

## Rainwater Harvesting – Is it right for your project?

Rainwater harvesting has received a lot of attention lately as a “win-win” approach to several issues relating to the built environment. Recent prolonged drought conditions in the southeast have heightened awareness of the need for rainwater harvesting and the LEED rating system includes several credit points which can help be achieved by the use of a rainwater harvesting system. Rainwater harvesting can be extremely advantageous for the Owner who is environmentally sensitive and has the desire to have a building that reflects this thinking.

RAINWATER  
HARVESTING



Rainy days are a reason to 'sing'.  
[www.DunlapPartners.com/Rainwater](http://www.DunlapPartners.com/Rainwater)

### What is rainwater harvesting?

Rainwater harvesting is the collection of rainwater for the purpose of using the stored water for irrigation systems or for non-potable plumbing use. Rainwater harvesting is not widely used for commercial potable water systems for a number of reasons including chemical leaching from roofing materials, water treatment requirements for potable water and quality control of the delivered water. The different applications of harvested rainwater have specific requirements for the processing and distribution of the stored rainwater with associated space and cost requirements. However, each application shares the basic components required for a complete system.

Rainwater which falls on roofs is collected by roof drains or gutters and is conveyed to a storage tank or cistern. One important aspect of collecting the water is to eliminate as much of the impurities (insects, plant debris, etc.) from the rainwater before it is stored in the cistern. There are devices on the market that facilitate the elimination of debris and these first-flush devices should be installed on the piping before it enters the cistern.

The water is collected in a cistern which can be either above ground or buried. The water is then pumped to the distribution system for end use. The cistern can have a connection to the municipal water supply to maintain a water supply during periods without rain.

Treatment of the harvested rainwater depends on the end use of the rainwater. For irrigation purposes the rainwater is used un-treated. Commercially available systems can clean the water for laundry purposes, plumbing fixture flushing, etc. The use of these systems needs to be coordinated with local municipal requirements since some municipalities may require that rainwater systems be treated with blue dye or in some way identified to reduce the likelihood of cross contamination with potable water systems.

### **Why use rainwater harvesting?**

While it can be argued that rainwater is free, certainly the infrastructure required to collect, store and distribute the rainwater carries associated costs. But rainwater offers several advantages over the municipal water supply.

Rainwater is a good source of relatively clean water free from dissolved solids. Water vapor as it released from clouds to form rain is very pure. As the rain falls, it does come into contact with some airborne pollutants. Additional contaminants can be picked up as the rainwater is collected on roof structures. However, the harvested rainwater does not pick up the pollution associated with groundwater run-off including fertilizers, automobile fluids and industrial ground pollution. Consider that all of the municipal water also started from the clouds, passed through the atmosphere but also travelled to rivers and reservoirs across parking lots, industrial sites, etc.

Rainwater harvesting puts the end use of the water close to the source, reducing cost for transporting water. The harvested rainwater is not treated at a central water plant and then pumped through the municipal water distribution system. Rainwater use lessens the demand on overburdened municipal water supply.

Rainwater harvesting can help reduce flooding from stormwater runoff. In localities that use a combined storm/sanitary system (as does the City of Richmond), rainwater harvesting can lessen the burden on municipal systems during periods of rain.

Rainwater used for irrigation helps plants to thrive. Those of use who are gardeners understand that nothing can substitute for a good soaking rain. I have noticed that watering will keep plants alive but a good summer rain can make things pop. Rainwater harvesting can also be used when the irrigation from the municipal systems is prohibited. Admittedly, when there is a drought the amount of rainwater collected for irrigation is also greatly reduced.

Rainwater harvesting helps to achieve LEED Certification including:

SS Credit 6.1: Stormwater Design: Quantity Control

SS Credit 6.2: Stormwater Design: Quality Control

WE Credit 1.1: Water Efficient Landscaping: Reduce by 50%

WE Credit 1.2: Water Efficient Landscaping: No Potable Water Use or No Irrigation

WE Credit 2: Innovative Wastewater Technologies

WE Credit 3.1: Water Use Reduction: 20% Reduction

WE Credit 3.2: Water Use Reduction: 30% Reduction

WE Credit 2: Innovative Wastewater Technologies

Each of these eight credits can provide one point each towards the LEED Certification of a building.

Rainfall amounts are unpredictable so rainwater harvesting systems are sized using average rainfall data. The Southeast Regional Climate Center (<http://www.sercc.com>) indicates that the average rainfall in the Richmond area for August is 4.94-inches. We can calculate that a building with a 20,000 square foot footprint will provide more than 60,000 gallons of water during the month of August, based on average rainfall rates. To put this into perspective, this is more than three times the amount of water contained in a typical residential swimming pool.

### **When does it make sense to include a rainwater harvesting system?**

The easy answer is “always.” However, easy answers never seem to apply to the built environment. Multiple factors need to be considered for a rainwater harvesting system.

Arguably the most important factor is the Owner’s desire to have an environmentally responsible building. We all want to “do the right thing” but having the desire to provide an environmentally responsible building may involve sacrificing other building features. If an Owner’s value system places a high importance on a building’s impact on the natural environment then consideration should be given to a rainwater harvesting system.

Capital cost needs to be considered when evaluating the practicality of providing a rainwater harvesting system. The cost of the cistern is a major cost item associated with the rainwater harvesting system. Engineering economy changes as the size of the

system changes, with a larger system being more cost effective than a smaller one.

Consideration needs to be given to the need and use for the harvested rainwater. If landscaping is provided which requires little or no irrigation then the need for rainwater will be greatly reduced. Also, a specific project may have a limited use for plumbing systems water such as a warehouse facility with few employees and subsequent limited municipal water use. Conversely, a facility may be more densely populated with an increasing municipal water demand or large quantities of municipal water may be used for process purposes such as a laundry.

Every building is unique and unique solutions need to be provided to accommodate the building's requirements. Rainwater harvesting can play a part in the successful completion of an environmentally sensitive project.