

Rainwater Harvesting: a Win-Win Option

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Most urban and suburban dwellers receive their water delivered via underground pipe infrastructure that carries water from dammed surface collection basins, known as reservoirs, or from underground sources, such as Edwards Aquifer in south-central Texas. Although water is generally considered to be a renewable resource, increases in impermeable surfaces, nonpoint source pollution (NPS), high evaporation rates, and unsustainable usage are complicating water quality, quantity, and its long-term renewability. Severe droughts have been followed by city and state efforts to increase awareness about water conservation practices, but more individual action is needed to effectively contribute to our local hydrologic cycle.

In terms of the hydrologic system, rainfall is Earth’s primary source of water. As water evaporates from lakes, oceans, plant transpiration, and so forth, it leaves behind all the adulterations it has engrossed during its terrestrial visit. Water utilities are charged with the task of providing their customers with clean and safe drinking water but have historically not considered rainwater as a source. Instead they collect surface water in reservoirs where a large volume is lost to evaporation; then attempt to clean contaminated surface waters; and finally, add chlorine to be sure all microorganisms are killed before piping their product to great distances and at high cost.

Domestic Rainwater Harvesting (DRWH) has been practiced for over 4,000 years throughout the world. It is mostly practiced in remote rural and arid regions to provide the majority of water needs where piped and well water is unavailable. DRWH has become an integral part of the built society out of sheer necessity in places such as Australia, India, some regions in eastern Africa, China, and Latin America (just to name a few locations) where piping water and reliance on wells is simply not an option.

Catchment systems are generally simple structures that include hard roofs and gutters that direct the rainwater into a storage unit, the quality of these components attribute to the overall quality of the harvested rainwater. The ideal roofing material for best practice is metal because pathogens are generally not able to survive on hot, sun drenched metal roofs. The storage units or cisterns vary throughout the world and depend on the availability of materials. Some villages in Africa report they use old oil drums, and other locations build storage units from concrete, but some of these units can contain leachants, which undermine the quality of the harvested rainfall. Purification systems are required for potable water supplies. The more sophisticated systems are UV light exposure (as seen in the photo below) and reverse osmosis.



Captured rainwater is exposed to UV light to kill any microorganisms and assure safe drinking water.

The amount of rainfall that can be captured is described in detail in the Texas Guide to Rainwater Harvesting, written by the Center for Maximum Potential Building and published by the Texas Water Development Board. The comprehensive Guide explains all elements of rainwater harvesting in detail and is referenced by supporting organizations throughout the world. The guide also provides the basic formulas needed to calculate the amount of water you can collect, approximately 600 gallons on a 1000 square foot roof, regardless of pitch, per inch of rainfall. Those relying on rainwater as their sole source of water would need to calculate annual rainfall and losses, and factor in overall household usage. The *Guide* is available online at www.twdb.state.tx.us/publications/reports/RainHarv.pdf.

Full DRWH systems capable of providing water for the entire household are seen mainly in rural settings because of the size of and space needed for the cisterns and purification housing. Typical urban homeowners would not likely want a large portion of their yard allocated to cisterns and pump housing. Therefore, an alternative for urban homes is smaller (50-75 gallon) rain collection barrels located at downspouts, which can provide irrigation water for the yard and garden. Approximately 40 percent of all urban water use is for irrigation. Lawns of St. Augustine grass require 50 inches of water, or 20 gallons of water per square foot a year. By collecting rainwater at large and small scales, we could greatly reduce demands on surface and ground water for irrigation.



These two 10,000 gallon tanks supply this homeowner's house with all their water needs.

A potential benefit to DRWH and Commercial RWH is the reduction of NPS pollution. Dr. Hari Krishna, Senior Engineer for the Texas Water Development Board and President of the American Rainwater Catchment Systems Association (ARCSA) states, "RWH does have a positive impact on NPS pollution because it reduces runoff and resulting erosion." Taking hundreds and thousands of gallons of water out of storm flow could theoretically impact stream volume and estuaries. Cindy Loeffler, Branch Chief of Water Resources in the Resource Protection Division of Texas Parks and Wildlife suggests that RWH would be no more impacting than our current system and that RWH is not practiced on a large enough scale to impact estuaries. Actually, RWH could potentially reduce withdrawals from ground and surface sources. Cindy explains that an added benefit of RWH is the retention of all captured rainfall. Dr. Rich Earl, water resources professor in the Texas State Geography Department adds, "in contrast, less than 20 percent of the rain that falls on central Texas becomes useable ground or surface water. In a typical year, more than 80 percent of the rain evaporates from the surface or transpires through plants." Additional water is lost through evaporation from reservoirs.

Through grassroots efforts, several cities and the State of Texas are now supporting RWH. In 2001, Senate Bill 2 was passed which included tax exemptions for items purchased for the sole purpose of RWH. Hays County provides tax rebates on property assessments each year for those with RWH systems. The City of Austin has held rain barrel sales (the last sales will be March 6 and April 17, 2004), and provides up to \$40,000 rebates on commercial systems. The City of Austin website also provides many commercial and domestic success stories. Overall, RWH has grown steadily in the last decade. Commercial retailer Richard Heinichen of Tank Town, in Dripping Springs, TX, reports a 100% increase in business every year since he started in 1990. Bill Hoffman, of the Water Conservation division of the City of Austin reports a major increase in commercial systems in the past 5 years.

By revitalizing the ancient practice of rainwater harvesting, domestic or commercial, we as environmental stewards have the potential to positively impact water resources in several ways: conservation, reduction in NPS, and sustainable living. For more information on rainwater harvesting and programs please visit one or all of the following websites:

- <http://www.arcsa-usa.org/> (American Rainwater Catchment Systems Association);
- <http://www.ci.austin.tx.us/watercon/commhome.htm>. (City of Austin);
- <http://www.window.state.tx.us/taxinfo/taxpubs/waterequip> (State of Texas).