

Weekly study Circle On Rainwater Harvesting

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Green Explore Society



What is Rainwater Harvesting?

- **Rainwater harvesting** is the accumulation and deposition of rainwater for reuse before it reaches the aquifer.
(Harvesting: catch or gather something for human consumption or use)
- Uses include water for garden, water for livestock, water for irrigation, etc. In many places the water collected is just redirected to a deep pit with percolation. The harvested water can be used for drinking water as well if the storage is a tank that can be accessed and cleaned when needed.

Benefits and advantages of rainwater harvesting

- ✓ Rainwater harvesting has a number of benefits both at an individual level and at the city-wide level.
- ✓ Rainwater harvesting provides an independent water supply during regional water restrictions and in developed countries is often used to supplement the mains supply.
- ✓ Rain water harvesting provides water when there is a drought.
- ✓ Rainwater harvesting prevents flooding of low lying areas.

Benefits and advantages of rainwater harvesting continued

- ✓ Rain water harvesting replenishes the ground water table and enables our dug wells and bore wells to yield in a sustained manner.
- ✓ It helps in the availability of clean water by reducing the salinity and the presence of iron salts.
- ✓ It would bring down consumer utility (water supply) bills and this is of great value especially to institutions, which spend considerable sums on water.

Benefits and advantages of rainwater harvesting continued

- ✓ Rainwater recharged into the ground would have a positive impact on groundwater quality through dilution of fluorides, nitrates and salinity. It would also stop the decline in groundwater levels.
- ✓ Rainwater has nearly neutral pH and has zero hardness. These properties make it very favourable for use in a variety of applications in homes, institutions and commercial establishments and industry. If stored for future use, rainwater can function as a useful supplementary supply, thus reducing the stress on public water supply sources.

Benefits and advantages of rainwater harvesting continued

- ✓ In coastal areas, where there is excessive groundwater extraction, recharge of rainwater into the ground would prevent sea-water ingress into fresh water aquifers.
- ✓ Urban flooding can be controlled if the residents of a city harvest rainwater from their rooftops for future use or take steps to effectively recharge groundwater within their premises.
- ✓ Using harvested rainwater reduces water demand from the municipality, which in turn reduces energy consumption in the water distribution network.

How to harvest rainwater:

Broadly there are two ways of harvesting rainwater:

- (i) Surface runoff harvesting**
- (ii) Roof top rainwater harvesting**

How to harvest rainwater continued

- **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.


- **Roof top rainwater harvesting (RTRWH):**

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.



Animated Rooftop Rainwater harvesting system

video #01



Rainwater Harvesting: A community based adaption option

video #02

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

The system mainly constitutes of following sub components:

§ Catchment

§ Transportation

§ First flush

§ Filter

- 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.

History of Rainwater Harvesting Earlier

- Around the third century BC, farming communities in Baluchistan (in present-day Pakistan, Afghanistan and Iran), and Kutch (in present-day India) used rainwater harvesting for irrigation.

Present day

- Currently in China and Brazil, rooftop rainwater harvesting is being practiced for providing drinking water, domestic water, water for livestock, water for small irrigation and a way to replenish ground water levels. Gansu province in China and semi-arid north east Brazil have the largest rooftop rainwater harvesting projects ongoing.
- In Beijing, some housing societies are now adding rain water in their main water sources after proper treatment.
- In Australia rainwater harvesting is typically used as a supplement to the reticulated mains supply, and it is mandated in many building codes. In South East Queensland, households that harvested rainwater doubled each year from 2005 to 2008, reaching 40% penetration at that time.

Do's and Don'ts

- Harvested rainwater is used for direct usage or for recharging aquifers. It is most important to ensure that the rainwater caught is free from pollutants. Following precautionary measures should be taken while harvesting rainwater:-
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- Roof or terraces uses for harvesting should be clean, free from dust, algal plants etc.
- Roof should not be painted since most paints contain toxic substances and may peel off.
- Do not store chemicals, rusting iron, manure or detergent on the roof.
- Nesting of birds on the roof should be prevented.
- Terraces should not be used for toilets either by human beings or by pets.
- Provide gratings at mouth of each drainpipe on terraces to trap leaves debris and floating materials.
- Provision of first rain separator should be made to flush off first rains.

Do's and Don'ts continued

- Do not use polluted water to recharge ground water.
- Ground water should only be recharged by rainwater.
- Before recharging, suitable arrangements of filtering should be provided.
- Filter media should be cleaned before every monsoon season.
- During rainy season, the whole system (roof catchment, pipes, screens, first flush, filters, tanks) should be checked before and after each rain and preferably cleaned after every dry period exceeding a month.
- At the end of the dry season and just before the first shower of rain is anticipated, the storage tank should be scrubbed and flushed off all sediments and debris.

Quality of Rainwater

- The concentration of contaminants is reduced significantly by diverting the initial flow of runoff water to waste. Improved water quality can also be obtained by using a floating draw-off mechanism (rather than from the base of the tank) and by using a series of tanks, with draw from the last in series. The stored rainwater may need to be analyzed properly before use in a way appropriate to its safety.
- The quality of collected rainwater is generally better than that of surface water. Contamination is always possible by airborne dust and mists, bird feces, and other debris, so some treatment is necessary, depending on how the water will be used.