



Return of the Cistern

By Diane McDilda

Cisterns help your homeowners conserve water the old-fashioned way.



This 5,600-gallon corrugated metal tank by Innovative Water Solutions offers a nostalgic appearance for water storage. Tanks can be installed to complement or blend with their surroundings.

A common approach to water supply that all but vanished nearly a century ago is back—but with a different look. While the steel-wrapped cypress rain barrels of yesteryear have been replaced with molded plastic or steel, this ancient practice of water conservation marries historical common sense with today's technology and regulations.

The trend in rainwater catchment is growing across the United States. Where water was once plenty, shortages have spurred alternative thinking. Out West, it's estimated that Lake Mead, the water source for Southern California, Arizona, and Las Vegas, may be dry by 2021. In the East, the feds have stepped in to quell a water war between Florida, Georgia, and Alabama. By collecting rainwater, the demand on aquifers

and other potable water sources is lessened and homeowners gain water use flexibility.

Many of the cistern and rain harvesting products on the market today emigrated from Australia, a country familiar with drought. Various vendors and suppliers have popped up in places like Texas and North Carolina and other parts of the country selling select components or entire packages. Most recommend that the cisterns be purchased locally or drop-shipped to the site, as the cost of shipping a tank can be as high as the purchase price.

Professionals in the rain harvesting businesses field phone calls from both homeowners and builders. They design site-specific systems or help contractors choose from one of the packages they offer. With equipment selection

Innovative Water Solutions uses a variety of tank brands in their designs, including this 10,000-gallon Pioneer tank (right) that will be used for irrigation.



Whether additional components are needed depends on how the water will be used. Those using collected rainwater to water yards or gardens simply need gravity and a hose. Larger cisterns are connected to automatic sprinkler systems. In this case, a pump—similar to a well pump—is used to convey the water to the irrigation network.

Water At Will

One benefit of using rainwater for irrigation is improved water quality, namely water free of chlorine. Reduced water costs are another benefit, particularly when considering that some homes use 40 percent of their potable water on the lawn. And, finally, using rainwater can offer a variance from local watering restrictions, giving homeowners the ability to water at will.

and schematics available, most systems can be installed by a builder or subcontractor with little experience in rain harvesting equipment. And, depending on the location, many who sell rain harvesting systems also install them.

"Rainwater is pretty easy, but the devil is in the details," says Chris Maxwell-Gaines, cofounder of Innovative Water Solutions out of Austin, Texas. Over the past five years, Maxwell-Gaines has installed systems, walked builders through the process, and has seen the idea of rain harvesting catch on in areas miles from home. "With the drought in the southeast, we've had irrigation contractors and home builders calling us wanting to add this to their line of services."

The perception and acceptance of rainwater harvesting varies across the United States. Cities like Austin are not only familiar with the process, but also offer a \$500 rebate for installation of a 300-gallon or larger landscape rainwater system and give tax exemptions on rainwater harvesting equipment.

As an added service to his customers, Maxwell-Gaines prepares the paperwork necessary to receive a rebate so the owners just sign and send it in.

How It Works

There are a variety of ways to collect and use rainwater, but the components, particularly the ones used to collect the water, are relatively the same. The roof serves as the perfect collection point as it's impermeable and sloped. Rain flows down the roof to gutters and on to a downspout.

Removing roof debris such as leaves and pine needles can be accomplished in different ways.

Gutter guards installed on top of gutters keep debris from entering the collection system. Roof washers can also be used to remove any debris that's been captured with the rainwater. Roof washers are installed in the downspout and divert a set volume of the initial rainfall and collect debris. Once this volume of water is collected, additional rainfall entering the downspout goes directly to the cistern or storage tank.

The majority of systems Brian Gregson has installed in the St. Petersburg, Fla., area are used for irrigation. As president of Rainwater Services, Gregson encourages his clients to reduce water demand by landscaping with drought-resistant plants and using micro-irrigation (low-pressure irrigation systems that spray, mist, sprinkle, or drip). This avoids the need to back up the system with a potable water source. "If there is a need to supplement, it can affect the variance of water restrictions and make it more complicated. If at any time rainwater isn't used and irrigation comes from another source, the system is subject to restrictions. Solely rainwater systems are exempt."

It's not just a worthy cause, but a monetary one. The City of St. Petersburg currently limits watering to once a week. First offenders are subject to a \$175 fine while those with repeated violations are subject to fines of \$500.

Connecting to a potable water source also requires that a backflow preventer or air gap be installed to ensure rainwater from the cistern doesn't enter the potable water supply. While these components are not complicated or expensive, the setup usually requires inspection and approval from the local health and building department.

Gregson suggests that those new to cistern installation

Flexible storage tanks (right) offer an alternative to rigid cisterns. The Original Rainwater Pillow can be installed in a crawl space or under a deck for storing potable and irrigation water. Rainwater collected for potable water use is disinfected using an inline chlorination or ultraviolet treatment system.



Top: Courtesy Innovative Water Solutions; Bottom: Courtesy The Original Rainwater Pillow



FIVE TIPS FROM THE EXPERTS

1. Investigate local ordinances, building codes, and permit requirements before giving a quote and maybe even accepting a job. Building and health department permitting and approval could impact the cost and success of a cistern project.

2. Get to know the green building programs' point systems, such as NAHB's National Green Building Program or US-

GBC's LEED for Homes to understand the criteria for water conservation.

