Harvesting the Water with Rain Barrels

By: JEANNIE RALSTON, This Old House magazine

Maybe, as some predict, fresh water will become the next oil in terms of being a necessary but limited resource. However, even if that turns out to be hyperbole, regional droughts will always be with us. That means that at some point many people will be forced to conserve water.

"The population is growing, but the water supply is not," says Bill Hoffman, a coordinator for the City of Austin Water Conservation Program, in Texas. That's why people around the country are turning to the centuries–old practice of collecting rain as an alternative source of water.

By collecting rain from a roof during wet months and storing it in a tank or cistern, homeowners can create an alternative supply that won't tax the groundwater or jack up the water bill.

And because rain doesn't contain the minerals found n wells or the chlorine in municipal supplies, it's ideal for watering the lawn, washing the car, doing the laundry, taking a shower—even drinking if it's properly filtered.

"Rainwater is the purest water you can find," says Dr. Hari Krishna, president of the American Rainwater Catchment Systems Association (ARCSA).

A rainwater-collection system can be as simple as a rain barrel at the end of a downspout or as elaborate as a whole–house system, which supplies all the water needs for my family of four in the Texas Hill Country. Cost and complexity depend on how much water you need and how you plan to use it.

A simple system is adequate for landscaping needs, but cost, complexity, and maintenance increase if you're planning to drink rainwater or pipe it into the house. Check with your local building official about the regulations on rainwater systems for indoor use—codes differ widely from one community to another.

Make sure you have a way to prevent leaves, bird droppings and other nasty materials from getting into your barrels.

A house with a sloped roof, gutters, and downspouts is well on its way to harvesting rainwater for landscape irrigation or other non-potable uses. You just need a few simple components: wire–mesh gutter screens to keep out debris, a storage tank, and a way to move the water out of the tank.

The storage tank, or cistern, can be made from almost any material—even a clean recycled metal drum. Gardening stores sell 55– to 75–gallon plastic rain barrels, complete with leaf screens and spouts, for $50 to $250. Wooden barrels have a nostalgic charm, but they're hard to come by and expensive. A wine or whiskey barrel made by a professional cooper will cost at least $250.

Larger storage tanks can be made of stone, cement, metal, wood, or fiberglass.

To prevent mosquitoes from breeding in tanks, make sure the tanks are covered or screened. Also, during winter months, barrels should be kept only three quarters full to allow freezing water to expand.

Gravity is the easiest (and cheapest) way to move rainwater out of the tank. Systems that work by gravity are good for watering landscapes; you only need to open a spigot or valve at the bottom of the tank. However, if you have to move water to a level higher than the tank, you'll need a pump.

A 1–horsepower electric jet pump mounted in a small shed near the tank costs about $400, and can provide about 8 gallons of water a minute up to 500 feet away from the water tank.

Collecting for Household Use

Things get more complicated if you're planning to drink, wash, or bathe with rainwater. You need specific types of roofs, gutters, and storage tanks, as well as a way to filter and purify the water and pump it into your house.

Filter can take out most bacteria and particulates, and reverse osmosis will catch the sulfuric and nitric acids in acid rain.

Unfortunately, there are areas with such heavy air pollution that rainwater cannot be filtered enough to make it drinkable.

"If you live in a highly industrialized area, I recommend using rain for gardening only," cautions Hoffman. "If you have any concern about rain quality, have a professional water test done on a sample."

Unpainted galvanized metal roofing is the best catchment surface for potable–water systems because it's smooth and nontoxic. Clay or concrete tile and slate also work well. Asphalt, asbestos, chemically treated wood shingles, and some painted metal roofs, however, can leach toxic materials and are recommended only for nonpotable water uses.

As in a simple system, gutters and downspouts should have leaf screens. But it's important that those gutters not have lead solder or lead–based paints. Seamless aluminum and vinyl gutters are fine. Also, a roof washer, a filtration system that removes any remaining leaves, debris, and bird droppings, should be placed in the line before the water enters a storage tank.

