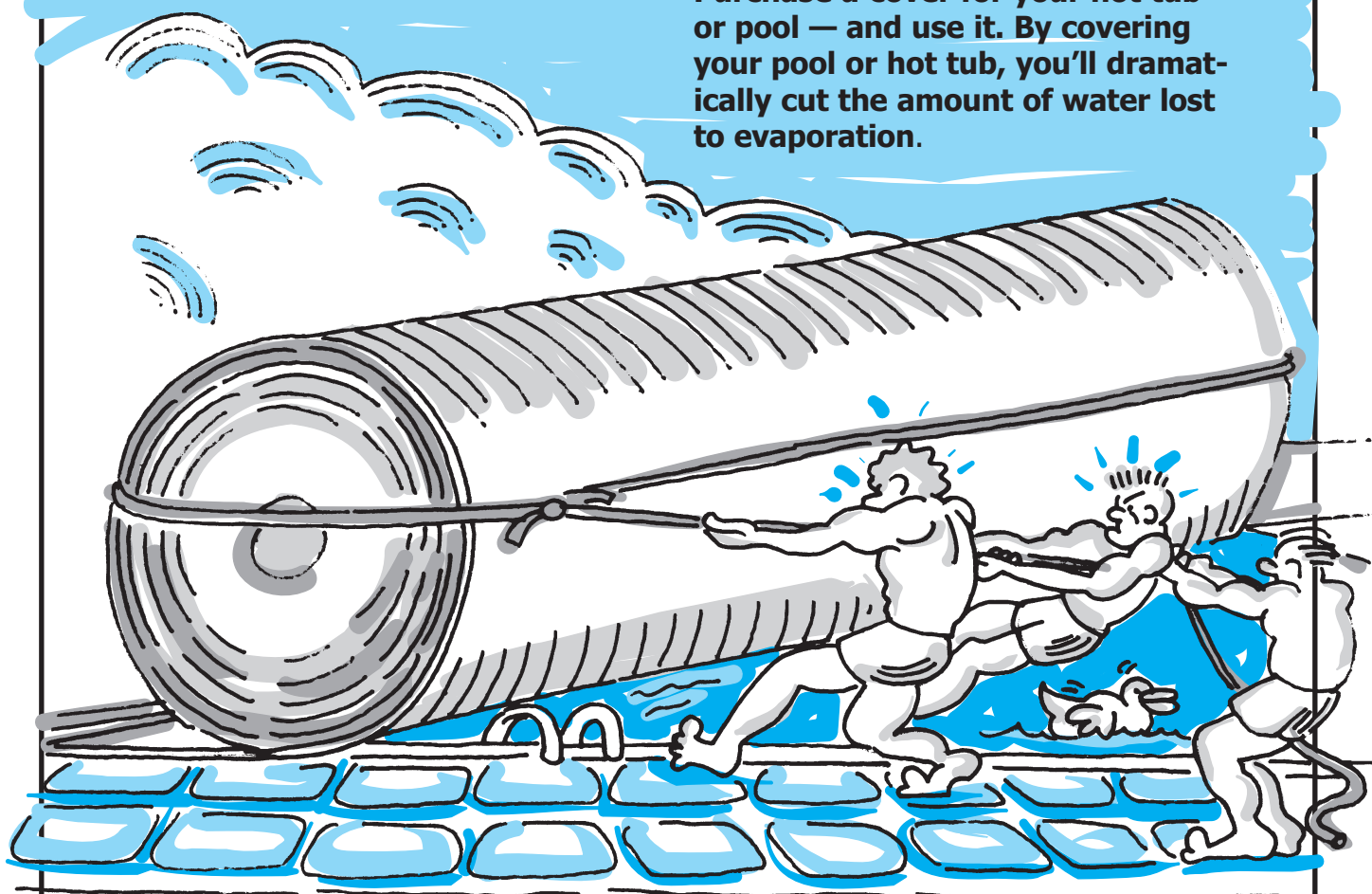
## ZONE 3: ARID

Farthest away from the house and removed from the most active areas of the landscape, Zone 3 features the most drought-tolerant vegetation. Choose native plants and other varieties that rarely require supplemental watering.



# Swimming Pools, Hot Tubs and Fountains

**Purchase a cover for your hot tub or pool — and use it. By covering your pool or hot tub, you'll dramatically cut the amount of water lost to evaporation.**



Swimming pools and hot tubs not only use water during filling, but lose water daily through evaporation. An average-sized (400-square-foot) swimming pool will evaporate about 16,000 gallons per year!

The simplest way to cut this water loss is to buy and use a cover for your pool or hot tub. Also, to minimize water loss due to splashing, don't overfill your pool.

Keeping your pool clean will help keep its filter clean. And the cleaner you

keep your filter, the less often you'll need to clean or backwash it. (If your pool has a sand filter, it could use up to 300 gallons from the pool every time you backwash.)

In most cases you can run the filter backwash water onto your lawn and shrubs rather than releasing it down the sewer. (Test the chlorine level of the water first. If it's over 3 parts per million, putting the water on plants could damage them.)





## **INSTANT WAYS TO CUT YOUR OUTDOOR WATER USE**

- 1.**  
Adjust your sprinklers to water only things that grow.  
(Watering pavement is a waste of precious water!)
- 2.**  
Don't water when it's windy, hot or raining.
- 3.**  
Don't water between the hours of 10 a.m. and 5 p.m. during the warm months (April through October).
- 4.**  
Plant vegetables, flowers and shrubs in lower areas to best capture and retain water. And put thirsty plants near downspouts or where water drips off the roof to best use rain water.
- 5.**  
Use sprinklers on turf, but use drip irrigation or soaker hoses on flowers, shrubs, gardens and trees.
- 6.**  
Don't put water-thirsty plants (including turf) on steep slopes.
- 7.**  
Don't plant grass in areas less than 10 feet wide.  
(It's almost impossible to irrigate narrow strips with sprinklers without wasting water. Such areas are more suitable for low-water-use plants on a drip irrigation system.)
- 8.**  
Install shutoff nozzles on hoses.
- 9.**  
Water only on even or odd numbered days. (If your street address is an even number, water only on even numbered days.)
- 10.**  
Eliminate overwatering. Measure moisture at root level with a soil moisture monitor, and water only when necessary.



# GO NATIVE: WATER-SAVING LAWNS

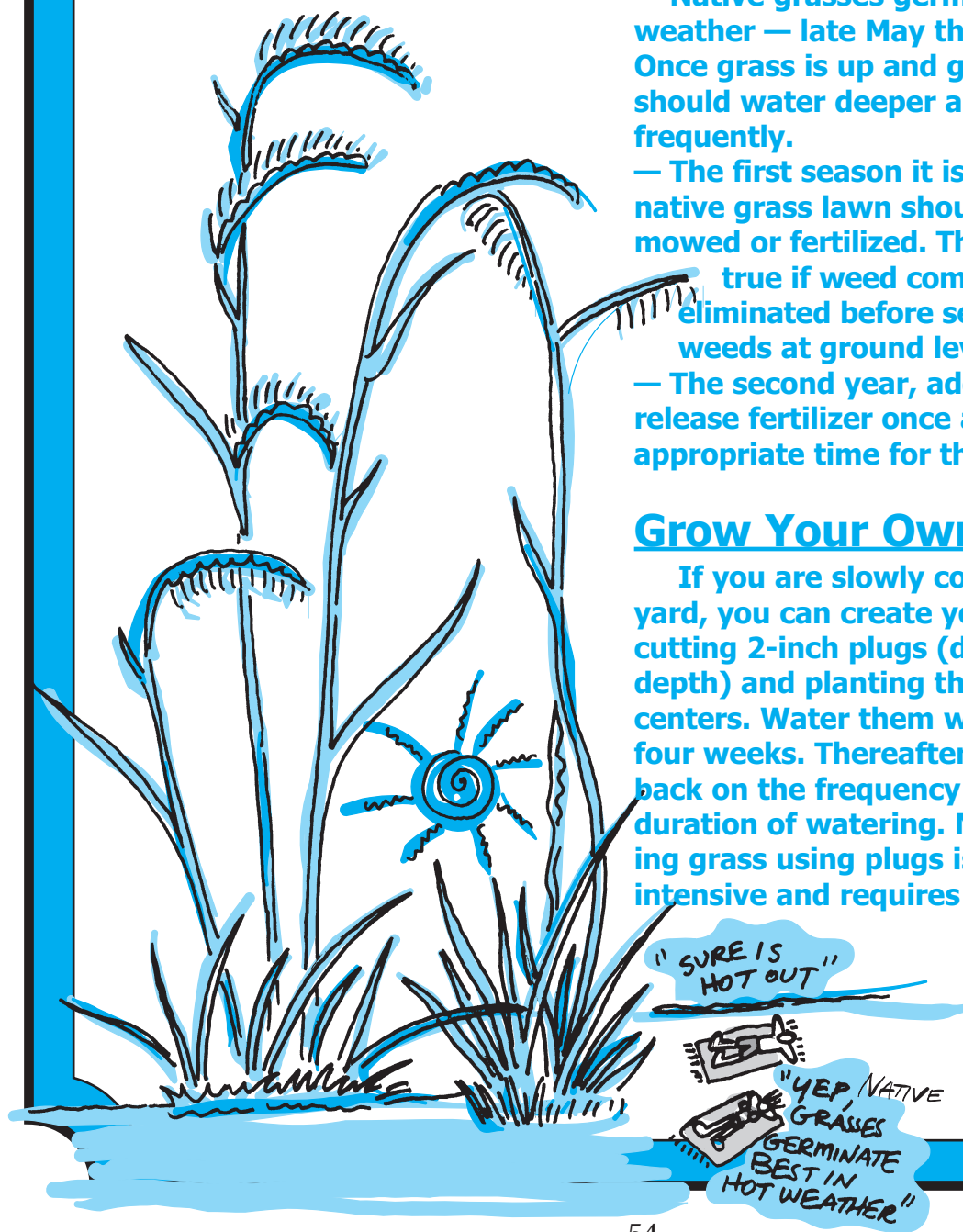
If you're fond of the lush look of green grass, but want to cut your exterior water usage, consider native grasses. The Plant List section of this book will give you choices for your area. Sod and plugs are often available at nurseries, or you can save money by spreading seed and watching your new lawn sprout.

## Helpful Hints

- Native grasses germinate best in hot weather — late May through August. Once grass is up and growing, you should water deeper and less frequently.
- The first season it is planted, a native grass lawn should not be mowed or fertilized. This is especially true if weed competition was not eliminated before seeding. (Cut weeds at ground level!)
- The second year, add organic, slow-release fertilizer once at the appropriate time for the type of grass

## Grow Your Own!

If you are slowly converting your yard, you can create your own lawn by cutting 2-inch plugs (down to root depth) and planting them in 12-inch centers. Water them well for two to four weeks. Thereafter, you can cut back on the frequency and increase the duration of watering. Note that planting grass using plugs is more labor intensive and requires more weeding.