3. For new buildings or major renovation projects try to combine the installation of rain harvesting equipment with other onsite work. This will minimize equipment rentals and labor on the project cost.

4. Look for rebates. Check with local and state utilities to

see if rebates are available for water conservation projects. Offer to prepare the necessary paperwork for your clients.

5. Know the law, especially when it comes to water restrictions and irrigation. In some areas of the country, any use of potable water in a cistern—even for temporary backup—can nullify the variance and require the owner to abide by water restrictions.

An elevated deck offers a shaded and out-of-the-way spot to store this 5,000-gallon poly storage tank.



contact the local codes department as requirements change from city to city, even within the same county. "In unincorporated Pinellas County and St. Pete, no permits are required, but Largo requires a permit," Gregson says. "I've also had to contact a health department to install an irrigation cistern because it might breed mosquitoes."

Inside Job

Beyond irrigation, collected rainwater can be used inside the home for washing clothes or flushing toilets. This type of connection is more prevalent in new buildings or major renovations as it requires the installation of separate piping—potable and non-potable—throughout the house. Not all municipalities require that non-potable water be treated before coming into a house, while others, regardless of the use, mandate that any water crossing the threshold be disinfected. As water is pumped from the cistern, disinfection is generally handled through an online chlorination or ultraviolet (UV) treatment system.

Skip VerMilyea installs irrigation and drinking water systems for clients primarily along the west coast of Florida. As president of Rain Drops Cisterns, VerMilyea recently installed a 1,000-gallon above-ground tank and chlorination system for a couple's home near Sarasota, Fla. He believes that some home systems are over-designed, pointing out that a 1,000-gallon cistern can provide an estimated 50,000 gallons of water a year. A pump is set to bring water from a private well should the water in the cistern drop below a set level. The system cost \$4,000 and included all materials and installation.

"Systems don't have to be complicated," VerMilyea emphasizes, noting that more intricate systems can turn homeowners away, either because of their complexity or cost.

Everything In Its Place

Along with determining how the collected rainwater will be used, builders and clients must decide where system components will be placed. Tanks are by far the largest part of the system and placing them can be daunting.

Cisterns range in size from 55-gallon rain barrels up to 20,000-gallon plastic or steel tanks. A typical 550-gallon round plastic storage tank is more than 5' in diameter and almost 4' tall. A 10,000-gallon round tank runs almost 12' in diameter and

just over 7' tall. Because of the size, many homeowners want cisterns installed below grade and while it might be doable, the price tag often precludes it.

Mike Ruck, president of Rain Water Solutions in Raleigh, N.C., educates many of the contractors who call for price quotes on cistern design and installation. He says contractors are often surprised at how much a seemingly simple element impacts the price. "When it comes to above ground or below ground, most people want it below ground. But any time you dig, it's going to increase the price, and that's not always understood." When digging around Research Triangle, where most of Ruck's projects are located, unearthing a big rock is almost a sure thing and removing it adds to the price.

One alternative to storing a tank above or below ground is using a water pillow. Through his business, The Original Rainwater Pillow, president Jim Harrington sells flexible water storage tanks that can be stowed in a crawl space or beneath a deck. Harrington offers to install his systems at homes in and around Atlanta. For those farther away, he leaves it up to the homeowner or a builder. "For anyone who's done light construction, the systems are fairly easy to install. It's a matter of gluing and screwing pipes together," Harrington says.

The systems are non-pressurized from the gutter to the pillow, and many use a 10-gallon-per-minute pump from the pillow to an outdoor spigot. Unlike rigid tanks, shipping empty pillows won't deflate a budget. For smaller systems, the pillow can be a cost-effective option with prices ranging from \$2,500 for a 1,000-gallon unit to \$4,200 for a 3,000-gallon unit.

The pillows come in standard sizes. The 1,000-gallon pillow is 10' by 10'. Harrington says that the dimensions are so easy to customize that people rarely buy them off-the-shelf. So far his installations have been used for irrigation, but the pillows are approved for the storage of drinking water, a resource he believes will become more scarce and limited. "The reality is that we really can really only use one percent of our water for drinking," says Harrington. "Water conservation and rainwater harvesting is something we're all going to have to do." 68

RESOURCES

- > American Water Works Association
www.awwa.org
- > Innovative Water Solutions
www.watercache.com
- > Rain Drops Cisterns
www.raindropscisterns.com
- > Rain Water Solutions
www.rainwatersolutions.com
- > Rainwater Services
www.rainwaterservices.com
- > The American Rainwater Catchment Systems Association (ARCSA)
www.arcsa.org
- > The Original Rainwater Pillow
www.rainwaterpillow.com
- > The Rainwater Harvesting Community
www.harvesth2o.com



A NEIGHBORHOOD OF CISTERNS

To avoid tapping into an already strapped Texas aquifer, a Travis County neighborhood is slated to rely solely on cisterns as the means of residential water supply. President of Kendree Custom Homes, Robert Kathman, changed the design from wells to rainwater harvesting and received county approval for The Vistas at Pedernales Canyon Trail subdivision. It's a first that has

nearby counties taking notice.

To cover their backside, county officials required that plat notes waive the county's liability should a drought leave the cisterns dry. If this happens, it's expected that a private company will deliver water to the Hill Country residents.

To reach a suitable aquifer, drinking water wells

would have to be drilled 1,000 feet down at a cost of \$28,000, that's \$8,000 more than the cost of a harvesting system. Site work for the development is currently under way.