A

Seminar report

on

# Rainwater Harvesting

Submitted in partial fulfillment of the requirement for the award of degree of CIVIL

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# Preface

I have made this report file on the topic **Rainwater Harvesting;** I have tried my best to elucidate all the relevant detail to the topic to be included in the report. While in the beginning I have tried to give a general view about this topic.

My efforts and wholehearted co-corporation of each and everyone has ended on a successful note. I express my sincere gratitude to ……who assisting me throughout the prepration of this topic. I thank him for providing me the reinforcement, confidence and most importantly the track for the topic whenever I needed it.

## Content

## Introduction for Rainwater Harvesting

Harvesting Rainwater for saving drinking water has gained enormously in significance as modern water saving sanitary technique. This can be used for private and public buildings as well as for many industrial areas. Beyond that rainwater harvesting plays an important role for the rainwater (stormwater) management of housing estates. Due to the storage (retention) and the usage of rainwater the water flowing off housing estates in both reduced and delayed.

## What is rainwater harvesting and why is it Important?

Water is our most precious natural resource and something that most of us take for granted. We are now increasingly becoming aware of the importance of water to our survival and its limited supply, especially in such a dry continent as Australia.

The harvesting of rainwater simply involves the collection of water from surfaces on which rain falls, and subsequently storing this water for later use. Normally water is collected from the roofs of buildings and stored in rainwater tanks. This is very common in rural Australia. Water can also be collected in dams from rain falling on the ground and producing runoff.

## Objectives of Rainwater Harvesting

The main objectives of rainwater harvesting are:

1. To meet the increasing demand of water.

2. To reduce the run-off which chokes the drains?

3. To avoid the flooding of roads.

4. To raise the underground water table.

5. To reduce groundwater pollution.

6. To reduce soils erosion.

7. Supplement domestic water needs.

# Methods of Rainwater Harvesting

Broadly there are two ways of harvesting rainwater.

(i) Surface runoff harvesting

(ii) Roof top rainwater harvesting

Various methods of rainwater harvesting are described in this section.

**1. Surface runoff harvesting**

In urban area rainwater flows away as surface runoff. This runoff could be caught and used for recharging aquifers by adopting appropriate methods.

**2. Roof Top rainwater harvesting**

It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchments, and the rainwater is collected from the roof of the house/building. It can either be stored in a tank or diverted to artificial recharge system. This method is less expensive and very effective and if implemented properly helps in augmenting the ground water level of the area.

# Components of the roof top rainwater harvesting

The illustrative design of the basic components of roof top rainwater harvesting system is given in the typical schematic diagram.

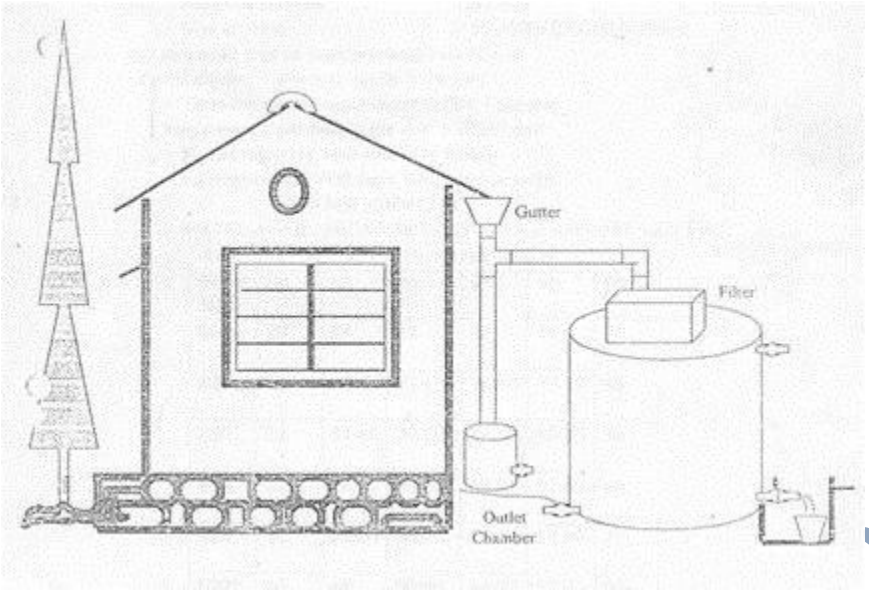


***Fig 1: Components of Rainwater harvesting***

The system mainly constitutes of following sub components:

- Catchment
- Transportation
- First flush
- Filter

**Catchment**

The surface that receives rainfall directly is the catchment of rainwater harvesting system. It may be terrace, courtyard, or paved or unpaved open ground. The terrace may be flat RCC/stone roof or sloping roof. Therefore the catchment is the area, which actually contributes rainwater to the harvesting system.

**Transportation**

Rainwater from rooftop should be carried through down take water pipes or drains to storage/harvesting system. Water pipes should be UV resistant (ISI HDPE/PVC pipes) of required capacity. Water from sloping roofs could be caught through gutters and down take pipe. At terraces, mouth of the each drain should have wire mesh to restrict floating material.