# How to Convert Your Lawn

Once you've decided to convert your lawn to native grasses, you might want to consult an expert for professional advice and assistance. But whether you do it yourself or hire a pro, here are the basic steps.

**1. Determine what kind of grass you now have.** This is important, because Bluegrass and Fescue are easier to remove than Bermuda grass. Bermuda grass can have roots which go down three feet or more and can spread from neighboring yards. Fescue turf planted from sod can have a plastic mesh backing which must be raked out.

**2. Remove existing turf.** Here are three basic options:

a. For actively growing plants, apply a non-selective, systemic herbicide that leaves no residue in the soil. (Follow the directions on the label.) After a few days the dead thatch can be raked off. In 10 days you may need to apply again if the grass was green and actively growing (e.g. in May to July) before the first applications. (Always follow the manufacturer's instructions on the label!) Be aware, however, that many herbicides will kill most herbaceous plants and so are dangerous to bees and small wildlife.

b. Smother the lawn with clear or black plastic in the hot summer months. (Note: this technique works for bluegrass and fescue but not Bermuda grass. Bermuda grass is most effectively removed with herbicide because of its root depth.)

c. Dig out the turf with a hand or power turf cutter (available at most rental stores). If you're using a power turf cutter, flag sprinkler lines and heads before you start! (Again, this technique may not fully remove Bermuda grass.)

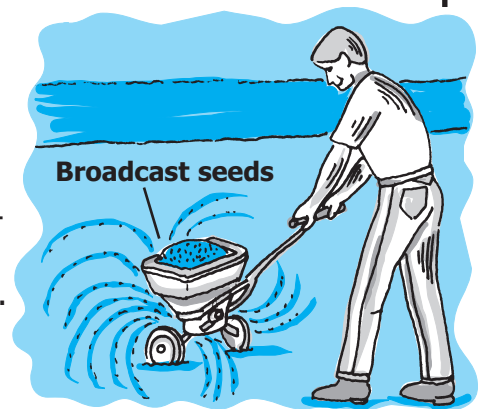
d. Rake out plastic or other sod backing where necessary.

e. If you or your neighbors have Bermuda grass, you may need to install a barrier to prevent the roots from re-entering your yard. One option: submerging sheet metal three feet deep as an underground wall. Overlap or seal the seams or the Bermuda grass may come through again!

**3. Till the soil.** Power tillers are available at most rental stores. Watch out for sprinkler heads and water lines!

**4. Rake seedbed so it is level.**

**5. Broadcast seeds or set out sod.** Buffalograss is available in sod, plugs and seed; Blue Grama is available only in seed. If you choose to broadcast seeds, lightly rake them into the surface soil. Firming the soil with a lawn roller increases the chances of germination, especially where wind is a problem. Top dress with peat moss, compost or topsoil to keep moist, and to keep the seeds from blowing away. The seedbed should be moist (water 3-5 times per day) until germination is complete — 15 to 30 days. Once grass is about 1" tall, gradually start cutting back. Water daily for the next couple of months.



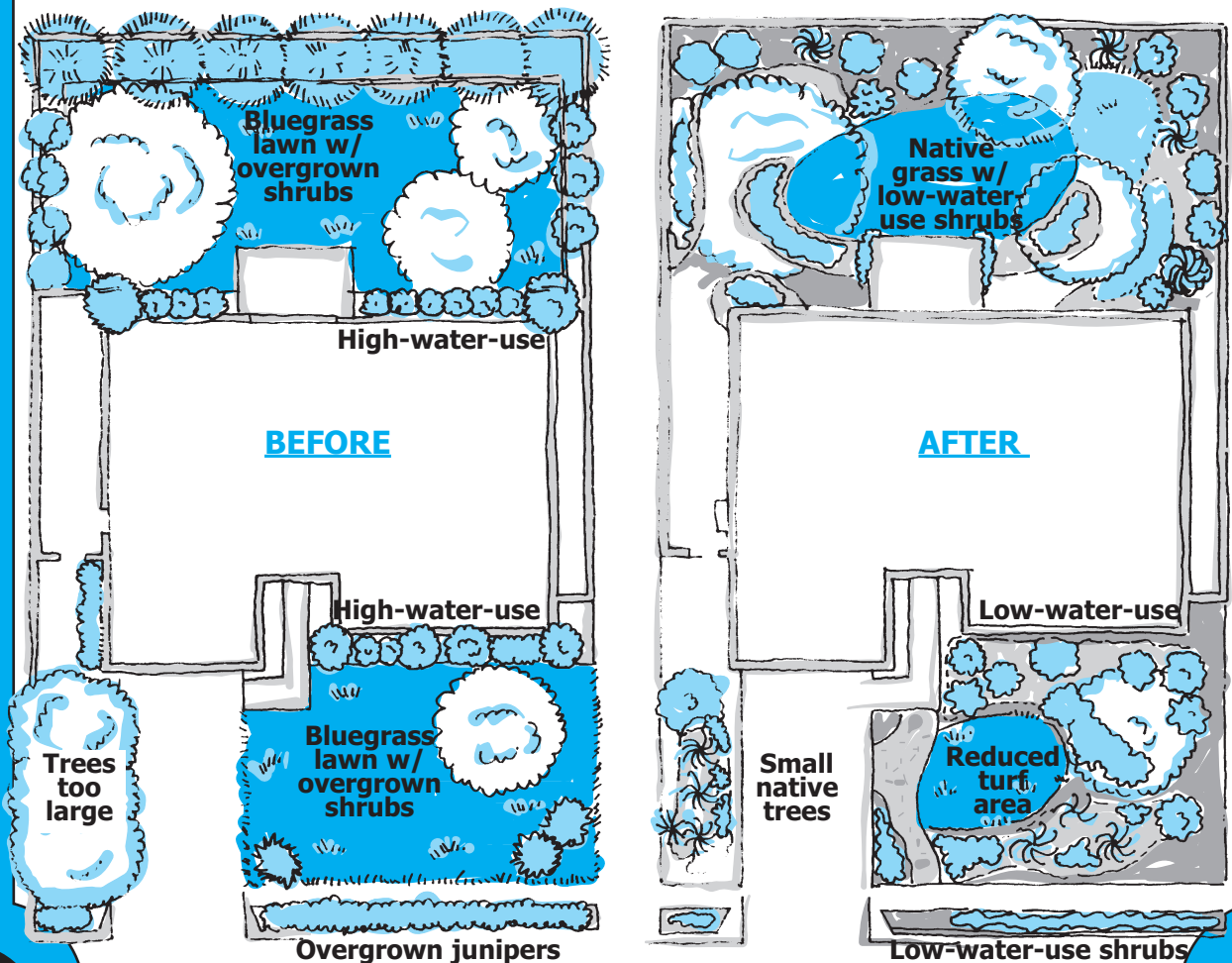


# CONVERTING YOUR YARD TO LOW WATER USE

## A THREE YEAR PLAN

There's no law that says you have to convert your water-thirsty yard to a water-thrifty yard all at once. The speed of conversion depends on how much money and time you want to spend. Many people call upon professional landscapers to design and install their new landscapes. You may also choose to convert your yard one step at a time as a "do-it-yourself" project. Either way, converting your yard to a xeriscape will take time, planning and some investment. But you'll enjoy the benefits of lower water bills, less maintenance, and a beautiful landscape that will enhance your home.

The following pages offer advice and examples of how to turn a traditional yard into a water-wise yard over three years.





# Conversion Year One

Much of the work on your new, water-saving landscape can be done in the first year. This way, you can capture the energy you have for this new project!

- Make a plan
- Modify existing watering system or design a new system based on the new plan
- Determine method to remove high-water-use turf
- Start working on easy-to-accomplish projects or areas in need of new planting

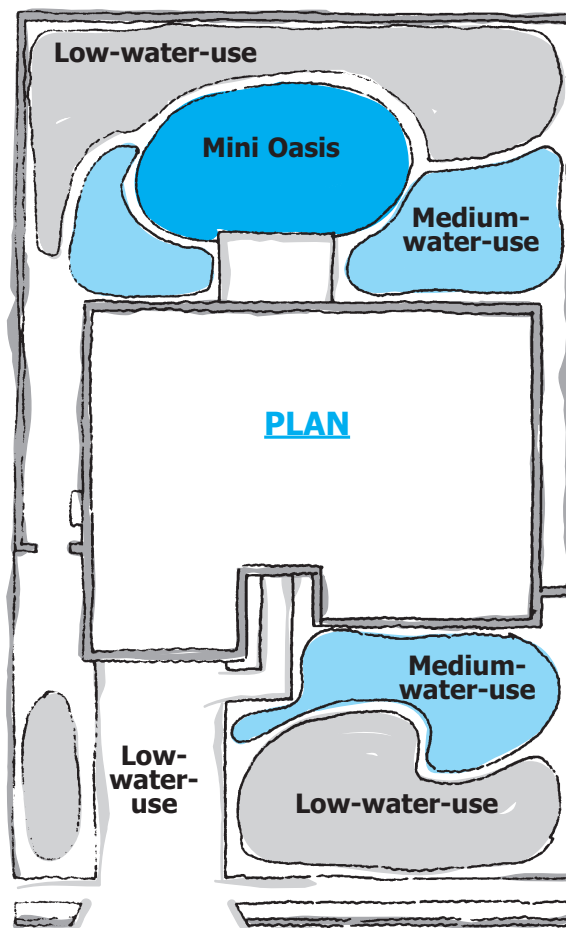
## MAKE A PLAN

Take some time to develop an overall landscape design. There are many quality books about plants and design which you can use as resources. You may also choose to hire a landscape professional to redesign your yard to suit your needs.

Determine what kind of "look" you're after. Some water-conserving landscapes resemble formal English gardens, while others create a much more "natural" look using strictly native plants.

Make a list of the activities you want to accommodate. Will you need a play area for kids? Is an outdoor eating area important to you? Think about traffic areas and the most likely paths people will use. Then sketch a basic landscape plan by blocking out the areas suited to your activities and needs.

Note that different parts of your yard may have different climatic characteristics. For instance the south side probably has a warmer microclimate than the cooler north side. West sides typically get lots of hot afternoon sun and are well-suited for arid landscaping. East sides offer better environments for oasis zones.



Talk to nursery or landscape professionals about what time of year is best to remove turf and set new plants, and how much water is needed the first two years to get plants established.



