

## Rainwater Harvesting (RWH)-Climate Boosting Practice

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### SUMMARY

Collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer or a reservoir with percolation. Dew and fog can also be collected with nets or other tools. Rainwater harvesting differs from storm water harvesting as the runoff is collected from roofs, rather than creeks, drains, roads or any other land surfaces. Its uses include watering gardens, livestock, irrigation, domestic use with proper treatment, and domestic heating. The harvested water can also be committed to longer-term storage or groundwater recharge.

### INTRODUCTION

Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households, and residential and household scale projects usually financed by the user. However, larger systems for schools, hospitals and other facilities can run up costs only able to be financed by companies, organization and governmental units.



Fig.Components of Rain water Harvesting

### Components of Harvesting. (RWF)

- Catchment.
- Delivery.
- Storage.

#### Catchment:

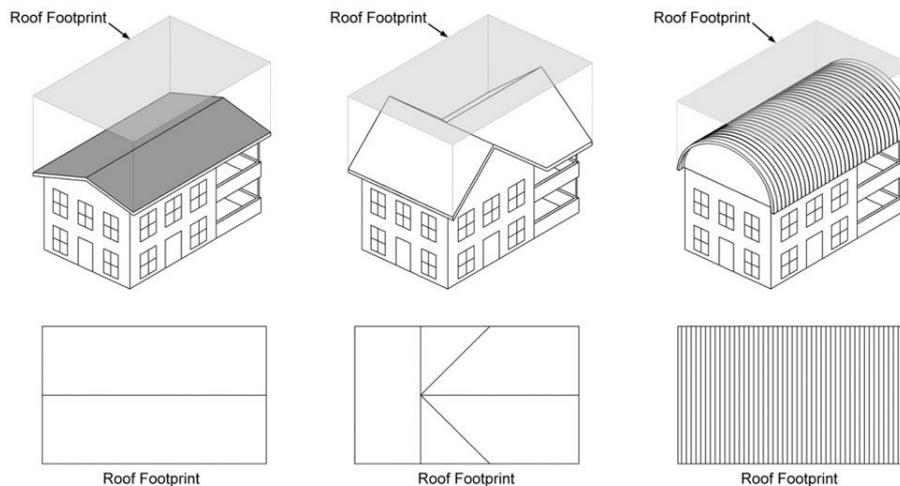
The catchment area is the first point of contact for rainfall. For the vast majority of tank-based rainwater harvesting systems, the catchment area is the roof surface. There are some important factors about the roof to consider when planning for a RWH system:

**Roof Material:** The material of the roof is not as important as contaminants that may be on the roof. For landscape purposes, the common asphalt shingle will work fine. If you are starting from scratch, we recommend a metal roof because they easily shed contaminants. In all cases, it's important to avoid wood shingles or metal flashing that contains lead.

**Slope:** The slope of the roof affects how quickly water will runoff during a rain event. A steep roof will shed runoff quickly and more easily clean the roof of contamination. A less-steep, flatter roof will cause the water to

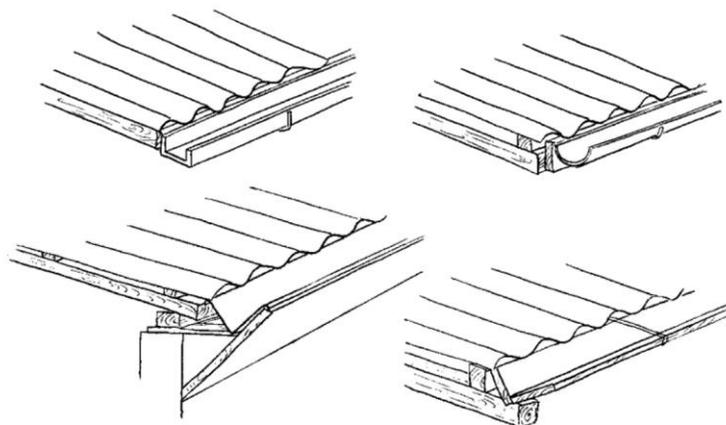
move more slowly, raising the potential for contamination to remain on the catchment surface. The roof on the right has a steep slope followed by a more gradual slope.

**Sizing a Catchment Area:** The size of the catchment area or roof will determine how much rainwater that you can harvest. The area is based on the “footprint” of the roof, which can be calculated by finding the area of the building and adding the area of the roof’s overhang. The image below shows how differences in roof slope do not change this building’s catchment area.



**Delivery.**

The delivery system from rural rooftop catchment usually consists of gutters hanging from the sides of the roof sloping towards a down pipe and tank. Guttering is used to transport rainwater from the roof to the storage vessel. Guttering comes in a wide variety of shapes and forms, ranging from the factory made PVC type similar as the pipes used in water distribution systems) to homemade guttering using bamboo or folded metal sheet. Guttering is usually fixed to the building just below the roof and catches the water as it falls from the roof (HATUM & WORM 2006).

