Original Research Paper

Volume - 12 | Issue - 03 | March - 2022 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Urban Planning

RAINWATER HARVESTING, A REVIEW

Lakshya Jain*	University Teaching Department, CSVTU Bhilai. *Corresponding Author
Vandana Chandrakar	University Teaching Department, CSVTU Bhilai.
Shubham Yadav	University Teaching Department, CSVTU Bhilai.

ABSTRACT Water management is critical to any economy's growth and development, particularly in growing economies like India. However, due to excessive groundwater exploitation in the process of socioeconomic development and to meet the increased needs of the growing population, the resource is currently under stress. As a result, we should make use of this valuable resource while also conserving it. The basic goal of this study is to give a broad review of rainwater collecting systems and groundwater, as well as their possible uses in everyday life. Many countries have implemented rainwater harvesting as a long-term strategy to complement public water supplies. Many water-related issues have been overcome thanks to the RWH system. Another source of water that can be counted on is groundwater.

KEYWORDS : rainwater, recharge, groundwater

INTRODUCTION

The water cycle was in good form in ancient times, but due to human intervention, groundwater levels have been rapidly declining. We couldn't have imagined needing to buy drinking water just a few years ago, yet we now have to do so wherever we go. Today, fresh water is a scarce resource, and its effects can be felt all around the world. According to the UNEP, more than 2000 million people would live in areas with acute water scarcity by 2050, and water will be a limiting factor for growth in many regions of the world. By 2025, two out of every three people on the planet will be in a water-stress condition due to current consumption habits. It now accommodates nearly a third of the world's population, according to the UNEP's Millennium Report, GEO (Global Environment Outlook) 2000. When water demand in countries with moderate to severe water stress exceeds 10% of sustainable fresh water resources. Water harvesting, on the other hand, is a method of collecting rainfall and preventing it from escaping. Within a property's limits, water gathered from terraces, agricultural land, and neighboring surfaces can be included.

Water can be gathered in a variety of methods, including the ones listed below:

- Collecting seasonal flood water from adjacent rivers
- Capturing runoff from residential and business rooftops
- Capturing runoff from local catchment areas
- Watershed management is a technique for conserving water.

Requirement of Rain Water Harvesting:

- As water shortage worsens, establishing self-sufficiency in meeting water demands becomes more critical.
- Groundwater gets depleted and polluted as urban water distribution systems struggle to satisfy the demands of a growing population.
- soil degradation from unchecked runoff; health hazards from drinking contaminated water.

Advantages of rainwater harvesting system:

- Rainwater is a relatively clean and completely free source of water, and it is healthier for plants and gardens because it is not chlorinated.
- It can be used to supplement other water sources like wells or municipal connections.
- It reduces the cost of water delivery.
- It is socially acceptable and environmentally responsible, and it can serve as a reliable emergency water supply.
- It lowers flood runoff and topsoil erosion by utilising simple, low-cost, and easy-to-maintain technologies.
- It is absolutely free; the only expenses are those incurred in the collection and usage of data.
- It reduces the contamination of surface water by sediment, fertiliser, and pesticides generated by rainwater runoff, resulting in clean lakes, rivers, oceans, and other storm water receivers.
- It may be used to recharge ground water since rain water is mild and reduces the need for detergent in laundry.
- It is utilised in places where there aren't adequate water sources.

Rainwater Harvesting Technique:

- Rainwater is collected and stored in above-ground or subsurface sumps / overhead tanks for immediate use in flushing, gardening, and washing. (Rainwater Collection)
- Recharged to the earth using recharge pits, drilled wells, bore wells, soak pits, and recharge trenches, among other methods. (Recharge of groundwater).
- Charcoal Filter

A proportionate layer of Gravel + Charcoal + Sand + Gravel , are used as filter.

- Sand filter

It's simple to put together and doesn't cost a lot of money. Filters can be used to effectively remove turbidity (suspended particles such as silt and clay), color, and microbes from water. The top layer of a simple sand filter made at home consists of coarse sand, followed by a 5-10 mm layer of gravel, and then another 5-25 cm layer of gravel.