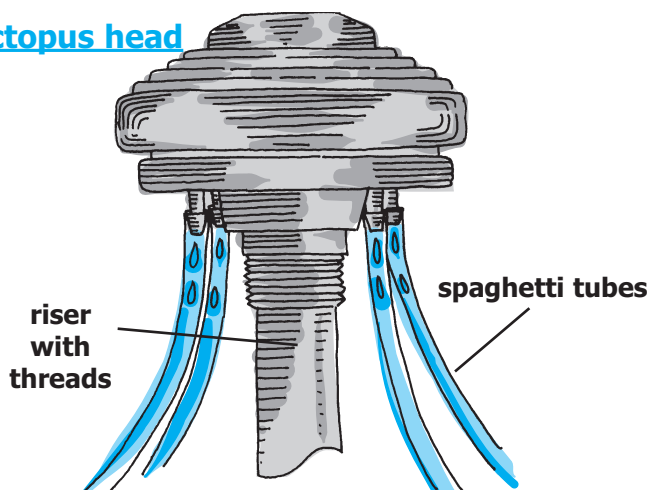
## CONVERTING YOUR YARD

### CREATING THE RIGHT IRRIGATION SYSTEM

You may want to consult with an irrigation professional for advice on a new watering system to ensure that your trees, shrubs, plants and grasses receive the appropriate amounts of water.

If you convert one area or water zone of your landscape at a time, your irrigation system may have to be adapted to the different water needs of each area. Look at your existing irrigation system and determine whether it can be modified or whether it needs to be completely replaced.

#### **octopus head**



Conventional lawn spray-heads may be converted to drip systems with multiple outlet adapters ("octopus head") and spaghetti tubes. (However, a pressure-reducing valve may be needed to protect the drip system.) Soaker hoses and micro sprayers are other irrigation options.

Set up your drip system so that it drains properly to prevent freezing and can be cleaned or flushed out to prevent clogging. Make sure your irrigation system meets code regulations and has backflow preventers to protect your family's safety.

Remember, you should not mix bubblers, drip emitters and lawn sprinklers on the same automatic zone. Irrigation companies, garden stores, or other professionals can provide valuable advice.

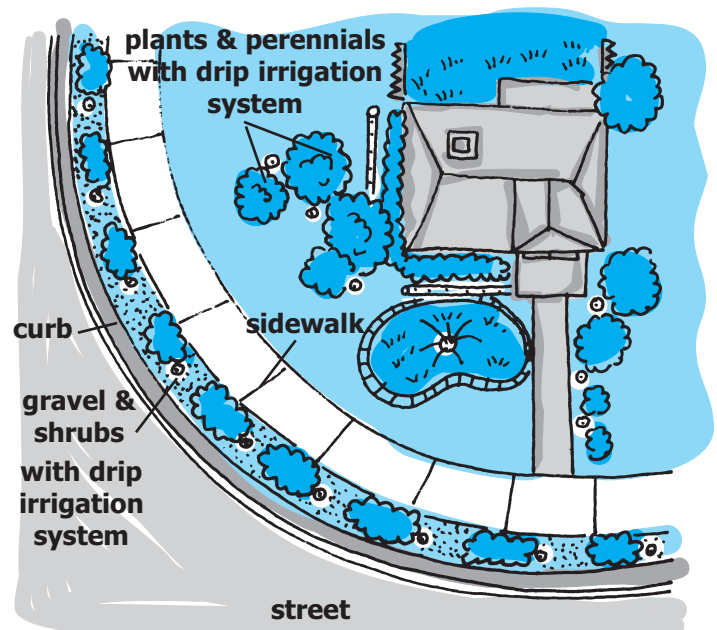
### PICK AN AREA IN YOUR YARD TO GET STARTED

You may have a "brown spot" in the yard because the sprinkler doesn't reach that area. This would be an ideal place to plant low water-use plants— especially if money and time are scarce.

A sloped area with grass is another good place to start. Remove the turf from the slope, grade or terrace the slope as necessary, and plant vines or groundcovers. (Remember to disconnect or cap sprinkler heads on the slope.)

Another good place to start is at the border where the lawn meets concrete. Dig up a 12" strip of lawn and plant a flowering groundcover.

Before you plant, you'll need to move the sprinkler heads 12-18 inches in from the concrete. If the 12-inch-wide strip you're planting will get some incidental spray from the sprinklers, you can plant low-water-use flowering plants. If it will be dry, plant drought resistant plants. You'll not only save water, you'll also enjoy an attractive, colorful border.

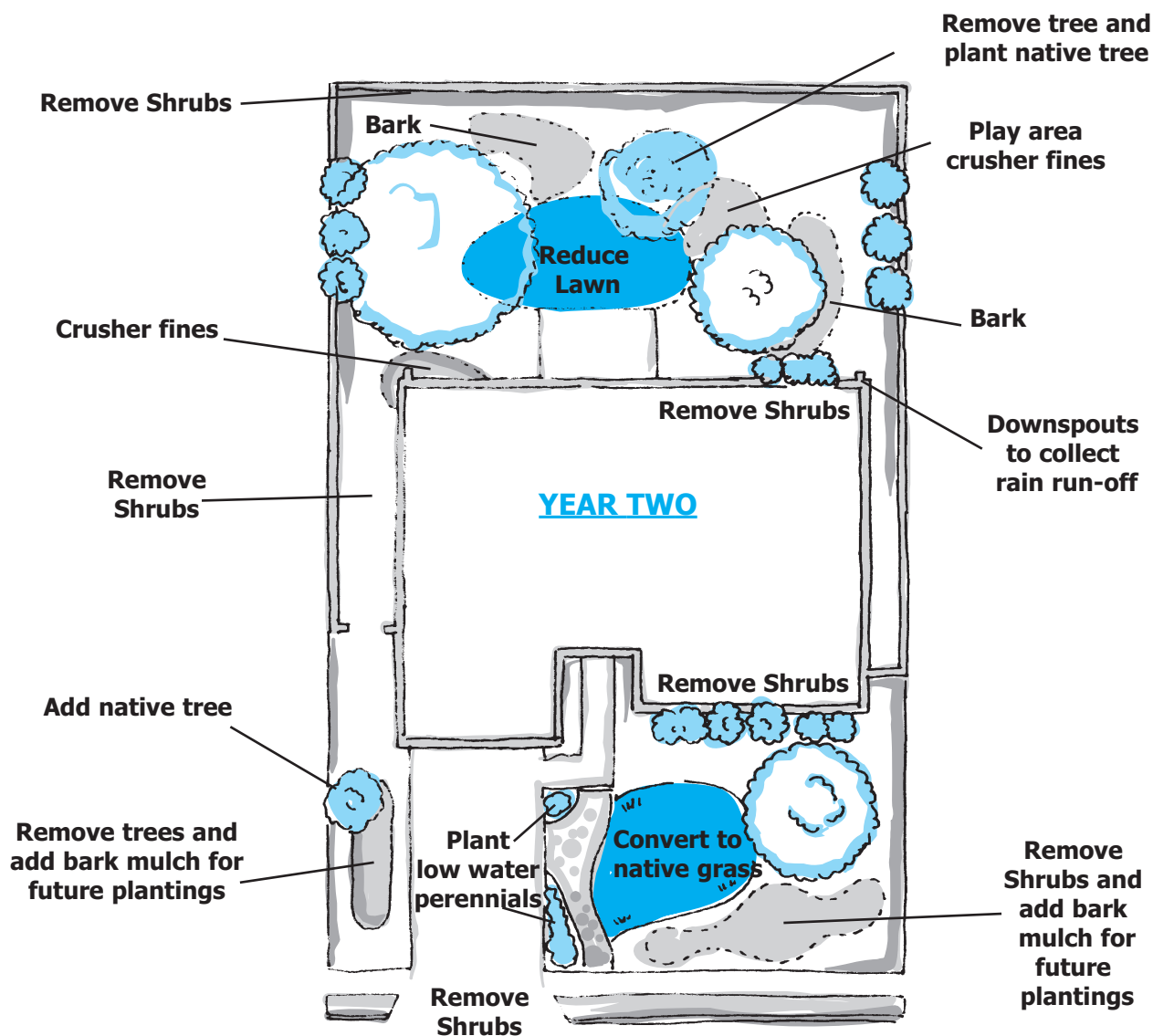


#### **Helpful Tip**

**Retrofit curved and irregularly shaped areas. Install low-water shrubs and perennials — and a drip irrigation system! To prevent water waste running into the street, reduce more of the turf area from the "zone" closest to the street.**



# Conversion Year Two



This is the establishment period for your new xeriscape. It's also the time to introduce new design elements, work into Zone 2, and convert another section of your landscape to xeriscape.

Continue to install plants! If Year One was used to establish perennials, add some annuals this year to fill in the space while perennials get established. Add more mulch.

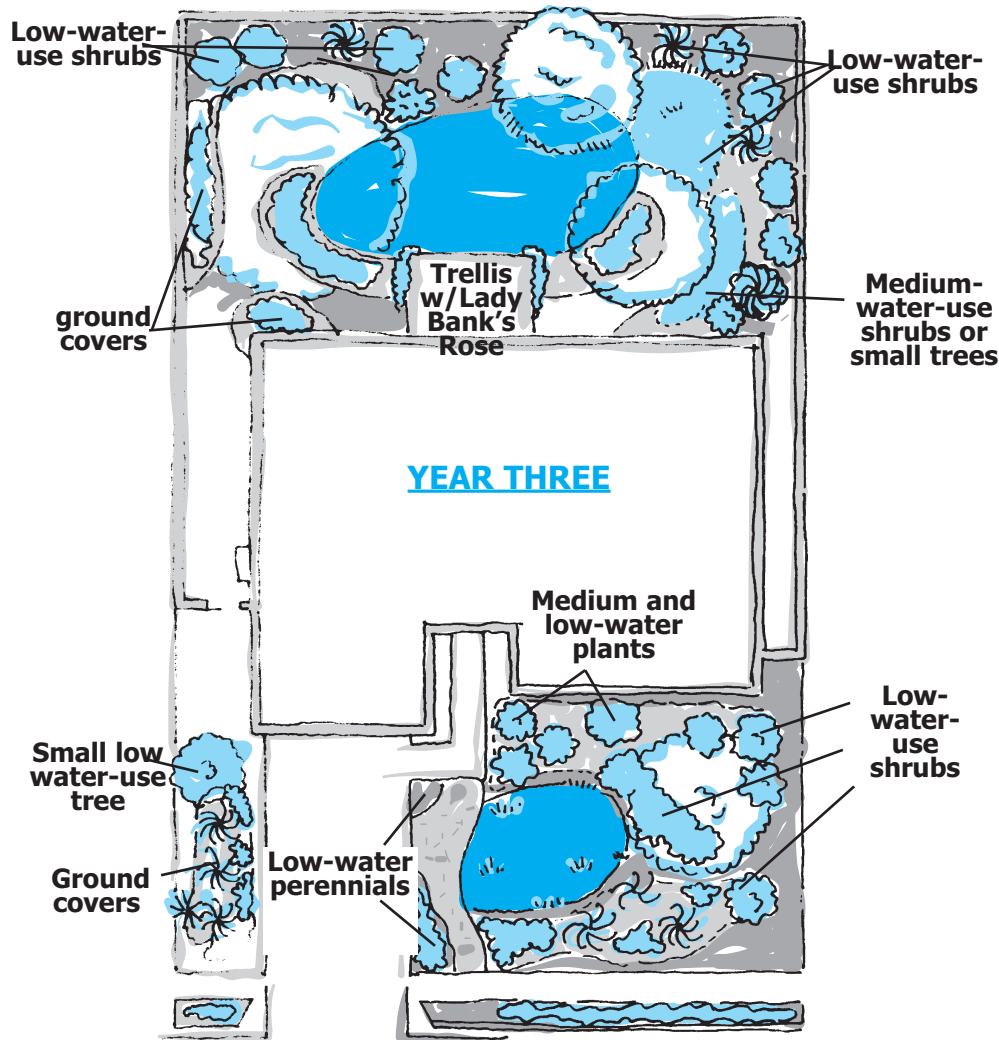
Concentrate on maintenance. Remove competitive plants and weeds. Take another look at the irrigation schedule and see if you can cut back on watering. Hand water only the new plants, not the entire yard.

