



## A Review on Rain Water Harvesting

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Date of Submission: 15-08-2023

Date of Acceptance: 31-08-2023

### Abstract

Rainwater harvesting is the accumulating and storing, of rainwater for reuse, before it reaches the aquifer. Rainwater collected from the roofs of houses, tents and local institutions can make an important contribution to the availability of drinking water. Rainwater Harvesting System (RHS) are a possible solution to achieve a sustainable management of the water resources.

**Keywords:** Rainwater Harvesting Systems (RHS); Water Conservation

### I. Introduction

Water is one of the most commonly used substances on our earth. We need water for all our activities in day-to-day life. Water supply in urban area is always shortage against the total demand. Surface water is inadequate to meet our demand and we have to depend on ground water. Due to rapid urbanization, infiltration of rainwater into the subsoil has decreased drastically and recharging of ground water has diminished. This scenario requires an alternative source to bridge the gap between demand and supply. Rainwater, which is the purest form of water, would be an immediate source to augment the existing water supply by "catching water wherever it falls". Rainwater Harvesting is the process of collecting and storing rainwater in a scientific and controlled manner for future use. Rainwater harvesting in urban areas include roof top rainwater harvesting, rainwater harvesting in paved and un-paved areas (open fields, parks, pavement landscapes etc). Rainwater Harvesting in large areas with open ponds, lakes, tanks etc.

In scientific terms, water harvesting refers to collection and storage of rainwater and also other activities aimed at harvesting surface and groundwater, prevention of losses through evaporation and seepage and all other hydrological studies and engineering inventions, aimed at conservation and efficient utilization of the limited

water endowment of physiographic unit such as a watershed.

### Need for rainwater harvesting:

Water harvesting is the activity of direct collection of rainwater, which can be stored for direct use or can be recharged in to the ground water.

1. Water is becoming scarce day by day, it is the need to attain self-sufficiency to fulfill the water needs.
2. Urban water supply system is under tremendous pressure for supplying water to ever increasing population.
3. Groundwater is getting depleted and polluted.
4. Soil erosion resulting from the unchecked runoff.
5. Health hazards due to consumption of polluted water.

### Advantages of Rain Water Harvesting:

1. Water harvesting to recharge the groundwater enhances the availability of groundwater at specific place and time and thus assures a continuous and reliable access to groundwater.
2. To reduce the runoff which chokes storm drains and to avoid flooding of roads.
3. To reduce groundwater pollution and to improve the quality of groundwater through dilution when recharged to groundwater thereby providing high quality water, soft and low in minerals.
4. Provides self-sufficiency to your water supply and to supplement domestic water requirement during summer and drought conditions.
5. Reduces soil erosion in urban areas.
6. The rooftop rainwater harvesting is less expensive, easy to construct, operate and maintain.
7. In saline or coastal areas, rainwater provides good quality water and when recharged to ground water, it reduces salinity and helps in maintaining balance between the fresh-saline water interfaces.
8. In Islands, due to limited extent of fresh water aquifers, rainwater harvesting is the most preferred source of water for domestic use.



### **Types of rainwater harvesting methods**

1. Rooftop rainwater harvesting
2. Surface runoff rainwater harvesting
3. Ground water recharge

### **Rooftop Rainwater Harvesting**

Interception of the rainwater in a particular direction is the first requirement. The water should reach a bucket or a tank through pipes. Construction of recharge pits can be done to hold onto the rainwater and rooftop harvesting can be done with the existing tube wells. The filter is placed for purification of the water and its usage. Water harvesting is the deliberate collection and storage of rainwater that runs off on natural or manmade catchment areas. Catchment includes rooftops, compounds, rocky surface or hill slopes or artificially prepared impervious/ semi-pervious land surface. The amount of water harvested depends on the frequency and intensity of rainfall, catchment characteristics, water demands and how much runoff occurs and how quickly or how easy it is for the water to infiltrate through the subsoil and percolate down to recharge the aquifers. Moreover, in urban areas, adequate space for surface storage is not available, water levels are deep enough to accommodate additional rainwater to recharge the aquifers, rooftop and runoff rainwater harvesting is ideal solution to solve the water supply problems.

### **Surface Runoff rainwater Harvesting**

This is one of the most suitable forms of rainwater harvesting in urban spaces. This is stored and can be used in the future. The surface runoff rainwater in the forms of ponds, tanks, and reservoirs are built for the purpose of same. Insufficient availability of water can lead to problems in both domestic and also sanitation issues; leading to environmental pollution. This could be prevented by storing surface water and also directing their flow towards small creeks and also streams, into reservoirs.

### **Ground water recharge**

Today we are using the ground water in a large amount which has caused the depletion of the ground water table. Due to depletion of ground water table the ground water is getting contaminated, the water table is getting lower with the time, so people find the way to artificially recharge by making wells, trenches, pits and by constructing recharge shafts, lateral shafts, bore wells.

### **Objective of study**

- 1) To prepare RWH system to use rainwater in residential building.
- 2) Rain water harvesting from rooftops then reuse & store it.

## **II. Result & Discussion**

Harvesting rainwater allows the collection of large amounts of water and mitigates the effects of drought. Most rooftops provide the necessary platform for collecting water. Rainwater is mostly free from harmful chemicals, which makes it suitable for irrigation purposes. For investigation purpose buildings of different categories such as one storied, two storied, ten storied of single unit and double unit were chosen. The objectives of taking different buildings having various roof area i.e. catchment area to investigate the water requirement of the inhabitants. For the purpose of study rainwater harvesting, five buildings of different storied with various units were considered. Population of those buildings was 10 to 95 during the study. Potential rainwater harvesting from those buildings found 198.70 m<sup>3</sup>/y to 481.85 m<sup>3</sup>/y. From the above results it is found that rainwater can full fill the 100% demand of drinking water. But in case of single storied with single unit only 40% of the demand of household can full fill the demand. In case of multi storied with multi units building insignificant amount may be met for household. From the laboratory experiments it is found that rainwater is safe for drinking as well as household uses. But during collection of rainwater may get contaminated if the reservoir or tank is not cleaned regularly. Specially microbial characteristics may be changed if rainwater harvesting system (RWHS) is not managed properly.

## **III. Conclusion**

The harvesting of rainwater simply involves the collection of water from surfaces on which rain falls, and subsequently storing this water for later use. Rainwater harvesting in rooftop harvesting is environmentally harmless, it has no negative impacts on its users. Moreover on purification, it had become the major source of drinking water. In this research water purification was held with laboratory test for water quality parameters such as chemical, mineral and microbial characteristics. Awareness may be developed through motivation in using rainwater and rainwater harvesting.



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