Like nonpotable systems, storage tanks can be made of stone, cement, metal, wood, or fiberglass. But if you're planning on showering with or drinking rainwater, stone and cement can leach minerals, and galvanized tanks can release zinc in the water unless a PVC liner is used (zinc from galvanized roofs is filtered out before being stored).

Fiberglass tanks, though hardly the most attractive, are easily the cleanest and most durable. You'll need to keep the tank out of the sun in order to avoid algae growth. Tanks are sometimes buried, either partially or fully, to keep the water cool or to hide the tanks (and to prevent the water inside from freezing).

However, buried tanks add costs for excavating and can't easily be cleaned. A better option is to shade the tanks to ensure that only rain—and not sunlight—gets in.

By looking at the average rainfall levels in your area, you can figure out how much rainwater you can expect to collect per year and whether that will meet your family's water needs.

(An average household with newer plumbing fixtures such as 1.6–gallon–per–flush toilets and 2.5–gallon–per–minute showerheads uses roughly 55 gallons per person per day.)

In general, 1,000 square feet of roof will collect 600 gallons of water for every inch of rain that falls. Remember that actual rainfall amounts fluctuate with the seasons, while household needs remain reasonably steady.

If you're depending on rainwater for all or most of your water needs, your tanks have to be big enough to get you through the dry spells. Plus, you'll need a fair amount of space to house those tanks. Be sure to follow municipal restrictions on tank placement.

The cost of a 10,000–gallon tank, PVC lines to and from the house, all filters, UV light, pressure tank, and pump runs $7,500 to $9,000.

To entice more participants (and thereby relieve overburdened water service, Austin, Portland, Oregon, and other cities are offering incentives like tax–free equipment or property–tax rebates to install collection systems.
Rain for the Whole House
Collecting rainwater isn't just for keeping lawns and gardens green.

Here in the Texas Hill Country, my husband, two young sons, and I use rain for everything from drinking to showering. Rainwater is much softer than the mineral–heavy well water we used to use, and because of that it leaves no milky scum on tiles and fixtures.

Plus, it tastes great.
At 39,000 gallons, our system is large enough to store seven months of water.

Because we drink the water, our storage tanks are coated on the inside with an FDA–approved food–grade resin and on the outside with gelcoat, an opaque resin that blocks out sunlight and helps prevent algae buildup.

Before the water enters the house, a 5– and then a 3–micron carbon filter take out any suspended sediment that the roof washer (which filters most debris) missed.

Then the water passes a UV light that kills bacteria. We clean filters from the roof washer at a self–service car wash. We change the 5–micron filter every month and the 3–micron filter every three months; the UV light is cleaned every five months and replaced every 14 months. We also regularly check the tank gauges so we know how many months' worth of water we have.

We stretch our supply by using water–saving toilets that require only 1.2 gallons per flush, a front-loading washer that uses 50 percent less water, and by limiting showers to two minutes, which is not popular with our guests.

At just under $25,000, the cost to install our system wasn't cheap compared with using city water or drilling a well. But now that it's running, we pay only for the electricity to run a 1–horsepower pump and $150 a year to replace all the filters. The payoff is delicious: chemical– and mineral–free tap water that's far better than anything from city or well sources.

Dishes, clothes, and skin rinse clean, and there's no buildup of iron or lime on the fixtures. Plus, we have a modicum of self-sufficiency, which is worth a lot to us these days. During the Y2K scare and after the terrorist attacks, many people told us that if the public utilities were ever crippled, they were coming to stay with us. Fine, I said, but the two–minute–shower rule still applies.