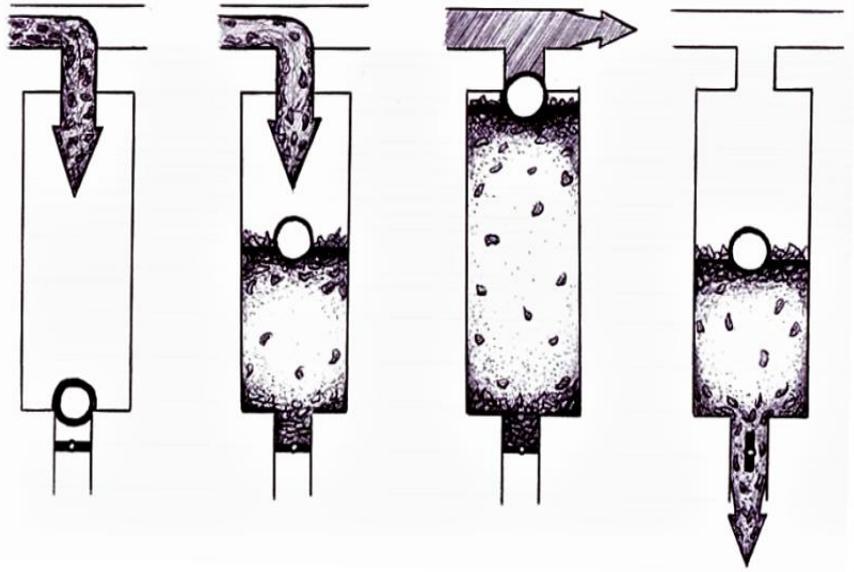


**A variety of guttering types. Source: HATUM & WORM (2006)**

Debris, dirt, dust and droppings will collect on the roof of a building or other collection area. When the first rains arrive, this unwanted matter would be washed into the tank. This will cause contamination of the water and the quality will be reduced. Many RWH systems therefore incorporate a system for diverting this ‘first flush’ water so that it does not enter the tank. These systems are called first flush devices.

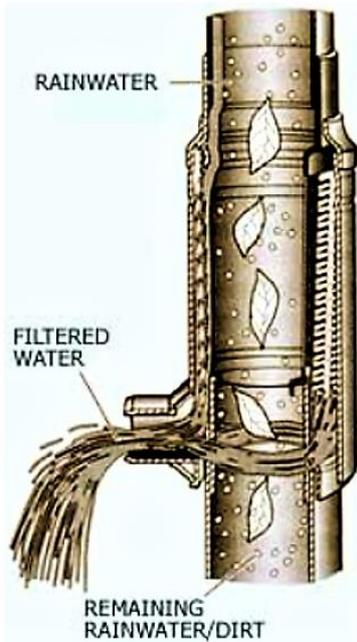
The simpler ideas are based on a manually operated arrangement whereby the inlet pipe is moved away from the tank inlet and then replaced again once the initial first flush has been diverted. This method has obvious drawbacks in that there has to be a person present who will remember to move the pipe. Other, more sophisticated methods provide a much more elegant means of rejecting the first flush water, (described in PRACTICAL

ACTION (2008), training material). But practitioners often recommend that very simple, easily maintained systems be used, as these are more likely to be repaired if failure occurs (PRACTICAL ACTION 2008).



Example of a first flush device (white, vertical PVC pipe, left). Illustration of the working principle of the device (right). Source: DOLMAN & LUNDQUIST (2008).

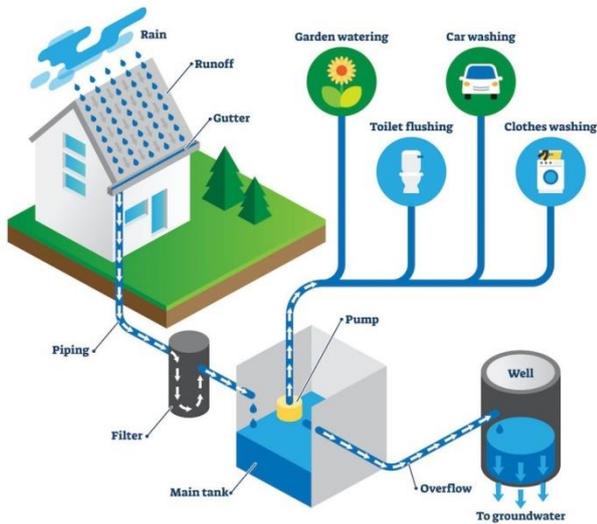
A coarse filter, preferably made of nylon or a fine mesh, can also be used to remove dirt and debris before the water enters the tank (HATUM & WORM 2006).



Left: this filter (developed by WISY) fits into a vertical down pipe and acts as both filter and first-flush system. Right: filter cartridge of Pop-up-filter (developed by KSCST) acts as a first-flush separator. Source: CSE (n.y.), KSCST (n.y.)

### Storage:

The storage container (cistern, tank and Bore well) is often the most visible or recognizable component of a RWH system. It is where the captured rainwater is diverted to and stored for later use. The main goal of the storage tank is safety. It should store water that is safe to use, and it should be secure so that children or animals cannot access the tank.



### Formula for Calculations:

It can be measured using following formula.

$$\text{Harvested Water (Gal)} = \text{Catchment area (Ft}^2\text{)} \times \text{Rainfall Depth} \times 0.623(\text{Conversion Factor})$$

The advantages of rainwater harvesting are:

- It is **cost-effective**.
- Conserves water.
- A source of water for landscape irrigation.
- It is a simple method and easy to practice.
- It reduces soil erosion and pollution of water bodies due to fertilizers and pesticides.

### REFERENCES

HATUM & WORM 2006.

PRACTICAL ACTION 2008.

Rainwater catchment systems for domestic supply by John Gould.

Rainwater Harvesting and Use: Understanding the Basics of Rainwater by Anthony Zagelow.