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RAIN WATER HARVESTING

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ABSTRACT

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 it's limited supply, especially in such a dry continent as India. The harvesting of rain water is simply involves the collection of water from surfaces on which rain falls, and subsequently storing water in rainwater tanks for later use. All this is necessary to capture this rainwater and to direct the flow of rainwater from roof gutters to a rainwater storage tank. If you are reliant on collected rainwater and are not connected to a town's water supply, then the water collected will be especially important to you. Rainwater harvesting involves collecting runoff. It is technique used to induce collect, store and conserve runoff from an assortment of source for unlimited purpose. The aim of rainwater harvesting is to concentrate runoff and collect it in vessels to be stored for future use.

Keywords - Components, Drains, Filtration and storage, Rain Water, Harvesting, Recharge.

I.INTRODUCTION

"Care for rain water before it becomes rare" First recognize that the source of all water on earth is not the river, is not the underground aquifer, is not the lake, well or stream. Rain is the source of all water. Second, recognise that in India the monsoon is a deluge. Rain spatters the earth. Fills ponds. Lakes brim. Rivers heave. But the monsoon is also brief. We receive most of its rainfall in just 100 hours out of 8,760 hours in a year. But this is enough to meet our water needs, provide food security and eradicate rural poverty?

II.WATER BALANCE IN INDIA

According to a study, India receives 400 million hectare meters (mham) of rain and snowfall. Another 20 mham flow in as surface water from outside the country. This total 420 mham provide the country with river flows of 180 mham. Another 67 mham is available as groundwater. About 173 mham is lost as evaporation or becomes soil moisture - which can be captured directly as rainwater or as runoff from small catchments in and near villages or towns. If even 20 - 3- mham can be captured through rainwater harvesting, tremendous pressure can greatly extend the availability of clean water. Why is Cherrapunji today short of drinking water when it gets more than 11 meters of

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rainfall annually? Simply because it does not capture the rain that falls over it. Third, recognise the rainwater needs to be harvested through capturing, storing and recharging it and later using it during prolonged parched periods. The key component of water management is 'storage' especially in India. Small means even more water.

III.RAIN WATER HARVESTING

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 it's limited supply, especially in such a dry continent as India. The harvesting of rain water is simply involves the collection of water from surfaces on which rain falls, and subsequently storing water in rainwater tanks for later use. All this is necessary to capture rainwater and to direct the flow of rainwater from roof gutters to a rainwater storage tank. If you are reliant on collected rainwater and are not connected to a town's water supply, then the water collected will be especially important to you.

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IV.BENEFITS OF RAIN WATER HARVESTING

- An ideal solution to water problems in area having inadequate water resources.
- The ground water level will rise.
- Mitigates the effects of drought and achieves drought proofing.
- Reduces the runoff which chokes the storm drains.
- Flooding of roads is reduced.
- Quality of water improves.
- Soil erosion will be reduced.
- Saving of energy for lifting of ground water- a one m rise in water level saves about 0.40 KWH of electricity.

V. DESIGN OF STORAGE TANK

The volume of the storage tank can be determined by the following factors:

- Number of persons in the household: The greater the number of persons, the greater the storage capacity required to achieve the same efficiency of fewer people under the same roof area.
- Per capita water requirement: This varies from household to household based on habits and also from season to season. Consumption rate has an impact on the storage systems design as well as the duration to which stored rainwater can last.
- Average annual rainfall

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- Period of water scarcity: Apart from the total rainfall, the pattern of rainfall -whether evenly distributed through the year or concentrated in certain periods will determine the storage requirement. The more distributed the pattern, the lesser the size.
- Type and size of the catchment: Type of roofing material determines the selection of the runoff coefficient for designs. Size could be assessed by measuring the area covered by the catchment i.e., the length and horizontal width. Larger the catchment, larger the size of the required cistern (tank).

VI. ILLUSTRATION

The system has to be designed for meeting drinking water requirement of a one hundred and sixty five students living in a Boy's hostel building with a rooftop area of 803.49 sq. m. The average annual rainfall in the region is 495 mm. Daily drinking water requirement per person is 5 litres.

Following details are available:

Area of the catchment (A) = 803.49 sq m.

Average annual rainfall (R) = 495 mm (0.495 m)

Runoff coefficient (C) = 0.70

1. Calculate the maximum amount of rainfall that can be harvested from the rooftop:
   Annual water harvesting potential = 803.49 x 0.495 x 0.7
   = 278.41 cu. m (278410 litres)

2. Determine the tank capacity: This is based on the dry period.The dry period is of two months (61 days)
Calculate drinking water requirement for the hostel students for dry period
   = 61 x 165 x 5
   = 50,325 litres

As a safety factor, the tank should be built 20 per cent larger than required; this tank can meet the basic drinking water requirement of 165-students for the dry period. A typical size of a rectangular tank constructed in the basement will be about 6.5 m x 5.5 m x 2.3 m.

VII. QUALITY OF STORED WATER

To prevent leaves and debris from entering the system, mesh filters should be provided at the mouth of the drainpipe. Further, a first-flush device should be provided in the conduit before it connects to the storage container. If the stored water is to be used for drinking purposes, a sand filter should also be provided. Methods to protect rainwater quality include appropriate system design, sound operation and maintenance and use of first flush devices and treatment. Treatment is mainly appropriate as a remedial action if contamination is expected. First flush devices

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can be effective in reducing levels of contamination if properly maintained. Good system design, operation and maintenance are generally the simplest and most effective means of protecting water quality.

VIII. OPERATION AND MAINTENANCE

Proper operation and maintenance of rainwater harvesting systems helps to protect water quality in several ways. Regular inspection and cleaning of catchment, gutters, filters and tanks reduce the likelihood of contamination. Water from other sources should not be mixed with that in the tank.

IX. TREATMENT

Treatment of stored rainwater only makes sense if it is done properly and if hygienic collection and use of the water will ensure it does not suffer from re-contamination. There are several types of treatment possible, the most common being chlorination, boiling, filtration and exposure to ultraviolet or natural sunlight.

X. CONCLUSION

From the project it is observed that by the "Rain Water Harvesting '' method is suitable for following purposes.

- First, Ground water table is get increased.
- Second, fulfill the needs of drinking water during dry period.

XI. ACKNOWLEDGMENT

I wish to thank all my friends who helped us to carry out this work.

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