In the Texas Hill Country, Jeannie Ralston and husband Robb Kendrick use rainwater for all their needs. The 39,000–gallon system consists of three 11,000–gallon fiberglass tanks and two with a capacity of 3,000 gallons each. Located 150 feet from the main house, a 900–square–foot shed (which also collects

rain) helps hide two of the 10–foot–tall tanks from view (1). Before the water empties into the tanks, a primary filter called a roof washer (2) helps remove leaves and other large debris. Inside the shed, a 1–horsepower electric jet pump and a pressure tank push the water through two carbon filters and past a UV disinfecting light before it goes back to the house via a 1½-inch PVC pipe (3).

How to Maintain the System

Good maintenance of a rainwater-collection system is crucial for keeping water quality high, particularly if the water is to be consumed.

Gutters must be kept free of leaves, no matter what kind of system you install. If you have a potable–water system, the roof washer has to be drained after a big rain (a simple turn of a valve) and all filters have to be changed periodically.

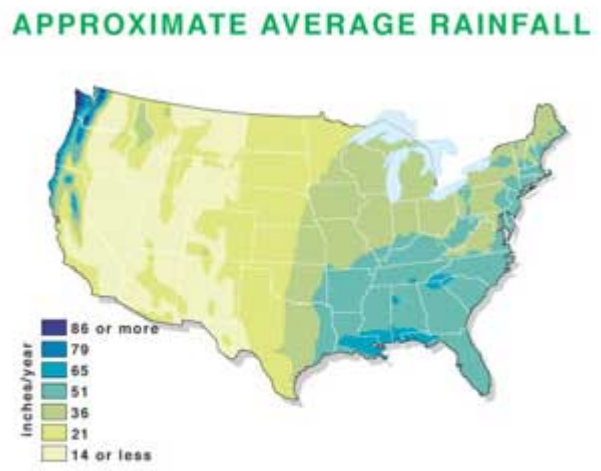
"I also recommend keeping back overhanging tree branches," says Krishna. "That way you can keep down the amount of leaves and bird droppings that go into the system."

With the right equipment and steady maintenance, rain can be a quality source of water in the dry months as well as in the wet ones. Plus, using rainwater for gardening and lawn irrigation will lower your consumption of well or city water.

"And that could lower your water bill," says Krishna.

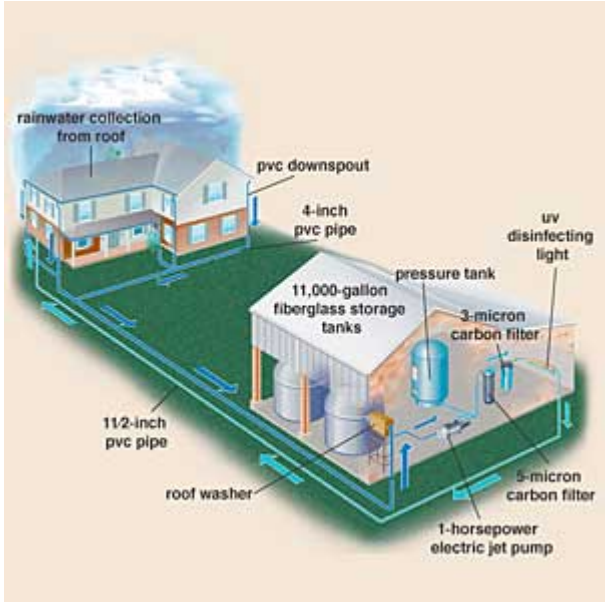
Make sure you have a way to prevent leaves, bird droppings and other nasty materials from getting into your barrels.

An inch of rain falling on the roof of an ordinary suburban will fill this 150–gallon closed fiberglass tank.



How much rainwater a household can collect depends on the size of the roof (or catchment surface) and local rainfall amounts. A thousand square feet of roof will collect about 600 gallons of water for every inch of rainfall.

As long as the inlet pipe to a storage tank is lower than the roof of a house, the captured rainwater will flow up and into the tank.



Cleverly disguised in this country building are 10–foot storage tanks, a pump and some small filters.

The box attached to the top of the tank is a primary filter, removing large debris.

This is as sophisticated as even a large water-collection system gets. Filters, a pump, and a pressure tank.