## Remember--Low-Water-Use Plants Require Water to Get Established

Most plants need water at least the first year (and often the first two years) to get established. Thereafter, you can reduce supplemental watering or eliminate it altogether (depending on the plant and the weather). Follow instructions from a garden center for each plant and look at the plant for cues to the water it needs.



## Conversion Year Three



This is the year when plants are getting fully established. Determine whether more of the yard could be converted to low-water use plants. Move plants around and fill in empty areas.

Practice continued maintenance by weeding while plants get established. Again, look at the irrigation schedule and see if you can cut back on water.

### **Costs for Converting to Low-Water Landscaping**

Naturally, the cost of converting your yard to xeriscaping will vary depending on

the plants selected, the size of your yard, how much work is hired, and how much you do yourself.

If you hire a landscape designer and start from scratch, installing a low water landscape is not much more expensive than a high-water landscape. (The price can be equivalent, or it can run 10-20% higher—usually an additional \$1-\$3 more per square foot).

Doing the work yourself can be a budget-wise option. Planting grass by seed can cost 12-17 cents per square foot (much less expensive than sod). Buying



## CONVERTING YOUR YARD

perennials and shrubs in 1-gallon containers instead of 5-gallon containers will also save you money (be patient, they'll grow!)

Paying someone to install your landscaping may cost from \$1 to \$4 a square foot — or more, depending upon the complexity of your job.

Plan on paying \$0.60 or more per square foot to convert an existing irrigation system. It's advisable to consult a professional to determine if your existing irrigation system can be used. For instance, it should be designed according to code requirements and include a back flow preventer installed at the valve.

### XERISCAPE SAVES

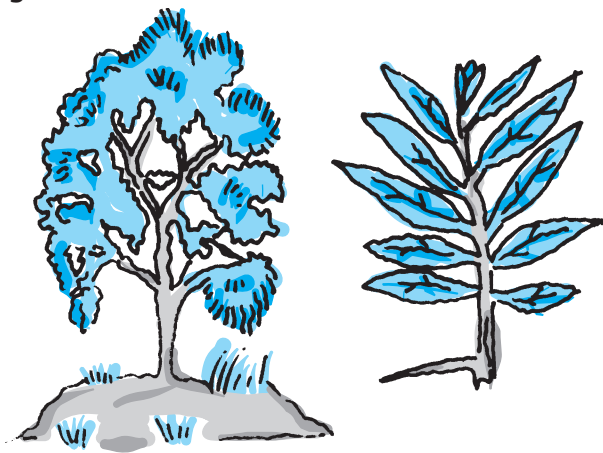
Xeriscape Saves Water. Drought-tolerant plants don't need to be watered as frequently.

Xeriscape Saves Time. You'll spend less time fertilizing, mowing and watering.

Xeriscape Saves Money. Enjoy lower water bills and lower maintenance costs!

### PLANT A (WATER-WISE) TREE

In hot, dry climates, people appreciate cool retreats from the fiery sun. One well-placed shade tree can transform a patio or deck from a scorching hot spot to a shady oasis. Buildings shaded by trees also require less air conditioning!



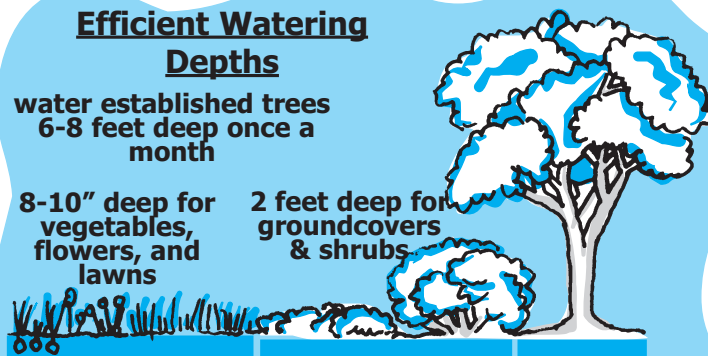
Choose low or medium-water use trees from the list for your area

### Efficient Watering Depths

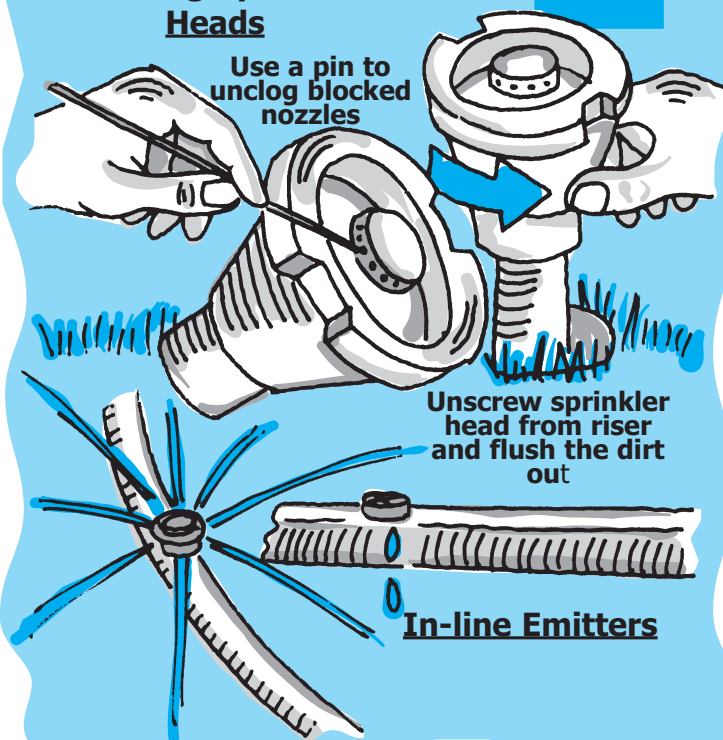
water established trees  
6-8 feet deep once a month

8-10" deep for  
vegetables,  
flowers, and  
lawns

2 feet deep for  
groundcovers  
& shrubs



### Cleaning Sprinkler Heads



Use a pin to unclog blocked nozzles

Unscrew sprinkler head from riser and flush the dirt out

### Irrigation System Tips

—Make sure plants with similar watering needs and rooting depths are placed together and are watered by the same irrigation valve.

—Always place your lawn on a separate valve from other plantings.

—If you plan to design and install your own irrigation system, ask for advice from an established retailer.

—Check your irrigation system regularly for broken sprinkler heads, leaks, clogged drip emitters or lines, and blocked sprinkler heads. Make needed repairs or modifications immediately.

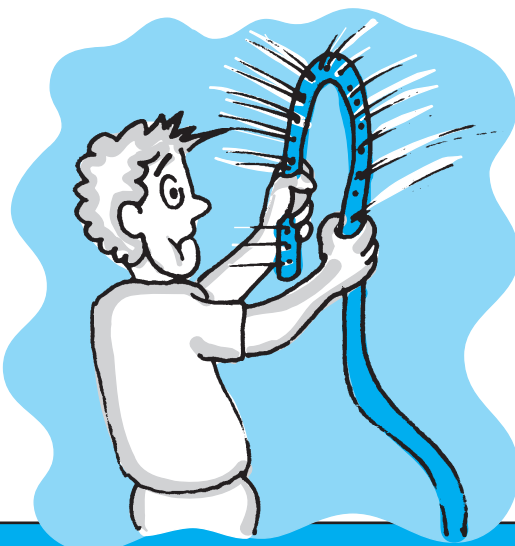
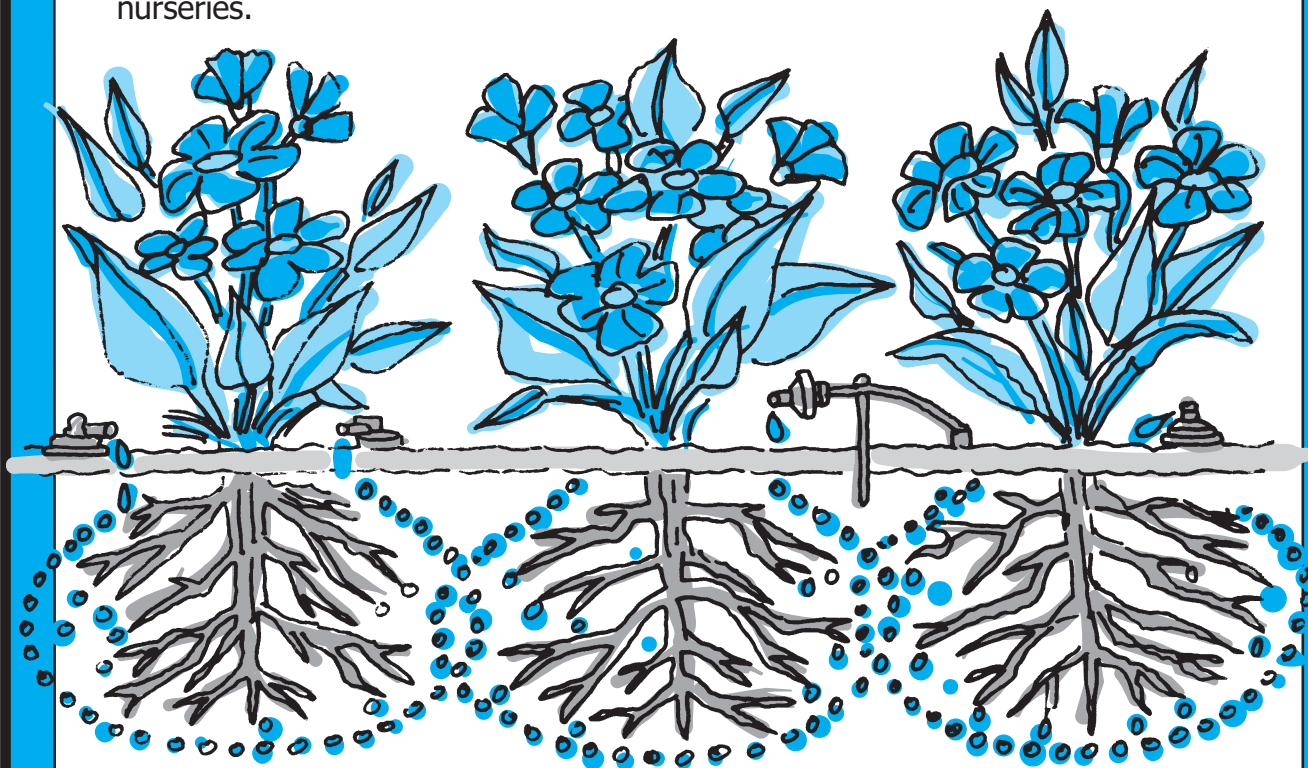


# TIPS ON DRIP

## A DRIP IRRIGATION PRIMER

Drip irrigation is the perfect method for watering most shrubs and trees. Drip irrigation systems save water because they deliver slow, steady amounts of water directly to plant roots. As a result, drip systems cut down on evaporation, runoff and overspray.

