

Design & Developing Rain Water Harvesting System in Campus

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Abstract - The areas around our college used to be unpaved and the rain falling on these area would percolate into the soil and remain there for being through shallow open wells. The rainwater harvesting is a simple collection or storing of water through scientific technique from the terrace where the rain falls. It involves utilization of rainwater for the domestic and agricultural purposes. The method of rainwater harvesting has been into practice since ancient times. The method is simple and cost effective too. It is especially beneficial in the areas which faces scarcity of water. Peoples usually makes complaints about the lack of water. During monsoons lots of water goes waste into gutters. And this is when Rainwater Harvesting proves to be the most effective way to conserve water.

Keywords – Water Conservation,.

I. Introduction

Pollution is increasing worldwide. Water supplies face a daily onslaught of hazardous wastes. Green building, a recent trend to address the negative effects of buildings, consists of the use of environmentally friendly materials, pollution prevention through recycling, and an increase in energy efficiency. The main idea behind this paper is to learn the Green Concept of building which is the most upcoming field in developing countries like India. A green building is an environmentally sustainable building, designed, constructed and operated to minimize the total environmental impacts. The Green building which is usually on a smaller scale and tends to focus on the use of natural materials those are available locally. The Green building” is a way of enhancing the environment. It benefits humans, the community, the environment, and a builder’s bottom line. It is about tailoring a building and its site to the local climate, site conditions, culture and community, in order to reduce resource consumption while enhancing quality of life.

Rainwater harvesting is a simple technique of catching and holding rainwater where its falls. Either, we can store it in tanks or we can use it to recharge groundwater depending upon the situation. Rainwater harvesting is the ideal situation for those areas where there is inadequate groundwater supply or surface resources. It was very difficult to imagine few decades before that you will require to buy drinking. The use value of water was never undetermined, but it’s about time that even in exchange value is given due to importance.

The aim of this paper is to develop criteria for a sustainable system for college buildings. Green Buildings are designed to reduce the overall impact on human health and the natural environment by the following ways:

1. Using energy, water and other resources efficiently.

2. By reducing waste, pollution, and environmental degradation.

1. Green buildings are designed and constructed to maximize the whole lifecycle performance, conserve resources and enhance the comfort of occupants. This research paper is going to analyze the market opportunities available for green buildings and barriers in accepting green buildings. [1]

2. This paper discusses the concerns over energy security measures and energy conservation in Indian context. The importance and benefits of Green Buildings have been highlighted in the paper in a view to save our planet and sustain life. [2]

3. ‘A Green building should create delight when entered, serenity and health when occupied and regret when departed’. [3]

4. Green Building, also known as green construction or sustainable building, is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle. [4].

II. Methodology

Construction Steps:

1. Collection of Water:

We are collecting water from terrace through the drains during rainy season. There are 8 drains from which we are collecting rain water and supplying to the tank.

2. Construction of Tank:

We are constructing tank for collecting and filtering the rainwater. The tank is constructed near to the college gate. The tank is made up of Reinforced Cement Concrete. The size of tank is 10m X 3m X 3 m.

3. Construction of Filter:

The filtration tank is used to remove suspended pollutants from rainwater collected over roof. We are using sand gravel filter for this which is less costly and easy to construct.

4. Collection of Main Tank:

All the water which is collected in collection tank is then supplied to the main tank and then use for domestic purpose after the period of rainy season.

Features of Rainwater Harvesting are:

- Reduces urban flooding.
- Ease in constructing system in less time.
- Economically cheaper in construction compared to other sources, i.e. dams, diversion, etc.
- Rainwater harvesting is the ideal situation for those areas where there is inadequate groundwater supply or surface resources.
- Helps in utilizing the primary source of water and prevent the runoff from going into sewer or storm drains, thereby reducing the load on treatment plants.
- Recharging water into the aquifers which help in improving the quality of existing groundwater through dilution.

Components of Rainwater Harvesting:

This flow chart diagram shows the rainwater harvesting working process.

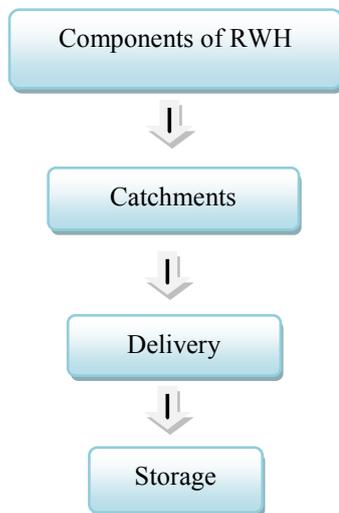


Fig 1. Flow Chart of Components of RWH

Data Collection:

Rainfall Data Collection atgaon is located at 23°42'N longitude and 72°33'E latitude in thane district of Maharashtra at an elevation of about 117 meters (383 feet) above mean sea level. Atgaon has a semi-arid climate and receives Medium rainfall during Southwest monsoon (June-September) and retreating southern east monsoon (December-January). Average annual rainfall ranges between 700-800 mm/annum. The average monthly rainfall data are being taken from the

Informatics Centre Thus rainfall data of the area related to campus is given below in the table.

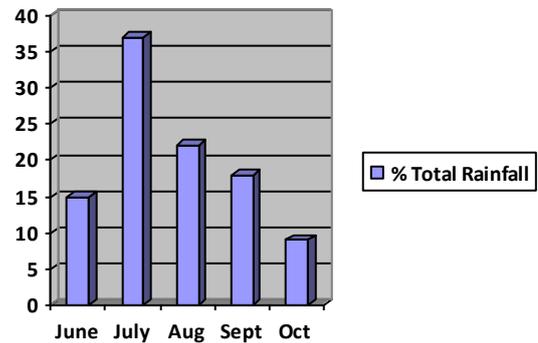


Fig 2. Rainfall Data

Determination of Catchment Area:

Total roof area = 3600 m²

Average annual rainfall at Campus = 851mm/year
= 0.851m/year

Total volume of surface runoff water suppose to be Collected = 3600 x 0.851
= 3063.6 m³ /year

Assume, Number of students = 3000

Total amount of water consumption per day = 1000x0.1
= 100 m³/day

Volume of water stored in tank was taken approx. = 5400 m³

Total no. of days we can utilize preserved water = stored water / water demand
= 5400/30 = 180 days (or 6 months)

For long term storage of preserved water in good condition, preserving chemical should be added.

III. Design Parameters

Size of Tank = 10m X 3m X 3m
Capacity of Tank = 5400 m³
Size of Pipe = 6 inch
Length of one pipe = 20 feet = 6 m
Total length of pipe = 280 m
Number of pipes = 46 nos.
Number of elbows = 14 nos.
Number of joints = 65 nos.

IV. Advantages

- Easy to maintain
- Reducing water bills
- Reduces demand on ground water
- Reducing floods and soil erosion
- Used for several non-drinking purpose

V. Future Scope

- System Integration: To capture waste energy and water for other buildings systems and to ensure systems are programmed to work together.
- Water Reuse and Efficiency: Includes reusing rain water and reducing total water consumption.

Result

We are constructed tank of size 10m x 3m x 3m. Total volume of water will be store approximately 5400 m³.which sourced out a drastic result that we can utilize this water for 6 months.

Conclusion

It is a very useful process during rainy season and during the scarcity of water. By doing this process we can save water for domestic purpose, drinking purpose and for future needs. It is a very simple and affordable process. With decreasing availability of water, Rainwater Harvesting is a best option.

Acknowledgement

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