

Rainwater Harvesting

By Deborah North, Master Gardener

Sixty percent of the freshwater used in metropolitan Tucson is used outdoors.

One solution to reducing the use of fresh water for gardening is to begin harvesting rainwater. It is an important act in conserving one of the most precious resources we have. Even in an area with the scarcity of rain we experience, Tucsonans can make a significant difference in the pressure placed on water storage systems and reduce the use of drinking water for outdoor purposes.

There are two methods of rainwater harvesting and one idea they both rely on is that water always follows the path of least resistance. Collect the water in high spots and move it to lower spots and you get the general idea of collecting and using rainwater.



A swale for passive collection.

Passive Rainwater Harvesting uses berms, swales, curb cuts and other methods of moving water to catchment areas that will contain the water long enough to allow it to be absorbed into the soil. A lot of passive collecting can be built in your landscape using a shovel – so it can be less expensive than the alternative. This method of rainwater collecting allows individuals who are not quite sure about it to step in lightly and build

a system over time.

Brad Lancaster is a Tucson local who has written two books on the subject and he developed the 4 S's of Passive Rainwater Harvesting: Slow It, Sink It, Sponge It and Spread It. When designing a passive system, it is important to keep these ideas in mind.

Slow It simply means to slow the flow of water so that it can be moved into catchment areas and not cause erosion.

Sink It encompasses the use of swales, basins, channels, conduits, and ponding areas where the water can be caught and used slowly by

the landscape. The area needs to be able to drain standing water in less than 24 hours to avoid mosquitoes and other unfriendly activity.

Sponge It teaches us that we need to have organic matter in the catchment areas so that the water can be slowly absorbed and used efficiently by the landscape.

Spread It is the idea of moving water to where it is needed. This could be a long swale that moves water along a row of trees or a series of swales that are terraced in a hilly landscape to move water from one level to the next.



**Residential size tank
draining from gutter
with overflow to swale.**

Active Rainwater Harvesting involves collecting, filtering, and storing the water for later use. Active collecting requires a vessel for storing the water and a system for re-using the water. This makes active systems more expensive and they can be more complex to design and install.

The basic components of an active water harvesting system include:

Catchment methods move the water from the roof to the collection tanks. These can be rain gutters, scuppers, canales, rain chains or just an active corner where two pitched roofing sections meet.

Storage vessel or collection tank. These can be a metal conduit set vertically, formal tanks or small barrels. This is an area of water harvesting that is just beginning to shine – the designs are becoming aesthetically pleasing as the practice becomes more widespread.

Filtering to remove sediment and debris – this is really optional as our rainwater is pretty pure. Studies from the University of Arizona indicate that water coming from rooftops in Tucson does not contain harmful substances and has many fewer solids than our drinking water.



**Large capacity tank
for a commercial
building.**

A method for **Moving the Water**. This can be as simple as a hose and spigot to use gravity, or one can install solar pumps to move water where it is needed.

A First Flush system. First Flush systems are pretty simple and tend to be manually operated. First Flush devices are used to allow the first shower to flush off contaminants, silt or other material deposited on the roof so that they don't enter the collection tank.

How Much Water Can You Expect to Collect?

One of the key pieces of data you need to consider before jumping into designing a rainwater harvesting system is how much water will your roof collect? For every 1" rain and 1,000 sq ft of roof surface = 620 gallons of water.

Here is the calculation:

- Square footage of roof space multiplied by .62
- Multiply that number by the average rainfall

So for a 2100 sq. ft. roof with average rainfall in Tucson at 11.6"

$(2100 \times .62) \times 11.6 = 15,103$ gallons of water can be collected annually.

How To Get Started?

Every landscape is different and the process of investigating the flow of water including where and how it can be stored and efficiently used can be a very engaging one for gardeners. In our next issue, we will explore a simple method of site analysis that can help get you started on a Rainwater Harvesting plan!

Rainwater Harvesting Resources

The photos in this article were taken at the Nature Conservancy Center in Tucson with their permission. For a living exhibit of passive and active rainwater harvesting options, visit The Nature Conservancy at 1510 E Ft. Lowell Rd, Tucson. For tours, call 520-622-3861. They have many free and low-cost resource lists available.

City of Tucson Water Harvesting Guidance Manual:

<https://www.tucsonaz.gov/files/transportation/stormwater/2006WaterHarvesting.pdf>

Pima County Rainwater Harvesting Workshop Schedule:

<https://www.tucsonaz.gov/water/rwh-workshops>

Tucson – How to participate in Rainwater Harvesting rebates:

<https://www.tucsonaz.gov/water/rwh-l2steps>

Brad Lancaster, author of volumes 1 and 2: Rainwater Harvesting for Drylands and Beyond.

How to Calculate Rainwater Harvesting Potential:

<http://www.surfrider.org/coastal-blog/entry/calculate-rainwater-harvesting-potential-area-needed-to-absorb-it>

ARCSA (American Rainwater Catchment Systems Association Rainwater Harvesting Manual can be ordered at: <https://arcsa.site-ym.com/store/ListProducts.aspx?catid=265505&ftr=>

Learning Activities for Youth:

Catch the Rain: A 4H Guide for Rainwater Harvesting:

<http://extension.arizona.edu/catchtherain/active-rainwater-harvesting.html>

Rainwater Harvesting Basics:

<http://extension.arizona.edu/catchtherain/rainwater-harvesting-basics.html>



05-2016