Drip irrigation kits are available at hardware stores, home centers and nurseries.



### Hey, This Hose Leaks!

The latest technology in hoses is, well, a leaky hose. A "soaker" hose is porous, so it literally "weeps" water slowly along its length. As the water seeps from the hose, plants receive a steady, consistent application of water. Soaker hoses are perfect for flower beds and gardens.



# WATER AUDIT CHECKLIST

## What You Can Do To Help Save Water Indoors

### IN THE BATHROOM

✓ **Check all faucets, pipes, and toilets periodically for leaks.**

A faucet drip or invisible leak in the toilet can add up to 15 gallons of water a day, or 105 gallons a week, which adds up to 5,475 gallons of wasted water a year.

✓ **Install water saving shower heads.** Low flow shower heads deliver 2.5 gallons of water per minute or less and are relatively inexpensive.

✓ **Take shorter showers or take a bath.** Simply taking shorter showers will save gallons of water. For long exposures to the water, a partially filled bath instead of a shower will use less water.

✓ **Look into a low flow toilet.** Ultra-low flush toilets use only about 1.6 gallons of water per flush. Using these could cut indoor water use by as much as 50%. Older toilets use 3.5 to 5 gallons per flush.

✓ **Check for toilet leaks.** Once a year, check for toilet leaks. Remove the toilet tank lid and drip 10 drops of food coloring into the tank. After 10 to 15 minutes check for color in the toilet bowl. If you see any color, your toilet has a leak.

✓ **Install high efficiency, low flow faucet aerators.** Older faucets use between 3 and 7 gallons per minute. Low-flow faucet aerators use no more than 2.5 gallons of water per minute.

✓ **Fix leaky faucets immediately.** A leaky faucet may simply need a new washer. Small faucet leaks can waste 20 gallons of water a day. Large leaks can waste hundreds of gallons.

✓ **Turn off the water while shaving, brushing teeth, etc.** Don't let the water run when you brush your teeth, wash your face or hands, or shave. This can save 3 to 7 gallons a minute.

✓ **Don't use the toilet as a wastebasket.** Use a wastebasket instead of the toilet for tissues and other bits of trash.

### IN THE KITCHEN & LAUNDRY ROOM

✓ **Fill your dishwasher.** Your dishwasher uses the same amount of water whether it is full or just partially full of dishes, so be sure to fill it.

✓ **Keep drinking water in your refrigerator.** Don't let the faucet run until the water cools down. Instead, keep a container of drinking water in the refrigerator.

✓ **Don't let the water run while rinsing vegetables and dishes.** Before rinsing, put the sink stopper in place instead of running the water. If you need to use the garbage disposal, release the used sink water as the disposal is turned on.

✓ **Defrost food in refrigerator.** When defrosting food, plan ahead to thaw it in the refrigerator or microwave oven instead of thawing under running water.

✓ **Select proper water level for laundry.** Unlike your dishwasher, we can control the amount of water used by our clothes washers. Select the proper water level for each load of laundry. A front load washing machine uses 1/3 less water than a top loading machine.

✓ **Reuse fish tank water.** Use fish tank water on your household plants. This will provide a nice fertilizer and save water.



# WATER AUDIT CHECKLIST

## What You Can Do To Help Save Water Outdoors

- ✓ **Automatic systems save time and water.** An automatic sprinkler system can be set to water the lawn for a specified amount of time. This saves you time and waters the lawn evenly. If you don't have a automatic sprinkling system, set a kitchen timer. A lot of water can be wasted in a short period of time if you forget to turn your sprinklers off.
- ✓ **Spot water.** Drier areas require more water than areas where water settles. If necessary, water dry areas by hand.
- ✓ **Use a soil probe to test soil moisture.** Water only when a soil probe shows dry soil or when a screwdriver is difficult to push into the soil.
- ✓ **Water the lawn only when needed.** Step on the grass; if it springs back up when you move your foot, it does not need water.
- ✓ **Don't water the pavement.** Position the sprinklers so that water lands on the lawn or garden, not in areas where it is not needed. Avoid watering when it is windy. Wind causes water to evaporate quickly and blows water onto areas where it is not needed. Remember, if it doesn't grow, don't water it!
- ✓ **Water without waste.** Interrupt watering when puddles or runoff occur. This allows the water to penetrate into the soil before restarting irrigation.
- ✓ **Plant drought-resistant trees and plants.** Landscape with plants that require less water. These plants can be very attractive. Rocks, gravel, benches, and deck areas can all be used to creatively decorate a yard.
- ✓ **Consider drip irrigation systems around trees and shrubs.** Drip systems permit water to flow slowly to roots, encouraging strong root systems. These systems will also cut down evaporation.
- ✓ **Accept a less than lush lawn.** Grass will naturally go dormant during periods of drought, but will readily regenerate when water becomes available. Reduce traffic on stressed turf areas if possible.
- ✓ **Match fertilizer to the plant requirement.** Fertilizer applications require additional water. Excess fertilizer stimulates top growth, often to the detriment of the root system. Plant turf grasses with low water use.
- ✓ **Mow higher and less frequently.** Never remove more than 1/3 of the leaf blade in one mowing. Mowing puts the grass under additional stress that requires more water.
- ✓ **Use a broom to clean the driveway and sidewalk.** Sweep instead of using hose to clean the driveway and sidewalk.
- ✓ **Don't let the water run while washing the car.** Get the car wet, then turn off the water while you soap the car down. Turn on the water again for a final rinse.
- ✓ **Use shut-off nozzles on hoses.** Shut-off nozzles completely shut off the water when you are not using it.
- ✓ **Move sprinkler heads away from curbs or sidewalks.** A mulch, bark, or rock area at least 8 inches wide adjacent to sidewalks and curbs will help eliminate water waste.
- ✓ **Check for leaks in pipes, hoses, and faucets.** All leaks cause water to be wasted. Repair or replace any equipment that leaks.



## FIND THE RIGHT PLANTS

The following is a state-by-state list of resources for native and waterwise plants. This list has been made available by EPA on its Water Sense website (<https://www.epa.gov/watersense/what-plant>). While this list is not all-inclusive, it can serve as a terrific resource about hundreds of plants that will grow in your area. Remember that different parts of a state vary greatly in climate and rainfall. For instance, northern New Mexico is much more like southern Colorado than southern New Mexico, and Western Oregon may be more similar to eastern Idaho than it is to other parts of Oregon. And don't forget to check with your local extension service located at the state university in your state.



### Young Plants Need Water More Frequently

NOTE: Even the most drought-resistant native plants need water more frequently during the first year or two to get established. (For example, you may need to water young plants twice a week or more during the hot summer months.) After plants are established, water less often.



<b>State</b>	<b>Source for Native Plants and Advice</b>
Alabama	Alabama Smart Yards—Alabama Cooperative Extension System <a href="http://www.aces.edu/pubs/docs/A/ANR-1359/ANR-1359.pdf">http://www.aces.edu/pubs/docs/A/ANR-1359/ANR-1359.pdf</a>
Alabama	Drought-Tolerant Landscapes for Alabama—Alabama Cooperative Extension System <a href="http://www.aces.edu/pubs/docs/A/ANR-1336/ANR-1336.pdf">http://www.aces.edu/pubs/docs/A/ANR-1336/ANR-1336.pdf</a>
Alaska	Alaska Department of Fish and Game—Native Alaskan and Exotic Plants used by wildlife <a href="http://www.adfg.alaska.gov/index.cfm?adfg=wildlifelandscaping.planttable">http://www.adfg.alaska.gov/index.cfm?adfg=wildlifelandscaping.planttable</a>
Arizona	Arizona Department of Water Resources—Drought Tolerant/Low Water Use Plant Lists <a href="http://www.azwater.gov/azdwr/WaterManagement/AMAs/LowWaterUsePlantList.htm">http://www.azwater.gov/azdwr/WaterManagement/AMAs/LowWaterUsePlantList.htm</a>
Arkansas	Plant Native List for Arkansas, Louisiana, Eastern Oklahoma, and Eastern Texas <a href="http://www.plantnative.org/rpl-arla.htm">http://www.plantnative.org/rpl-arla.htm</a>
Arkansas	University of Arkansas—Drought Tolerant Plants Suitable for Arkansas Landscapes <a href="https://www.uaex.edu/counties/pulaski/docs/Drought%20Tolerant%20Plants%20Suitable%20for%20Arkansas%20Landscapes.pdf">https://www.uaex.edu/counties/pulaski/docs/Drought%20Tolerant%20Plants%20Suitable%20for%20Arkansas%20Landscapes.pdf</a>
California	Contra Costa Water Saving Plants <a href="http://www.contracosta.watersavingplants.com/">http://www.contracosta.watersavingplants.com/</a>
California	The Metropolitan Water District of Southern California Plant <a href="http://www.bewaterwise.com/Gardensoft/browser04.aspx?SearchType=Characteristic">http://www.bewaterwise.com/Gardensoft/browser04.aspx?SearchType=Characteristic</a>
California	Theodore Payne Foundation for Wildflowers and Native Plants—California Native Plant Wiki <a href="http://www.theodorepayne.org/mediawiki/index.php?title=Main_Page">http://www.theodorepayne.org/mediawiki/index.php?title=Main_Page</a>
California	Nifty 50 Plants for Water Smart Landscapes <a href="http://www.watersmartd.org/content/nifty-50-plants-watersmart-landscapes">http://www.watersmartd.org/content/nifty-50-plants-watersmart-landscapes</a>
California	Water Wise Gardening in Santa Barbara County <a href="http://www.sb.watersavingplants.com/plants.php">http://www.sb.watersavingplants.com/plants.php</a>
California	Water Wise Gardening in Fresno Region <a href="http://www.fresnogardening.org/">http://www.fresnogardening.org/</a>
California	The San Francisco Low Water Use and Climate Appropriate Plant List <a href="http://www.sfwater.org/modules/showdocument.aspx?documentid=63">http://www.sfwater.org/modules/showdocument.aspx?documentid=63</a>
Colorado	Colorado State University— Colorado Plant Database <a href="https://www.jeffco.us/coopext/wordsearch.jsp">https://www.jeffco.us/coopext/wordsearch.jsp</a>
Colorado	Harlequin's Gardens— List of Trees for Xeriscapes <a href="http://www.harlequinsgardens.com/mikls-articles/list-of-trees-for/">http://www.harlequinsgardens.com/mikls-articles/list-of-trees-for/</a>
Colorado	Plant Select— Plant Smarter <a href="http://plantselect.org/">http://plantselect.org/</a>



