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DESIGN OF RAINWATER HARVESTING SYSTEMS, AND ITS IMPACTS ADOPTED IN ALL PARTS OF THE WORLD

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Abstract

As the world population increases, the demand increases for quality drinking water. Surface and groundwater resources are being utilized faster than they can be recharged. Rainwater harvesting is an old practice that is being adopted by many nations as a viable decentralized water source. This paper reviews the methods, design of rainwater harvesting systems, and its impacts adopted in all parts of the world.

Keywords: Rain Water Harvesting (RWH).

Introduction

As the world population increases, the demand increases for quality drinking water. Surface and groundwater resources are being utilized faster than they can be recharged. Rainwater harvesting is an old practice that is being adopted by many nations as a viable decentralized water source. Individual rainwater harvesting systems are one of the many tools to meeting the growing water demand. Rainwater harvesting is an environmentally sound solution to address issues brought forth by large projects utilizing centralized water management approaches. Population growth all over the world is causing similar problems and concerns of how to supply quality water to all.

As land pressure rises, urban communities are developing vertical and in wide open increasingly timberland zones are infringed and being utilized for farming. In India the little ranchers rely upon Monsoon where precipitation is from June to October and a great part of the valuable water is before long lost as surface spillover. While water system might be the most evident reaction to dry spell, it has demonstrated exorbitant and can just profit a lucky few. There is currently expanding enthusiasm for the minimal effort elective for the most part alluded to as 'Downpour Water Harvesting' (RWH).

Water harvesting is the movements of direct assortment of rainwater, which can be put away for direct utilize or can be revived into the groundwater. Water harvesting is the assortment of spillover for gainful purposes. As water harvesting is an antiquated convention and has been utilized for centuries in most dry grounds of the world, a wide range of techniques have been created. Be that as it may, similar techniques now and again have various names in various areas and others have comparable names in any case, practically speaking, are totally unique.

Benefits of Rain Water Harvesting System:

I. Rainwater is a comparatively clean and totally free source of water.
II. Rainwater is improved for scenery plants

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and gardens because it is not chlorinated.

III. It can supplement other sources of water supply such as groundwater or municipal water connections.
IV. It lower the water supply cost.
V. It can provide an excellent back-up source of water for emergencies.
VI. It is socially acceptable and environmentally responsible.
VII. It uses simple technologies that are inexpensive and easy to maintain.
VIII. Reduced flood flows and topsoil loss.
IX. It is free; the only cost is for collection and use.
X. It reduces the contamination of surface water with sediments, fertilizers and pesticides from rainwater run-off resulting in cleaner lakes, rivers, oceans and other receivers of storm water.
XI. It is used in those areas which face insufficient water resources.
XII. It is good for laundry use as rainwater is soft and lowers the need for detergents.
XIII. It can be used to recharge groundwater.
XIV. It minimizes the runoff which blocks the storm water drains.

Need For Rainwater Harvesting

1. As water is becoming scarce, it is the need of the day to attain self-sufficiency to fulfill the water needs.
2. As urban water supply system is under tremendous pressure for supplying water to ever increasing population.
3. Groundwater is getting depleted and polluted.
4. Soil erosion resulting from the unchecked runoff.
5. Health hazards due to consumption of polluted water.

Methods of Rainwater Harvesting

- Rainwater stored for direct use in above ground or underground sumps / overhead tanks and used directly for flushing, gardening, washing etc. (Rainwater Harvesting)
- Recharged to ground through recharge pits, dug wells, bore wells, soak pits, recharge trenches, etc. (Ground water recharge)

Rainwater Harvesting Studies All Over the World

Kahinda et al. (2008) characterized RWH as the assortment, stockpiling and utilization of rainwater for small scale profitable purposes. Characterized it as the assortment of overflow for profitable use. Oweis (2004) characterized it as the convergence of rainwater through overflow into littler objective territories for valuable use.

Kumar (2000), characterized RWH as the purposeful assortment of rainwater from a surface known as catchment and its stockpiling in physical structures or inside the dirt profile. Rainwater harvesting is an antiquated practice that has been progressively accepting consideration on the planet, powered by water deficiencies from dry seasons, contamination and populace development.

Spillover age criteria yields two sorts of frameworks for example overflow based frameworks (spillover concentrated from a catchment) and in-situ water protection (precipitation moderated where it falls). The overflow stockpiling criteria yield two classifications, i.e., capacity inside the dirt profile and capacity structures. The size of catchment yields two classifications, i.e., full scale catchments and small scale catchments (inside field).

It has been accounted for that rainwater harvesting can advance huge water sparing in habitations in various nations. In Germany, an investigation performed by Herrmann and Kumar (2000) demonstrated that the capability of consumable water sparing in a house may differ from 30% to 60%, contingent upon the interest and rooftop zone. In Australia, investigated 27 houses in Newcastle and presumed that rainwater utilization would advance consumable water sparing of 60%. In Brazil, an examination performed by indicated the potential water sparing by utilizing water harvesting in 62 urban areas ranges from 34% to 92%, with a normal potential for consumable sparing of 69%.

Rain Water Harvesting Studies in India

Julius et al (2013) have reviewed the impact assessment of RWH on ground water quality at Indore and Dewas, India. The impact assessment of roof top improves the quality and quantity of Ground Water. The roof top rainwater was used to put into the ground using sand filter as pretreatment system. This lead to a reduction in the concentration of pollutants in ground water which indicated the effectiveness of increased recharge of aquifer by roof top rain water. He observes that in certain areas, the amount of total and faecal coliform were observed high in harvested tube well water than normal tube well water. The reason of this increase was poor cleanliness of roof top and poor efficiency of filter for bacterial removal. The author concludes that quality mounting of rainwater harvesting is an essential prerequisite before using it for ground water recharge.

Critical Issue in Rain Water Harvesting

One of the most significant fundamental qualities in rainwater harvesting is that it is a generous innovation (Julius et al., 2013) and can't make

unwanted consequences. Water harvesting activities are driven by firm convictions and suspicions, some of which are: (1) there is an enormous measure of storm stream which remains uncaptured and in the long run winds up in the regular sinks, particularly oceans and seas, upheld by the national level totals of full scale hydrology; (2) neighborhood water needs are little to the point that exogenous water isn't required; (3) nearby water harvesting frameworks are in every case little and are along these lines practical; (4) since the financial, social and natural estimations of water are exceptionally high in locales hit by water deficiencies, water harvesting intercessions are suitable, bolstered by the supposition that savvy options that can get a similar measure of water don't exist; (5) gradual structures lead to steady advantages; and (6) being little, with low water stockpiling and preoccupation limits, they don't present negative consequences for downstream employments.

Conclusion

It is no denying that sustaining and recharging the groundwater along with judicious use of the limited fresh water resources is the need of the hour. If sufficient measures are not taken up immediately, we will face a crisis which will be detrimental to the very survival of mankind. Efficient management of water resources and education about judicious utilisation of water resources along with measures of harnessing, recharging and maintaining the quality of water and water bodies has to be taken up on war footing.

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