Storage tanks: Rainwater harvesting storage tanks that can be used for domestic, animal, and gardening purposes. The following aspects must be considered when planning the tank's optimal capacity:

- Annual Rainfall Average
- The catchment's size
- Needs for drinking water

Field's Runoff Water Harvesting

We lose our healthy soil every year due to runoff water during rains, which is why Indian soils are losing production day by day. There are only a few methods for preserving the soil's fertile layer. In a field, water flows in the direction of the slope; as the slope becomes steeper, the water flows at a faster rate, but it also takes the top layer of soil with it. We must direct soil and water in a preferred direction by creating proper channels in order to conserve them.

Tube wells are becoming a major supply of water in India due to the inexpensive cost of installation, but they are not always sufficient to meet the needs of any agriculture field, house, or industry.

A direct effect of the reduced ground water level on tube wells can be seen. Due to their depth, tube wells are the best media for "Ground Water Recharge."

Rain Water Harvesting Studies In India

In his analysis, Venkateswara Rao (1996) highlights the significance of artificial rainfall water recharge for Hyderabad's water supply. Rainwater from the roof tops of the buildings was recharged in specially designed recharge pits to replenish the city's ground water supply. Storm runoff from public places such as highways, parks, and play grounds is refilled through naturally occurring tanks within the city by not allowing municipal sewage or industry effluents in these tanks. Finally, he suggests that, in the absence of natural tanks,

community recharge pits be built in hydrogeologically suitable locations.

Ravikumar et al. (2003) discuss roof-top rainwater collection at Chennai Airport using a geographic information system (GIS). They go through the SCS approach for estimating surface runoff as well as the rainwater collection equipment that were installed in the Chennai Airport Terminal buildings. Roof drainage delineation was done in a GIS environment after scanning thematic maps with map Info GIS software. Based on the airport's geography and lithology. As artificial recharge structures, a recharge shaft, well, and pit were built.

Wells that previously fetched water for about 1-2 hours now fetch water for more than 8-10 hours, according to Hazra (1997), who reported in his overview of crop yield performance in the Tejpura watershed that, as a result of soil and water conservation works and water storage structures, wells that previously fetched water for about 1-2 hours now fetch water for more than 8-10 hours. This is due to a 10 to 23 foot increase in the ground water table after the construction of water storage structures.

In his study of the Vanjuvankal watershed in Andhra Pradesh, Naidu (2001) discovered that water harvesting structures and percolation ponds caused ground water levels in the watershed area to rise by 2 to 3 metres.

RWH's impact on ground water quality in Indore and Dewas, India, was researched by Deepak Khare (2004). (2004). The quality and quantity of ground water are improved as a consequence of rooftop impact studies. After passing through a sand filter as a pretreatment device, roof rainwater was pumped into the ground. The efficacy of enhanced aquifer recharging by roof top rain water was demonstrated by a decrease in contaminants in ground water as a result of increased aquifer recharging by roof top rain water. He finds that total and faucal coliform levels in harvested tube well water are higher than in ordinary tube well water in several regions. This growth was caused by a lack of hygiene on the roof and a filter that was ineffective at removing microorganisms.

According to Muralidharan, precipitation is the primary source of moisture replenishment in the soil by infiltration and subsequent recharge to the groundwater via deeper percolation (2007). Natural groundwater recharge refers to the amount of moisture that enters the earth and finally reaches the water table. This research discovered an exponential relationship between rainfall amount and subsequent rise in water level, implying that daily rainfall of more than 40 mm/day results in a significant rise in water level.

CONCLUSION:

The necessity of the hour is to preserve and recharge groundwater while making wise use of the limited fresh water supplies available. Recognizing the importance of rainwater harvesting is one of the most logical steps toward this aim. Rainwater, if stored and exploited via rainwater collecting technology, can be an effective strategy for restoring ground water resources, according to the research.

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