<b>State</b>	<b>Source for Native Plants and Advice</b>
Connecticut	Connecticut Botanical Society—Gardening with Native Plants <a href="http://www.ct-botanical-society.org/Gardens/view">http://www.ct-botanical-society.org/Gardens/view</a>
Connecticut	"Uconn Plant Database of Trees, Shubs, and Vines" <a href="http://hort.uconn.edu/search.php">http://hort.uconn.edu/search.php</a>
Delaware	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf</a>
Delaware	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>
Florida	Florida-friendly Plant Database <a href="http://www.floridayards.org/fyplants/index.php">http://www.floridayards.org/fyplants/index.php</a>
Florida	Drought-Tolerant Plants for North and Central Florida—University of Florida <a href="http://baker.ifas.ufl.edu/Horticulture/Drought_files/Drought%20tolerant%20plants%20for%20North%20FL.pdf">http://baker.ifas.ufl.edu/Horticulture/Drought_files/Drought%20tolerant%20plants%20for%20North%20FL.pdf</a>
Florida	Native Florida Plants for Home Landscapes <a href="http://ufdcimages.uflib.ufl.edu/IR/00/00/17/12/00001/EP01100.pdf">http://ufdcimages.uflib.ufl.edu/IR/00/00/17/12/00001/EP01100.pdf</a>
Florida	Natives for Landscaping—Florida Native Plant Society <a href="http://www.fnps.org/plants">http://www.fnps.org/plants</a>
Florida	The Florida-Friendly Landscaping Guide to Plant Selection & Landscape Design - Florida-Friendly Landscaping <a href="http://www.swfwmd.state.fl.us/publications/files/fynplantguide-web.pdf">http://www.swfwmd.state.fl.us/publications/files/fynplantguide-web.pdf</a>
Georgia	Georgia Coastal Plain Native Plants for Conservation Landscaping and Wildlife Habitat - University of Georgia Marine Extension Service <a href="https://ecoscapes.bugwood.org//">https://ecoscapes.bugwood.org//</a>
Georgia	Georgia's Native Plants - Georgia Native Plant Society <a href="http://gnps.org/plant-types/groundcover/">http://gnps.org/plant-types/groundcover/</a>
Georgia	Part 1: Native Plants for Georgia - The University of Georgia College of Agricultural and Environmental Sciences <a href="http://extension.uga.edu/publications/detail.html?number=B987">http://extension.uga.edu/publications/detail.html?number=B987</a>
Hawaii	Native and Introduced Plants of Hawaii <a href="http://www.tradewindsfruit.com/content/hawaiian-plants.htm">http://www.tradewindsfruit.com/content/hawaiian-plants.htm</a>
Hawaii	Native Nursery Plant Guide <a href="https://www.mauinativenursery.com/plant-guide.html">https://www.mauinativenursery.com/plant-guide.html</a>
Idaho	Landscaping with Native Plants—University of Idaho Extension <a href="http://www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0862.pdf">http://www.cals.uidaho.edu/edcomm/pdf/BUL/BUL0862.pdf</a>
Idaho	Landscaping with Native Plants of the Intermountain Region - Idaho Native Plant Society <a href="http://idahonativeplants.org/Guides/cover_p7.pdf">http://idahonativeplants.org/Guides/cover_p7.pdf</a>



<b>State</b>	<b>Source for Native Plants and Advice</b>
Illinois	Illinois' Best Plants <a href="https://www.chicagobotanic.org/plantcollections#plantfinder">https://www.chicagobotanic.org/plantcollections#plantfinder</a>
Illinois	Directory of Wildflowers - University of Illinois Extension <a href="http://extension.illinois.edu/wildflowers/directory.cfm">http://extension.illinois.edu/wildflowers/directory.cfm</a>
Illinois	Plant Profiles - Chicago Botanic Garden <a href="https://www.chicagobotanic.org/plantinfo/pp/">https://www.chicagobotanic.org/plantinfo/pp/</a>
Indiana	ViteGreenhouses—Indiana Native Plants <a href="http://www.vitegreenhouses.com/PlantResults.asp?Query=61">http://www.vitegreenhouses.com/PlantResults.asp?Query=61</a>
Indiana	Landscaping with Plants Native to Indiana <a href="http://www.inpaws.org/wp-content/uploads/LandscapingPlants070312.pdf">http://www.inpaws.org/wp-content/uploads/LandscapingPlants070312.pdf</a>
Indiana	Landscape-Worthy Indiana Natives - Indiana Native Plant & Wildflower Society <a href="http://www.inpaws.org/landscaping/landscape-worthy-indiana-natives/">http://www.inpaws.org/landscaping/landscape-worthy-indiana-natives/</a>
Iowa	Short, Showy Native Plants - State Library of Iowa <a href="http://www.statelibraryofiowa.org/ld/c-d/continuing-ed/ce-archive/landscape/showy">http://www.statelibraryofiowa.org/ld/c-d/continuing-ed/ce-archive/landscape/showy</a>
Kansas	Water-Wise Plants Trees and Ornamentals for South Central Kansas <a href="http://www.sedgwick.k-state.edu/gardening-law-care/documents/Water%20Wise%20Plants%202015.pdf">http://www.sedgwick.k-state.edu/gardening-law-care/documents/Water%20Wise%20Plants%202015.pdf</a>
Kentucky	<a href="http://www.plantnative.org/rpl-kytn.htm">Native Plant List - Kentucky and Tennessee</a> <a href="http://www.plantnative.org/rpl-kytn.htm">http://www.plantnative.org/rpl-kytn.htm</a>
Louisiana	Plant Native List for Arkansas, Louisiana, Eastern Oklahoma, and Eastern Texas <a href="http://www.plantnative.org/rpl-arla.htm">http://www.plantnative.org/rpl-arla.htm</a>
Louisiana	Louisiana Ecosystems and Plant Identification <a href="http://www.rnr.lsu.edu/plantid/">http://www.rnr.lsu.edu/plantid/</a>
Maine	Maine Bureau of Land and Water Quality—The Buffer Handbook Plant List <a href="http://www.maine.gov/dep/land/watershed/buffer_plant_list.pdf">http://www.maine.gov/dep/land/watershed/buffer_plant_list.pdf</a>
Maryland	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf</a>
Maryland	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>
Massachusetts	University of Massachusetts—Drought Tolerant Plants for the Landscape (PDF) <a href="http://ag.umass.edu/landscape/fact-sheets">http://ag.umass.edu/landscape/fact-sheets</a>



<b>State</b>	<b>Source for Native Plants and Advice</b>
Massachusetts	Native Plants Suitable for the Cultivated Cape Cod Landscape—Cape Cod Commission <a href="http://grownativemass.org/sites/default/files/downloads/NP-Cultivated%20Cape%20Cod%20Landscape.pdf">http://grownativemass.org/sites/default/files/downloads/NP-Cultivated%20Cape%20Cod%20Landscape.pdf</a>
Massachusetts	North American Plants for New England Gardens—UMass Extension Landscape, Nursery & Urban Forestry <a href="http://www.grownativemass.org/sites/default/files/umass_native_plts.pdf">http://www.grownativemass.org/sites/default/files/umass_native_plts.pdf</a>
Michigan	Michigan Native Plants Database <a href="http://www.nativeplant.com/plants/search/input">http://www.nativeplant.com/plants/search/input</a>
Michigan	Native Trees - City of Ann Arbor <a href="https://www.a2gov.org/departments/Parks-Recreation/NAP/Native-Plants/Pages/NativeTrees.aspx">https://www.a2gov.org/departments/Parks-Recreation/NAP/Native-Plants/Pages/NativeTrees.aspx</a>
Michigan	Northern Michigan's Native Plants—Tip of the Mitt Watershed Council <a href="https://www.watershedcouncil.org/native-plants.html">https://www.watershedcouncil.org/native-plants.html</a>
Michigan	Regional Plant Lists - Upper Peninsula - Michigan State University <a href="http://www.canr.msu.edu/nativeplants/plant_facts/local_info/upper_peninsula">http://www.canr.msu.edu/nativeplants/plant_facts/local_info/upper_peninsula</a>
Michigan	Regional Plant Lists - Southern Lower Peninsula - Michigan State University <a href="http://www.canr.msu.edu/nativeplants/plant_facts/local_info/south_lower_peninsula">http://www.canr.msu.edu/nativeplants/plant_facts/local_info/south_lower_peninsula</a>
Michigan	Regional Plant Lists - Northern Lower Peninsula - Michigan State University <a href="http://www.canr.msu.edu/nativeplants/plant_facts/local_info/north_lower_peninsula">http://www.canr.msu.edu/nativeplants/plant_facts/local_info/north_lower_peninsula</a>
Minnesota	Living Landscapes in Minnesota: A Guide to Native Plantscaping—USDA <a href="https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_022410.pdf">https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_022410.pdf</a>
Minnesota	Native Plant Encyclopedia—Minnesota Department of Natural Resources <a href="https://webapps8.dnr.state.mn.us/restoreyourshore">https://webapps8.dnr.state.mn.us/restoreyourshore</a>
Minnesota	Blue Thumb—Planting for Clean Water <a href="http://www.blue-thumb.org/">http://www.blue-thumb.org/</a>
Mississippi	Native Shrubs for Mississippi Landscapes—Mississippi State University Extension Service <a href="http://extension.msstate.edu/publications/publications/water-conservation-your-landscape">http://extension.msstate.edu/publications/publications/water-conservation-your-landscape</a>
Mississippi	The Crosby Arboretum Plant List—The Crosby Arboretum <a href="https://www.wildflower.org/collections/printable.php?collection=Organization_817">https://www.wildflower.org/collections/printable.php?collection=Organization_817</a>
Missouri	Plant Finder—Missouri Botanical Garden <a href="http://www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx">http://www.missouribotanicalgarden.org/plantfinder/plantfindersearch.aspx</a>
Missouri	Grow Native!—Missouri Prairie Foundation <a href="http://grownative.org/native-plant-info/">http://grownative.org/native-plant-info/</a>