**First Flush**

First flush is a device used to flush off the water received in first shower. The first shower of rains needs to be flushed-off to avoid contaminating storable/rechargeable water by the probable contaminants of the atmosphere and the catchment roof. It will also help in

cleaning of silt and other material deposited on roof during dry seasons Provisions of first rain separator should be made at outlet of each drainpipe.

**Filter**

There is always some skepticism regarding Roof Top Rainwater harvesting since doubts are raised that rainwater may contaminate groundwater. There is remote possibility of this fear coming true if proper filter mechanism is not adopted. Secondly all care must be taken to see that underground sewer drains are not punctured and no leakage is taking place in close vicinity. Filters are used fro treatment of water to effectively remove turbidity, colour and microorganisms. After first flushing of rainfall, water should pass through filters. A gravel, sand and 'netlon' mesh filter is designed and placed on top of the storage tank. This filter is very important in keeping the rainwater in the storage tank

Clean. It removes silt, dust, leaves and other organic matter from entering the storage tank. The filter media should be cleaned daily after every rainfall event. Clogged filters prevent rainwater from easily entering the storage tank and the filter may overflow. The sand or gravel media should be taken out and washed before it is replaced in the filter.

# Advantages of Rainwater Harvesting

**1. Easy to Maintain:** Utilizing the rainwater harvesting system provides certain advantages to the community. First of all, harvesting rainwater allows us to better utilize an energy resource. It is important to do so since drinking water is not easily renewable and it helps in reducing wastage. Systems for the collection of rainwater are based on simple technology.

The overall cost of their installation and operation is much lesser than that of water purifying or pumping systems. Maintenance requires little time and energy. The result is the collection of water that can be used in substantial ways even without purification.

**2. Reducing Water Bills:** Water collected in the rainwater harvesting system can be put to use for several non-drinking functions as well. For many families and small businesses, this leads to a large reduction in their utilities bill. On an industrial scale, harvesting rainwater can provide the needed amounts of water for many operations to take place smoothly without having to deplete the nearby water sources.

It also lessens the burden of soil erosion in a number of areas, allowing the land to thrive once again. In fact, it can also be stored in cisterns for use during times when water supplies are at an all time low.

**3. Suitable for Irrigation:** As such, there is little requirement for building new infrastructure for the rainwater harvesting system. Most rooftops act as a workable catchments area, which can be linked to the harvesting system. This also lessens the impact on the environment by reducing use of fuel based machines.

Rainwater is free from many chemicals found in ground water, making it suitable for irrigation and watering gardens. In fact, storing large reservoirs of harvested water is a great idea for areas where forest fires and bush fires are common during summer months.

**4. Reduces Demand on Ground Water:** With increase in population, the demand for water is also continuously increasing. The end result is that many residential colonies and industries are extracting ground water to fulfill their daily demands. This has led to depletion of ground water which has gone to significant low level in some areas where there is huge water scarcity.

**5. Reduces Floods and Soil Erosion:** During rainy season, rainwater is collected in large storage tanks which also help in reducing floods in some low lying areas. Apart from this, it also helps in reducing soil erosion and contamination of surface water with pesticides and fertilizers from rainwater run-off which results in cleaner lakes and ponds.

**6. Can be Used for Several Non-drinking Purposes:** Rainwater when collected can be used for several non-drinking functions including flushing toilets, washing clothes, watering the garden, washing cars etc. It is unnecessary to use pure drinking water if all we need to use it for some other purpose rather than drinking.

## Disadvantages of Rainwater Harvesting

**1. Unpredictable Rainfall:** Rainfall is hard to predict and sometimes little or no rainfall can limit the supply of rainwater. It is not advisable to depend on rainwater alone for all your water needs in areas where there is limited rainfall. Rainwater harvesting is suitable in those areas that receive plenty of rainfall.

**2. Initial High Cost:** Depending on the system's size and technology level, a rainwater harvesting system may cost anywhere between $200 to $2000 and benefit from it cannot be derived until it is ready for use. Like solar panels, the cost can be recovered in 10-15 years which again depends on the amount of rainfall and sophistication of the system.

**3. Regular Maintenance:** Rainwater harvesting systems require regular maintenance as they may get prone to rodents, mosquitoes, algae growth, insects and lizards. They can become as breeding grounds for many animals if they are not properly maintained.

**4. Certain Roof Types may Seep Chemicals or Animal Droppings:** Certain types of roofs may seep chemicals, insects, dirt or animals droppings that can harm plants if it is used for watering the plants.

**5. Storage Limits:** The collection and storage facilities may also impose some kind of restrictions as to how much rainwater you can use. During the heavy downpour, the collection systems may not be able to hold all rainwater which ends in going to to drains and rivers.

Rainwater harvesting is a system that is gaining speed over time. Areas that experience high amounts of rainfall will benefit the most from the system and will be able to distribute water to dry lands with ease. However, the beneficial environmental impact of the system is what drives it further as of now.

## Harvesting can begin today

Rainwater harvesting is something that thousands of families across the world participate in, and you could be the next to enjoy the multitude of benefits offered with rainwater harvesting. It is an easy, simple and worthwhile process, so it is only in your best interest to take a look at rainwater harvesting and its benefits to your home.

## References


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- www.wikipedia.com
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