

A close-up photograph of rainwater falling onto a cobblestone surface. The water is captured in motion, creating a blurred, cascading effect as it flows into a rectangular metal grate with horizontal slats. The surrounding cobblestones are dark and wet, reflecting the light. The top portion of the image is partially obscured by a semi-transparent grey banner containing the title.

# Important Factors in Rain Water Harvesting

**LORMAN**®

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Rainwater harvesting is a sustainable method of providing fresh, clean water to growing populations when freshwater sources are limited. While harvesting rainwater has proven to be an effective technique for providing populations with much-needed water, there are important factors related to implementing and maintaining a rainwater harvesting system that must be examined prior to planning such a system.

### **Freshwater Supply Shortages Remedied by Rainwater Harvesting**

The purpose of examining important factors related to rainwater harvesting is better understood when the reasoning behind such projects is revealed. Areas that struggle with clean water supply issues can benefit from implementing a rainwater harvesting system to collect enough clean water to meet the needs of the population in the immediate area.

Clean drinking water concerns have become a serious problem as populations continue to increase. While it may be possible to increase supplies of food and other essentials in a specific area to meet the needs of a growing population, water supplies tend to remain steady due to the finite quantity of water. Urban areas now house approximately half of the population of the world while making up less than 3 percent of the land. This high population density is the biggest contributing factor to clean water shortages. The key to sustaining

populations with available water sources is utilizing innovative collection and sanitation methods to fully take advantage of resources that are available and accessible.

Even areas that are able to access ample supplies of water are struggling with the task of treating this water to make it safe for consumption. Developed countries that are dealing with rapid population growth and an inability to treat water at a rate at which it is consumed by the local population have found that rainwater harvesting is a viable option for providing clean drinking water to residents with a significant reduction in the energy and time spent on collection and sanitation.

### **Uses of Rainwater**

Rainwater harvesting is not simply used to collect clean water that is suitable for drinking. Urban areas that have implemented a rainwater harvesting system commonly route these resources to homes and businesses for cleaning and bathing purposes. Using such a system for these purposes cuts down on the amount of water that needs to be collected by other means that may be more complicated and expensive to implement.

Research has found that rainwater harvesting benefits an area by reducing the impact that water collection has on the environment. This collection method prevents the need to consume high amounts of energy resources during the collection

and sanitation process. The most significant environmental benefit is a reduction in carbon dioxide emissions.

### **Health Concerns Related to Rainwater Harvesting**

Rainwater may be safe to drink without treatment. However, the implementation of a rainwater harvesting plan should include efforts to avoid contamination during the collection and storage process.

The collection process leaves rainwater susceptible to contamination because of the possibility of the introduction of animal waste and plant matter. Prevention of these contamination risks is a matter of a well-designed rainwater harvesting system that is specifically built to avoid the introduction of contaminants.

One way that contaminants often enter rainwater collection tanks is through erosion of the tank due to the high acidic content of rainwater in many regions. This issue is resolved through the use of materials that are not broken down by contact with highly acidic rainwater. It should also be noted that any materials used for rainwater collection should be safe in regards to the health of people consuming water stored in these materials.

Mesh coverings that allow rainwater to be harvested while keeping waste products and other contaminants out of the collected water are suggested. Not only do these

coverings keep rainwater clean, but they also keep away mosquitoes that use standing water as a breeding ground.

### **Determining Amount of Rainwater Needed**

Households researching the feasibility of a rainwater harvesting system for use by members of the household can do so by using some simple calculations related to average consumption. Average daily consumption can be estimated based on utility bills that outline the amount of water used by all members of the household within a defined period of time. This information can then be used to calculate the annual water needs of a family.

Weather data can then be used to determine the average rainfall in the immediate area. This information is generally available from local news stations, national organizations studying weather and climate patterns throughout the country or even school districts. This data will determine whether it is reasonable for a family to expect to sustain their water needs through rainwater harvesting.

Officials that are planning to implement a rainwater harvesting system for residents living in their jurisdiction can use the same principles to calculate need and availability. It is common for municipalities implementing a rainwater harvesting system to intend for the system to be used only for a portion of the water needs of the population.

## **Rainwater Harvesting Design and Installation Issues**

Design issues related to rainwater harvesting systems are largely a matter of the budget associated with the project. While materials that can break down when exposed to acidic rainwater should be avoided, there are still a variety of materials that may be used.

The most inexpensive collection containers are plastic jugs and buckets. However, these containers have a very small capacity and end up being relatively expensive for the amount of rainwater that can be collected. This option is best used for individual households that are comprised of only one or two people.

Steel drums are the most economical choice for municipalities that are planning to implement a rainwater harvesting system that is intended to collect enough water to sustain a sizable population.

Taps or pumps are used to access the water that has been collected in a large rainwater harvesting container. While taps are easier to install, pumps may be preferred because they are located at the top of the storage tank rather than the bottom. This prevents any loss of collected water if a leak occurs.

Any openings in the system that are used to let rainwater in the collection tank should be covered by mesh for sanitation purposes. Mosquito mesh is typically preferred because it is durable enough to keep out

both mosquitoes and environmental contaminants.

## **Utilizing Environmental Conditions for Successful Rainwater Harvesting**

Average rainfall in a given geographical area significantly impacts the probability of success in a rainwater harvesting initiative. Some areas with low annual rainfall are not suitable candidates to use this method of collection clean drinking water.

Studies show that the best areas for rainwater harvesting are those in a tropical climate zone that receive heavy storms during a rainy season. These geographical areas may have a dry season that lasts between one and four months, but the ample supply of rainwater during the rainy season is adequate to provide enough water to harvest and store to sustain a population through dry spells.

Ideal locations for rainwater harvesting must receive a minimum of two inches of rain per month for at least six months out of the year. Locations that receive rain throughout the year should have a minimum total rainfall of 12 inches per year. Climates that are excluded include desert and semi-desert climates.

## **Maintaining a Rainwater Harvesting System**

Monitoring the rainwater harvesting system once it has been installed is a crucial component of keeping the system running

smoothly. Regular maintenance will also ensure that any issues that may otherwise go undetected are quickly identified.

Cleanliness and pH levels must be monitored on a regular basis to determine whether the rainwater that is collected is safe to drink. Tests that can identify contamination check for E. coli bacteria and heavy metals that can cause serious illness when consumed. Detection of any of these contaminants in rainwater collections should prompt an evaluation to pinpoint the point of contamination and adjust the collection process to rectify the issue.

Monitoring also involves measuring the rainwater that has been collected to see if the amount is in line with the size of the storage container and the available local rainwater statistics. Any major discrepancies often indicate that a portion of the collection system is in need of repair.

Areas that have successfully implemented and maintained a rainwater harvesting system serve as proof that these systems have the power to help sustain human populations when clean water resources are limited. Properly assessing the needs of a population and selecting a system that can adequately collect water based on these needs is the most important consideration when deciding how to implement a rainwater harvesting system. Officials and households that would like to take advantage of this method of collecting water should be sure to take contamination issues into consideration and properly monitor the system following installation to ensure that it is working properly and efficiently.

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