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How many drops make up an ocean? Conserve water, every drop counts. Don't flush our planet. (A Review paper)

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Abstract

Currently, available sources of water face extreme pressures around the globe because of oblivious human activities as well as changing climate. The rainwater harvesting system (RWHS) carries a huge potential to enhance surface and groundwater resources in regions having a poor water supply. Recently, several countries have started to promote the updated implementation of such practices to tackle the problem of growing water demand. These

These considerations motivated our enthusiasm for looking at its current circumstances and the possibility of RWHS in the future. In this regard, the study aims to identify the evidence gap among different determinants (climate change, reliability, water quality, and financial viability) intertwined with RWHS. In the paper, studies related to the significance of RWHS amidst scarcity of water around the globe, published in valued journals are reviewed. We found that the RWHS becomes economically viable when certain steps and risk assessment methods are executed in planning and maintaining this system. The study concludes that drinking water sufficiency is possible if a sustainable drinking water supply system is built via RWHS.

Keywords- RWHS, Executed, Sustainable, Harvesting

Introduction

Improving rainwater use in agriculture is necessary to ensure sustainable food production for the growing global population (Rockström et al., 2009, Springmann et al., 2018). Since the use of water from river and groundwater resources is reaching unsustainable rates (Aeschbach-Hertig and Gleeson, 2012, Hoekstra and Wiedmann, 2014, Jaramillo and Destouni, 2015), increasing water withdrawals and consumption by intensive irrigation is not a suitable option in many regions of the world. Moreover, better management of freshwater resources alone will not be sufficient to ensure sustainable food production, because land degradation caused by climate and land-use change drivers is a major constraint to agro-ecosystem functions (IPBES, 2015). On the other hand, rainfed agriculture still has a large untapped potential, particularly in dry and tropical developing areas (Rockström et al., 2010.

Water preservation methods during ancient times

Water conservation includes all the policies, strategies, and activities to sustainably manage the natural resources of fresh water, protect the hydrosphere, and meet the current and future human demands.

Population, household size, growth, and affluence all affect how much water is used. Factors such as climate change have increased pressures on natural water resources, especially in manufacturing and agricultural irrigation. It is as old as civilization itself.

Archaeological evidence shows that the practice of water conservation is deep-rooted in the science of ancient India. Excavations show that the cities of the Indus Valley Civilisation had excellent systems of water harvesting and drainage. The settlement of Dholavira, laid out on a slope between two storm water channels, is a great example of water engineering. Chanakya's Arthashashtra mentions irrigation using water harvesting systems. Sringaverapura, near Allahabad, had a sophisticated water harvesting system that used the natural slope of the land to store the floodwaters of the river Ganga. Chola King Karikala built the Grand Anicut or Kallanai across the river Cauvery to divert water for irrigation (it is still functional) while King Bhoja of Bhopal built the largest artificial lake in India.

Jhalara

Jhalaras are typically rectangular-shaped stepwells that have tiered steps on three or four sides. These step wells collect the subterranean seepage of an upstream reservoir or a lake. Jhalaras were built to ensure an easy and regular supply of water for religious rites, royal ceremonies, and community use. The city of Jodhpur has eight jhalaras, the oldest being the Mahamandir Jhalara which dates back to 1660 AD.

Talab /Bandhi

Talabs are reservoirs that store water for household consumption and drinking purposes. They may be natural, such as the pokhariyan ponds at Tikamgarh in the Bundelkhand region, or man-made, such as the lakes of Udaipur. A reservoir with an area of fewer than five bighas is called a talai, a medium-sized lake is called a bandhi and bigger lakes are called sagar or samand.

Bawari

Bawaris are unique step-wells that were once a part of the ancient networks of water storage in the cities of Rajasthan. The little rain that the region received would be diverted to man-made tanks through canals built on the hilly outskirts of cities. The water would then percolate into the ground, raising the water table and recharging a deep and intricate network of aquifers. To minimize water loss through evaporation, a series of layered steps were built around the reservoirs to narrow and deepen the wells.

Methods of Rainwater Harvesting Now

There are primarily two prevalent methods of rainwater harvesting that are used in most the areas:

1. Surface Run-off Rainwater Harvesting:

The rainwater that flows off in the urban areas can be collected and stored to recharge the groundwater level or the aquifer bed, instead of letting the water flow into the drains.

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2. Rooftop Rainwater Harvesting:

In rooftop harvesting, the rainwater is directly collected from the roof of the buildings and transported either into a tank or an artificial aquifer. Through this method, the harvested water can be used for daily use purposes (including drinking and cooking, only after purifying the water at a basic level) and for recharging the aquifers and helping restore the groundwater levels.

Methods:
1. Water storage for usage
2. Recharging aquifers
3. Bore well recharging
4. Recharge pits
5. Recharge shafts or Soakway
6. Dug wells recharge
7. Recharging Trenches

Benefits of Rainwater Harvesting

- Storing rainwater helps in recharging the aquifers.
- It helps in preventing urban flooding due to excess rain.
- The stored water can be used for irrigation practices in a farming region.
- The water can be used for daily use and help in reducing water bills in the towns and cities.
- Is a helpful way to tackle the scarcity of water in arid and dry regions.
- It helps in restoring the groundwater level.

Global warming is taking its toll on the climate pattern across the world. Rains have become unpredictable in nature with some regions suffering from usual longer dry spells, while some regions are hit by incessant rain. Rain hit regions are unable to utilize or control the excess waters, which leads to a flood-like situation. Rainwater harvesting can help overcome the problem of the flood, while also helping in storing excess water that can help in providing water to the water-scarce region. This renewable source of water management can help in overcoming major water-related problems, that is not only plaguing the world right now but can have a severe impact on the global population and environment in the future.

Conclusion-

In this survey, the correlation between the collected water from a RWHs, the catchment area and the number of users served was assessed. Water-saving through integrated water management is put forward by the practice of RWH. Considering the specific geophysical characteristics of the Chios island, and the everyday routines of its inhabitants, this work investigates the context that makes the RWHs a sustainable and a reality for the islanders. The number of users and contributing surfaces define the water supply and inflow, and ultimately the optimal volume of the collection tank. Water harvesting could be applied for other uses except drinking in both houses and schools. Daily rainfall data in the Chios island is used as an input to the system simulation model for toilet flushing and garden irrigation for seven years. This study discussed the optimal size of the rainwater collection tank via the application of the daily water balance for specific collection surfaces and defined needs. In the case of a house where water is used daily, the installation of a rainwater collection system with a tank of 5 m3, with an investment cost of EUR 1900, and an average price of a 28-year repayment period is economically acceptable. In the case of a school setting, with no water consumption in the summer season, it is estimated that RWHs with a tank of 24 m3 cover 60% of water needs, costs EUR 5700 and the repayment period is about 14 years. This study indicates that it is smooth enough to connect society, beyond the economy, with the environment. Social analysis points out that the community's attitude, norms, and forms of knowledge regarding water perception and its day-to-day management affect the implementation of water practices and facilitate the dialogue among stakeholders and local authorities. Social practices such as RWH, which are already exercised on Chios island, could enhance the quality of urban life connected to environmental values. This study argues that social services, such as education and social safety, can be further supported by sustainably providing safe water, through RWH.

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