Scientific Journal of Impact Factor (SJIF): 4.72

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 4, Issue 3, March -2017

Down to the top: An introduction to rainwater harvesting In India

Review, implementation and future perspectives

Akanksha Makwana [1], Pinak Devaliya [2], Kewang Bhagat [3]Jinal Dalwadi[4]

[1] *Civil department, Spce*
[2] *Civil department, Spce*
[3]*Civil department, Spce*
[4] *Civil department, Spce*

Abstract — *the rainwater harvesting locally collects and stores rainfall through different Technologies, for future use to meet the demands of human consumption or human activities. However, rainwater harvesting has much wider perspectives, in particular, if it is considered in relation to its role in supporting ecosystem goods and services.*

Keywords – rooftop, demonstration rain water harvesting, ground water

I. INTRODUCTION

India has witnessed a rapid increase in the urban population during last few decades. All towns and cities currently are facing today the problem of increasing water demand supply gap invariably exerting pressure on the water resources and its supply requirements. But the modern water management relies heavily on the cost intensive long distance transfer of water to meet the widening demand-supply including overexploitation of in-situ groundwater resources. The sustainable water management requires understanding the value of rain, and to make optimum use of rainwater at the place where it falls. In this scenario, RWH can contribute considerably to tackle water crisis. The best option is to harvest the rainwater where we get it and store it appropriately (on surface or into the aquifer) for eventual recovery and use at times of need.

Urban centers in India are facing an ironical situation with regard to water today. On one hand there is acute water scarcity and on the other, the streets are often flooded during the monsoons, requiring managerial efficiency of the Urban Local Bodies to use the surplus water of the rainy season to overcome the deficiency in other seasons. The shortage of ground water is more pronounced due to urbanization and limited open areas available for recharge of ground water. In some cities ground water extraction has reached very high levels and has brought problems like declining water table day by day, failures of wells/ tube wells and deterioration in ground water quality and quantity. Water is more than often been seen as a cause for social conflicts, protests, demonstrations and road blockades.

In the given situation rainwater harvesting could prove to be a solution for overcoming this scenario. Depending on local environmental conditions, water harvesting may provide a supplementary supply, an alternative supply or the only feasible improved supply, especially in urban areas. To meet these challenges, the Government has made roof top rain water harvesting (RWH) mandatory for all buildings. Rainwater harvesting (RWH) primarily consists of the collection, storage and subsequent use of captured rainwater as either the principal or as a supplementary source of water. Both potable and non-potable applications are possible (Fewkes, 2006).

II. Water Scarcity - A Phenomenon of the 20th Century

With time; the rivers flowing through the urban areas have turned-up into the streams of garbage and become dirty where mosquitoes and bacteria breed. To keep pace with the population growth, urbanization and the green revolution the big dams are being seen as the ultimate solution of water woes of a country faced by perennial drought, flood or both. Now-a-days agriculture has become almost dependent on canal water provided by reservoirs. The construction of big dams struck a death knell for the traditional harvesting systems. Harnessing and supplying water became the responsibility of the government. At the time of independence, the rulers of the princely states and the seminars were the most successful peoples in developing minor irrigation systems through the water harvesting. Thousands of traditional water harvesting systems had declined due to improper want of maintenance and use and as a result-

- Tanks silted up, their embankments were breached and their beds were used for cultivation
- Wells fell into disuse and collected with rubble and garbage
- Deforestation led to floods and soil erosion which destroyed water harvesting structures
- Knowledge of traditional water harvesting systems was not put into practice or passed on to future generations.

