An Overview: Rain Water Harvesting System

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Abstract— As water shortage in the dry areas is a recurrent crisis, people have a great need for information on how to capture and use every available drop of water efficiently. Water harvesting is an effective and economical means of achieving the objectives and information on its various systems and techniques is in great demand. For our water requirement we entirely depend upon rivers, lakes and ground water. However rain is the ultimate source that feeds all these sources. Rain water harvesting means to make optimum use of rain water at the place where it falls. i.e. conserve it and not allow draining away and causing floods elsewhere.

Key words: Objectives, Rain Water, Rain Harvesting, Uses, Store

I. INTRODUCTION

The rain water harvesting may be defined as the technique of collection and storage of rain water at surface or in sub-surface aquifer before it is lost as surface run off. The augmented resources can be harvested whenever needed.

Rainwater provides benefits in the quality of water for both cultivation, household aid and rainwater is pure water with no chemicals dissolve in it. In India, it is an ancient practice to collect the rainwater from the rooftops, foot-hills into the tanks. Rajasthan is very famous for this because a person named 'Rajendra Singh' has contributed a lot by constructing check dams and he was even respected with the Magsaysay Award for his commendable work. Since from the kings ruling period India has talabs, Hauz etc. which were used to save the rainwater and frequently water was supplied in dry periods. Mostly in dry and semi-dry regions check dams were built to save the water.

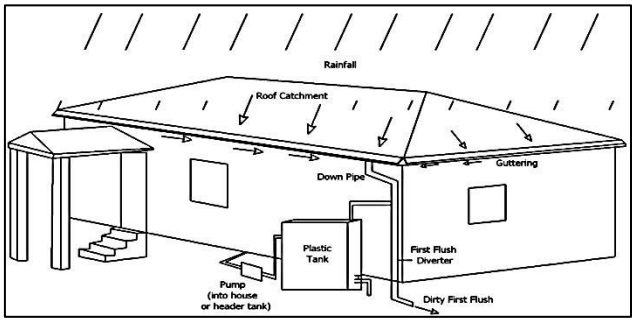

Fig. 1: Example of rain water harvesting system

II. OBJECTIVES OF RAINWATER HARVESTING

- Meet the growing needs and demands of water.
- It decreases the run-off because it stops or blocks the drain.
- Shunning the flooding of roads.
- Increase the underground water level and decreases the ground water pollution.
- Decreases the corrosion of soil and complete the domestic needs of water.

III. METHODS OF HARVESTING WATER

Tanks and reservoirs are used to store the water.

- By building pits, dug wells and by recharging ground water.

IV. RAINWATER CAN BE HARVESTED FROM THE FOLLOWING SURFACES

A. *Surface runoff Harvesting*

In towns and cities, rainwater flows as surface runoff and this could be stored for the future use by implementing correct methods.

B. *Rooftop Rainwater Harvesting*

In this method, the rainwater is directly stored, at where it falls. The components needed in this type of harvesting are:

- Catchment
- Transportation
- First flush
- Filter

1) Catchment: The surface which takes the rainwater is called catchment and the catchment may be a terrace, open ground area etc.
2) Transportation: The water from the catchment is taken down through the pipes to the harvesting place.
3) First flush: the First flush is a machine provided at the outlet of transportation pipes and used to flush the water to avoid any contamination.
4) Filter: At the peak points of the storage tanks filters are present which aids in removing all the dust particles present in water before storing it in the reservoir or tank.

Rooftop harvested rainwater can be used in different methods and some of them are as follows:

- The storage can be used directly.
- The stored water can be used to recharge the ground water.

C. *Advantages of Rainwater Harvesting*

- The rainwater harvesting is very beneficial and some of the advantages of it are:
- The system of rainwater harvesting is very pliable because can avail it for different uses.
- These methods are implemented within the house which makes the availability of water for domestic uses.
- These are affordable and have low maintenance cost. These systems can be integrated privately ad eradicate the argument issue of maintenance.
- Building the rainwater harvesting system is very simple and availing the system reduces the water bills.
- There will be the reduction in the demand of water, floods and soil erosion.
- It has the wide range of applications.

V. DESIGN CONSIDERATIONS

Three most important components, which need to be evaluated for designing the rainwater harvesting structure, are:

1) Hydrogeology of the area including nature and extent of aquifer, soil cover, topography, depth to water levels and chemical quality of ground water
2) Area contributing for runoff i.e. how much area and land use pattern, whether industrial, residential or green belts and general built up pattern of the area
3) Hydro-meteorological characters like rainfall duration, general pattern and intensity of rainfall.

VI. COMPONENTS OF RAIN HARVESTING SYSTEM

A rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and storage in tanks for reuse or recharge. The common components of a rainwater harvesting system involved in these stages are illustrated here.

– The Basics: A storage system is comprised of four key components:

1) Collection Area – roof surfaces provide an opportunity for rainwater capture.
2) Conveyance System – used to transfer water and is comprised of gutters or flat roof drainage holes, and downspouts and piping.
3) Water Storage – may be above or below ground and can be comprised of a single container or multiple containers.
4) Filtration – to keep debris out of the system.

A. Key Components

1) Collection Area

The smoother and more impermeable the collection surface, the less debris will accumulate, keeping the stored water cleaner.

2) Conveyance Systems

– Dry – Do not have water in them until it rains.
– Wet – Water sits in the low sections until replaced by new

VII. SUMMARY

"Rainwater harvesting" is usually taken to mean the immediate collection of rainwater running off surfaces upon which it has fallen directly.

So collecting rain water is cost effective and best alternative to the scarcity for water worldwide.

Therefore rainwater harvesting should be improved to gain sustainability in various aspect in rural as well as in urban areas.

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