State	Source for Native Plants and Advice
Missouri	Native Plants for Your Landscape—Missouri Department of Conservation <a href="https://mdc.mo.gov/sites/default/files/downloads/nativeplantsrevision_2012_07web.pdf">https://mdc.mo.gov/sites/default/files/downloads/nativeplantsrevision_2012_07web.pdf</a>
Montana	Landscaping with Native Plants of South Central Montana—Montana Native Plant Society <a href="http://www.mtnativeplants.org/Native_Plant_Landscaping">http://www.mtnativeplants.org/Native_Plant_Landscaping</a>
Montana	Recommended Species for Native Plant Landscaping in the Helena Area—Montana Native Plant Society <a href="http://www.mtnativeplants.org/Helena_Area_Native_Plant_Landscaping">http://www.mtnativeplants.org/Helena_Area_Native_Plant_Landscaping</a>
Nationwide	Plant Native <a href="http://www.plantnative.org/">http://www.plantnative.org/</a>
Nationwide	Lady Bird Johnson Wildflower Center <a href="https://www.wildflower.org/plants/">https://www.wildflower.org/plants/</a>
Nationwide	USDA Plant Database <a href="https://plants.usda.gov/java/">https://plants.usda.gov/java/</a>
Nationwide	Izel Native Plants for your Garden <a href="https://www.izelplants.com/">https://www.izelplants.com/</a>
Nationwide	North American Native Plant Society <a href="http://www.nanps.org/plant/plantlist.aspx">http://www.nanps.org/plant/plantlist.aspx</a>
Nationwide	Floridata—Plant Profile List <a href="https://floridata.com/plantlist/">https://floridata.com/plantlist/</a>
Nationwide	National Gardening Association—USDA Hardiness Zone and Plant Finder <a href="https://garden.org/nga/zipzone/index.php">https://garden.org/nga/zipzone/index.php</a>
Nationwide	High Country Gardens—Beautiful Plants for the WaterWise Garden <a href="https://www.highcountrygardens.com/">https://www.highcountrygardens.com/</a>
Nebraska	Perennials in Water Wise Landscapes—University of Nebraska—Lincoln Extension <a href="http://extensionpublications.unl.edu/assets/pdf/g1214.pdf">http://extensionpublications.unl.edu/assets/pdf/g1214.pdf</a>
Nebraska	Wildflowers for the Home Landscape—University of Nebraska—Lincoln Extension <a href="http://extensionpublications.unl.edu/assets/pdf/g1074.pdf">http://extensionpublications.unl.edu/assets/pdf/g1074.pdf</a>
Nebraska	Recommended Species for the Western Great Plains—Nebraska Statewide Arboretum <a href="http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1001&amp;context=arboretumpubs">http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1001&amp;context=arboretumpubs</a>
Nevada	Southern Nevada Water Authority—Water Smart Plant List (PDF) <a href="https://www.snwa.com/assets/pdf/wsl_plantlist.pdf">https://www.snwa.com/assets/pdf/wsl_plantlist.pdf</a>



State	Source for Native Plants and Advice
New Hampshire	Native Plant List for New Hampshire, Maine and Vermont - PlantNative <a href="http://www.plantnative.org/rpl-nen.htm">http://www.plantnative.org/rpl-nen.htm</a>
New Hampshire	A New Hampshire Plant Palette - University of New Hampshire Cooperative Extension <a href="https://extension.unh.edu/resources/files/Resource000556_Rep578.pdf">https://extension.unh.edu/resources/files/Resource000556_Rep578.pdf</a>
New Jersey	Incorporating Native Plants in Your Residential Landscape—Rutgers NJAES Cooperative Extension <a href="https://njaes.rutgers.edu/pubs/fs1140/">https://njaes.rutgers.edu/pubs/fs1140/</a>
New Jersey	Landscaping for Water Conservation—Rutgers NJAES Cooperative Extension <a href="https://njaes.rutgers.edu/pubs/e080/">https://njaes.rutgers.edu/pubs/e080/</a>
New Jersey	All Gardening and Landscaping Fact Sheets & Bulletins-- Rutgers NJAES Cooperative Extension <a href="https://njaes.rutgers.edu/pubs/subcategory.asp?cat=5&amp;sub=1001">https://njaes.rutgers.edu/pubs/subcategory.asp?cat=5&amp;sub=1001</a>
New Jersey	Native Plants for Wildlife Habitat Improvement in New Jersey's Coastal Plain Region—Cape Atlantic Conservation District <a href="http://capeatlantic.org/Native%20Plants%20for%20Wildlife%20Booklet.pdf">http://capeatlantic.org/Native%20Plants%20for%20Wildlife%20Booklet.pdf</a>
New Mexico	New Mexico Plant List <a href="http://wuc.ose.state.nm.us/Plants/home.jsp">http://wuc.ose.state.nm.us/Plants/home.jsp</a>
New Mexico	Southwest Yard and Garden Plant Advisor—New Mexico State University <a href="http://desertblooms.nmsu.edu/plantadvisor/">http://desertblooms.nmsu.edu/plantadvisor/</a>
New York	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf</a>
New York	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>
North Carolina	Going Native - Urban Landscaping for Wildlife with Native Plants - North Carolina State University <a href="https://projects.ncsu.edu/goingnative/howto/mapping/nplants/index.php">https://projects.ncsu.edu/goingnative/howto/mapping/nplants/index.php</a>
North Carolina	Common native plant species—Mecklenburg County Government - Trees, Shrubs, Grass and Flowers <a href="https://www.mecknc.gov/luesa/solidwaste/mastercomposters/nativeplants/pages/native-plants.aspx?redirect=charmec">https://www.mecknc.gov/luesa/solidwaste/mastercomposters/nativeplants/pages/native-plants.aspx?redirect=charmec</a>
North Carolina	Native Wildflowers for Your Garden—North Carolina Botanical Garden <a href="http://ncbg.unc.edu/uploads/files/NativePlantsWildflowersEtc.pdf">http://ncbg.unc.edu/uploads/files/NativePlantsWildflowersEtc.pdf</a>
North Carolina	Recommended Native Species—North Carolina Native Plant Society <a href="http://ncwildflower.org/native_plants/recommendations">http://ncwildflower.org/native_plants/recommendations</a>



State	Source for Native Plants and Advice
North Dakota	Living Landscapes in North Dakota: A Guide to Native Plantscaping— USDA <a href="https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_001520.pdf">https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs141p2_001520.pdf</a>
North Dakota	Trees and Shrubs of North Dakota - North Dakota State University Extension Service <a href="https://www.ag.ndsu.edu/pubs/plantsci/trees/eb38.pdf">https://www.ag.ndsu.edu/pubs/plantsci/trees/eb38.pdf</a>
Ohio	Plant Recommendations for Special Conditions - Ohio Landscape Association <a href="http://www.myohiolandscape.com/drought-tolerant-plants.cfm">http://www.myohiolandscape.com/drought-tolerant-plants.cfm</a>
Ohio	Go Native! Native Species Lists - Ohio Department of Natural Resources <a href="http://ohiodnr.gov/gonative">http://ohiodnr.gov/gonative</a>
Oklahoma	Plant Native List for Arkansas, Louisiana, Eastern Oklahoma, and Eastern Texas <a href="http://www.plantnative.org/rpl-arla.htm">http://www.plantnative.org/rpl-arla.htm</a>
Oklahoma	Plant Selections for Oklahoma—Oklahoma Proven <a href="http://www.oklahomaproven.org/">http://www.oklahomaproven.org/</a>
Oklahoma	Under-Utilized Native Plants of Oklahoma—OKPLANTtrees <a href="http://www.okplanttrees.org/nativeplants.pdf">http://www.okplanttrees.org/nativeplants.pdf</a>
Oregon	City of Salem—WaterWise Plants (PDF) <a href="http://www.cityofsalem.net/CityDocuments/water-wise-plants-handout.pdf">http://www.cityofsalem.net/CityDocuments/water-wise-plants-handout.pdf</a>
Oregon	Clean Water Services—Native Plant Finder <a href="http://emswcd.org/native-plants/native-plant-database/">http://emswcd.org/native-plants/native-plant-database/</a>
Oregon	City of Ashland—Native Plant Guide <a href="http://www.ashlandsaveswater.org/">http://www.ashlandsaveswater.org/</a>
Oregon	Regional Water Providers Consortium—Water-Plant Guide <a href="http://www.conserveh2o.org/low-water-use-plants">http://www.conserveh2o.org/low-water-use-plants</a>
Oregon	Water-Efficient Plants for the Willamette Valley—Eugene Water & Electric Board <a href="http://www.oregon.gov/owrd/docs/Willamette_Valley_Water_efficient_Plants.pdf">http://www.oregon.gov/owrd/docs/Willamette_Valley_Water_efficient_Plants.pdf</a>
Pennsylvania	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf</a>
Pennsylvania	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>
Rhode Island	RI Native Plant Guide—College of the Environment and Life Sciences <a href="http://web.uri.edu/rinativeplants/">http://web.uri.edu/rinativeplants/</a>