III. Literature Review

1.0) Roof selection for rainwater harvesting (2011):
Roofs are the first candidates for rainwater harvesting in urban areas. This research integrates quantitative and qualitative data of rooftop storm water runoff in an urban Mediterranean-weather environment. The objective of this paper is to provide criteria for the roof selection in order to maximize the availability and quality of rainwater. Four roofs have been selected and monitored over a period of 2 years (2008e2010): three sloping roofs e clay tiles, metal sheet and polycarbonate plastic e and one flat gravel roof. The authors offer a model for the estimation of the runoff volume and the initial abstraction of each roof, and assess the physicochemical contamination of roof runoff. Great differences in the runoff coefficient (RC) are observed, depending mostly on the slope and the roughness of the roof. Thus, sloping smooth roofs (RC > 0.90) may harvest up to about 50% more rainwater than flat rough roofs (RC ¼ 0.62). Physicochemical runoff quality appears to be generally better than the average quality found in the literature review (conductivity: 85.0 _ 10.0 mS/cm, total suspended solids: 5.98 _ 0.95 mg/L, total organic carbon:
11.6 _ 1.7 mg/L, pH: 7.59 _ 0.07 pH). However, statistically significant differences are found between sloping and flat rough roofs for some parameters (conductivity, total organic carbon, total carbonates system and ammonium), with the former presenting better quality in all parameters (except for ammonium). The results have an important significance for local governments and urban planners in the (re)design of buildings and cities from the perspective of sustainable rainwater management. The inclusion of criteria related to the roof's slope and roughness in city planning may be useful to promote rainwater as an alternative water supply while preventing flooding and water scarcity.

2.0) Rain Water Harvesting and Ground Water Recharging in North Western Himalayan Region for Sustainable Agricultural Productivity (2011):
This paper reveals the study of low cost traditional water harvesting structures that helps in improving the socio-economic status of the poor farmers of the hill region. In the foothill region of North Western Himalayan region of India, the soil erosion has converted most of the fertile soils into barren, fallow and degraded lands. It is estimated that about 40 per cent of the total geographical area of Himachal Pradesh, Uttrakhand and Jammuand Kashmir is highly degraded. Soil loss through erosion is about 3.6 to 80 t ha -1. The farmers are not aware of rainwater management for storage and ground water recharge. The major constraints identified for conservation and management of water and soil in the area includes lack of technical knowledge and poor economic status of the farmers. Assessment of the area showed that if rainwater is conserved vis-à-vis managed properly and existing technologies are refined for specific land and pedospheric characteristics, it would rehabilitate the degraded lands and in turn increase the productivity in the area. Low cost farm ponds are a better option for collecting rainwater excess during monsoon periods for utilization for irrigation. The most efficient and cheapest way of conserving rainwater at the agricultural farm was found to be in- situ runoff management, which also reduces soil losses and increases the opportunity time for ground water recharging. The earthen embankment for rainwater harvesting has cost benefit ratio of 1.38:1. In addition, good results of harvesting and storage are being achieved in ferro-cement water storage structures of different dimensions of 3 to 5 m deep and 1 to 3 m in diameter.

REFERENCES

[1] Kumar M. (2000), Aqua Dholavira, Archaeology: A Publication of the Archaeological Institute of America, Volume 53, No. 6, November/December 2000.

[2] Meghashyam. K, Rainwater Harvesting- A New Concept to Utilize Rainwater and Secure the Future (J.M. Jaina & Brothers: Delhi,2006).

[3] Jeet. Inder, Rainwater Harvesting (Mittal Publication: New Delhi, 2009).

[4] M. Murase Edited by K. Matsushita, Sustainable Water Strategies for New Development Patterns - Environment in 21st Century and New Development Patterns' in English, 1999.

[5] Tanwar, B.S, Water Related Problems of Haryana- Need for Science and Technology Inputs for Management and Geohydrology', 2003 Indian Geological Congress, pp. 29-38.

[6] Bhatnagar, Madhu, interview by Jessica Canfield. Head Master Shri Ram School. August 2008. Che, David. Water resource management key to Chennai's future. July 18, 2007.

[7] **http://chennai.metblogs.com/2007/07/18/water-resourcemanagement-key-to-chennais-future**. March 2009.