<b>State</b>	<b>Source for Native Plants and Advice</b>
South Carolina	Native Plant List for Coastal South Carolina—South Carolina Native Plant Society <a href="http://scnps.org/wp-content/uploads/2012/04/CoastalNativePlantList.pdf">http://scnps.org/wp-content/uploads/2012/04/CoastalNativePlantList.pdf</a>
South Carolina	Plants that Tolerate Drought—Clemson University Cooperative Extension Service <a href="http://www.clemson.edu/extension/hgic/plants/pdf/hgic1717.pdf">http://www.clemson.edu/extension/hgic/plants/pdf/hgic1717.pdf</a>
South Dakota	Living Landscapes in South Dakota: A Guide to Native Plantscaping—USDA <a href="https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcbk7831.pdf">https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcbk7831.pdf</a>
Tennessee	Landscaping with Native Plants—Tennessee Exotic Pest Plant Council <a href="http://s3.amazonaws.com/tneppc2/uploads/583/original/natives2010-web.pdf">http://s3.amazonaws.com/tneppc2/uploads/583/original/natives2010-web.pdf</a>
Tennessee	Native Plant Selector—Tennessee Valley Authority <a href="https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Land%20Management/plantguide.pdf">https://www.tva.gov/file_source/TVA/Site%20Content/Environment/Environmental%20Stewardship/Land%20Management/plantguide.pdf</a>
Texas	Smart Scape Plant Search <a href="http://www.txsmartscape.com/plant_search">http://www.txsmartscape.com/plant_search</a>
Texas	Austin City Connection—Native and Adapted Landscape Plants <a href="http://www.austintexas.gov/watershed_protection/publications/document.cfm?id=198301">http://www.austintexas.gov/watershed_protection/publications/document.cfm?id=198301</a>
Texas	Texas A&M Agrilife Water University Plant Database for North Texas <a href="http://wateruniversity.tamu.edu/design/plant-database/">http://wateruniversity.tamu.edu/design/plant-database/</a>
Texas	Plant Native List for Arkansas, Louisiana, Eastern Oklahoma, and Eastern Texa <a href="http://www.plantnative.org/rpl-arla.htm">http://www.plantnative.org/rpl-arla.htm</a>
Texas	Earth-Kind Plant Selector <a href="http://ekps.tamu.edu/">http://ekps.tamu.edu/</a>
Utah	Utah Water Wise Plants <a href="https://waterwiseplants.utah.gov/">https://waterwiseplants.utah.gov/</a>
Utah	Central Utah Gardens <a href="http://www.centralutahgardens.org/">http://www.centralutahgardens.org/</a>
Vermont	Northern Drought-Resistant Plants <a href="http://pss.uvm.edu/ppp/pubs/oh73drought.htm">http://pss.uvm.edu/ppp/pubs/oh73drought.htm</a>
Virginia	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakekenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakekenatives.pdf</a>
Virginia	Virginia Department of Conservation and Recreation—Native Plants <a href="http://www.dcr.virginia.gov/natural-heritage/nativeplants">http://www.dcr.virginia.gov/natural-heritage/nativeplants</a>
Virginia	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>



<b>State</b>	<b>Source for Native Plants and Advice</b>
Virginia	How to Landscape with Native Plants at Home—James River Association <a href="http://jrava.org/wp-content/uploads/2016/05/Native-Plants.pdf">http://jrava.org/wp-content/uploads/2016/05/Native-Plants.pdf</a>
Washington	Saving Water Partnership—The Plant List <a href="http://www.savingwater.org/Resources/PlantLists/index.htm">http://www.savingwater.org/Resources/PlantLists/index.htm</a>
Washington	King County—Native Plant Guide <a href="https://green2.kingcounty.gov/gonative/index.aspx">https://green2.kingcounty.gov/gonative/index.aspx</a>
Washington	Native Plants—Spokane Smartscape <a href="http://www.sccd.org/programs/smartscape/native-plants">http://www.sccd.org/programs/smartscape/native-plants</a>
Washington	Washington Native Plant Society—Native Plant List <a href="http://www.wnps.org/landscaping/index.html">http://www.wnps.org/landscaping/index.html</a>
West Virginia	Wildlife Habitat and USFWS—Native Plants for Conservation Landscaping Chesapeake Bay Watershed (PDF) <a href="https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf">https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf</a>
West Virginia	Native Plant Center for the Chesapeake Region <a href="http://www.nativeplantcenter.net/?q=database">http://www.nativeplantcenter.net/?q=database</a>
West Virginia	West Virginia Pollinator Handbook <a href="http://www.xerces.org/wp-content/uploads/2009/11/WVPH-SEC.pdf">http://www.xerces.org/wp-content/uploads/2009/11/WVPH-SEC.pdf</a>
Wisconsin	A Guide to Selecting Landscape Plants for Wisconsin—University of Wisconsin-Extension <a href="http://learningstore.uwex.edu/assets/pdfs/a2865.pdf">http://learningstore.uwex.edu/assets/pdfs/a2865.pdf</a>
Wisconsin	Landscape Plants of the Upper Midwest—University of Wisconsin—Madison <a href="https://www.landscapeplants.org/plant_search.php">https://www.landscapeplants.org/plant_search.php</a>
Wisconsin	Landscaping for Water Quality—Center of Environmental Study <a href="http://www.miwaterstewardship.org/Portals/0/docs/Lanscaping%20for%20Water%20Quality%20-%20PLANT%20LIST.pdf">http://www.miwaterstewardship.org/Portals/0/docs/Lanscaping%20for%20Water%20Quality%20-%20PLANT%20LIST.pdf</a>
Wyoming	LaBonte Park's Outdoor Learning Center Water-Wise and Native Plant Demonstration Garden—University of Wyoming Extension Service <a href="http://www.uwyo.edu/barnbackyard/_files/documents/magazine/waterwisewe-brochure-2012compressedweb.pdf">http://www.uwyo.edu/barnbackyard/_files/documents/magazine/waterwisewe-brochure-2012compressedweb.pdf</a>
Wyoming	The WyoScape Xeric Demonstration Garden—University of Wyoming Cooperative Extension Service <a href="http://www.uwyo.edu/barnbackyard/_files/documents/resources/casper-berm-plant-guide-web.pdf">http://www.uwyo.edu/barnbackyard/_files/documents/resources/casper-berm-plant-guide-web.pdf</a>
Wyoming	Water-wise Plants for Wyoming—University of Wyoming Extension Service <a href="https://www.youtube.com/playlist?list=PL9EF57DE0DE7CBEED">https://www.youtube.com/playlist?list=PL9EF57DE0DE7CBEED</a>
Wyoming	Water-Wise Wyoming Gardens—University of Wyoming Cooperative Extension Service <a href="http://www.wyomingextension.org/agpubs/pubs/B1143.pdf">http://www.wyomingextension.org/agpubs/pubs/B1143.pdf</a>



# Resources

Listed below are a few resources for help with water conservation in the home and for water-wise landscape design. In addition, check with your water utility and with the cooperative extension service located at a state university in your state.

*SAVE: The Homeowner's Guide to Using Water Wisely*, Tucson Water Conservation Office, PO Box 27210, Tucson AZ 85726-7210.

<https://www.ag.arizona.edu/pima/smartscape/wp-content/uploads/2013/09/Homeowners-Guide-to-Using-Water-Wisely.pdf>

*A Watering Guide for Texas Landscape* and other water conservation publications, Texas Water Development Board, 1700 N. Congress Ave, Austin, TX 78701

<https://www.twdb.texas.gov/publications/brochures/conservation/>

*Water-Efficient Landscape Guide*, Truckee Meadows Water Authority, 1355 Capital Blvd Reno, Nevada 89502

[http://www.tmwlandscapeguide.com/landscape\\_guide/interactive/index.php](http://www.tmwlandscapeguide.com/landscape_guide/interactive/index.php)

*Water-Smart Landscape Design*, US EPA

<https://www.epa.gov/watersense/water-smart-landscape-design>

*Water Efficient Landscapes*, California Department of Water Resources

[http://www.water.ca.gov/wateruseefficiency/docs/water\\_efficient\\_landscapes.pdf](http://www.water.ca.gov/wateruseefficiency/docs/water_efficient_landscapes.pdf)

*Xeriscape Plant Guide* Denver Water.

<https://www.denverwater.org/residential/rebates-and-conservation-tips/remodel-your-yard/xeriscape-resources>

*Water Conservation: It All Starts With You*, Department of Ecology, State of Washington

<http://www.ecy.wa.gov/programs/wr/ws/wtrcnsv.html>

*The WaterSense Water-Smart Landscapes Guide*, U.S. EPA,

<https://www.epa.gov/watersense/landscaping-tips>

*Landscaping Water Conservation*

<https://energy.gov/energysaver/landscaping-water-conservation>

Phillips, Judith; 1995. *Natural By Design and Plants for Natural Gardens* (a two-volume series) Museum of New Mexico Press, P.O. Box 2087, Santa Fe, New Mexico 87504

Available from Amazon.com and other bookstores

Phillips, Judith; 1987. *Southwestern Landscaping With Native Plants*, Museum of New Mexico Press, P.O. Box 2087, Santa Fe, New Mexico 87504

Available from Amazon.com and other bookstores

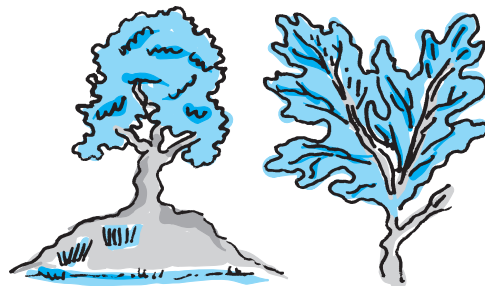
*Reader's Digest New Complete Do-It-Yourself Manual*; Reader's Digest Association, Inc. 1991, Pleasantville, NY. Available from Amazon.com and other bookstores

Rondon, Joanne; 1980. *Landscaping for Water Conservation in a Semiarid Environment*, City of Aurora, Colorado, Department of Utilities, Municipal Building, 1470 South Havana Street, Aurora, Colorado, 80012

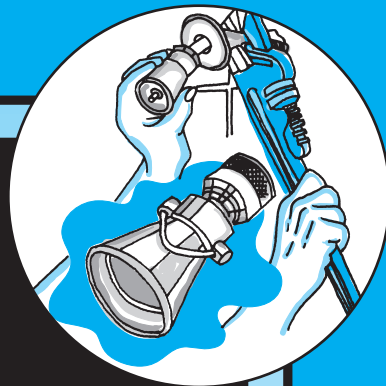
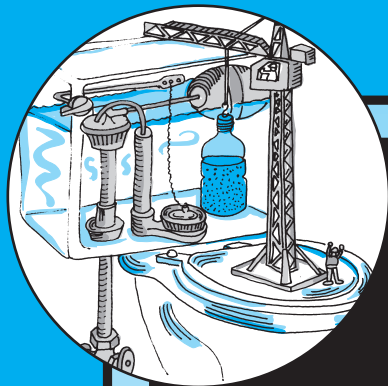
Available from Amazon.com and other bookstores

Shuler, Carol; 1993. *Low Water-Use Plants for California and the Southwest*, Fisher Books, PO Box 38040, Tucson, Arizona 85740. 1993

Available from Amazon.com and other bookstores





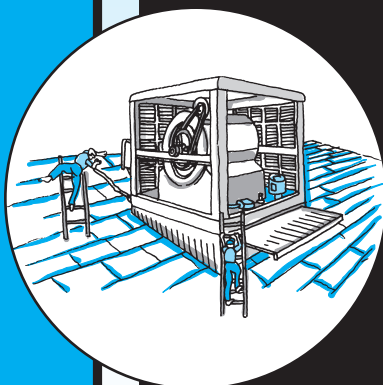


# HOW TO SAVE WATER AT HOME

A Step-By-Step Manual for the Do-It-Yourselfer

## HOW TO SAVE WATER AT HOME:

*A Step-By-Step Manual for the Do-It-Yourselfer* is filled with practical advice on how you can save water in and around your home—starting right now.



Southwest  
Environmental  
Finance  
Center

