P: ISSN NO.: 2394-0344 RNI No.UPBIL/2016/67980 VOL-1* ISSUE-11* February- 2017
E: ISSN NO.: 2455-0817 *Remarking An Analisation*

Rain Water Harvesting in Satna (M.P.)

Abstract

Rain water harvesting besides helping meet the ever-increasing demand for water, reduce flood hazards, augment the groundwater storage and control the decline in the water level, improve quality of groundwater and reduce soil erosion This is considered to be an ideal solution for water problem, where there is inadequate groundwater supply or where surface resources are either not available or insufficient. Rainwater is bacteriologically pure,_free from organic matter and soft in nature. The suggested structures of harvesting rainwater are simple, economical and eco-friendly. Previous studies have shown that substance agriculture in hilly region could be successfully transformed into a profit earning enterprise by tapping and utilizing rainwater in limited quantities (Saha et al. 2007).

Archana Nigam
Professor,
Deptt.of Botany,
Govt. Auto. P. G. Collage,
Satna, M.P.

Keywords: Rain Water Harvesting, Water Resources

Introduction

World-wide pressure on water resources is increasing due to population growth, Ground water and climate change. Domestic and agricultural water usage is a Significant component of Water demand. The intensity of drought is increasing year after year for the past six years. The district is facing serious water shortage problem during the summers. The rainwater harvesting can be implemented as a viable alternative to Conventional water supply or on – farm irrigation projects. The water can be stored either in a storage tank or in a soil media as groundwater. The rainwater can be harvested using eco-friendly low cost technologies such as UV-resistant plastic lined ponds ferro-cement tanks, RCC tanks, etc. and used for multiple purposes. An attempt has been to highlights the various rain water harvesting methods that can be used effectively to augment the water supply position in satna district. There is need to change some existing policies relating to water management to tackle the water shortage during scarcity.

Delay in pre-monsoon showers and slow onset of monsoon along with skewed distribution of rainfall in Satna not only leads to serious dislocations, but also causes damage to the crops and also severe water shortage. All this only underscores the need for a scientific and technical approach towards water management, with focus on harvesting and multiple uses of water.

Aim of the Study

So the aim of analysis indicated that establishment of such an integrated system is not only financially viable, but also a highly attractive proposition for low-cost harvesting and effective use of rainwater/run off. Moreover, the studies suggested that these technologies are sustainable, locally adaptable, cost-effective, applicable and affordable to the farmers.

Materials and Methods

Satna - The district Satna is situated between $23^0$58' latitude and $25^0$12' north and longitude $80^0$21' & $8^0$23' east in mid northern part of Rewa. The Data were collected from different sources such as-Irrigation and Public Health Department, Rural Development Department.

Results and Discussion

The study has revealed the following points: The drinking water demand has grown 2.4 times in rural areas and 6.8 times in urban areas in a time period of 50 years (Sharma 2007). The demand will further rise 1.62 times in rural areas as well as urban areas in the next 30 years. The drinking water sources, of 3.2% water supply schemes get affected more than 75%. The drinking water sources of 4.67% schemes get affected between 50 and 75%. The drinking water sources of 6.71% schemes get affected between 25 and 50% and the drinking water sources of 7.33% schemes get affected up to 25%. Thus, the sources of only 22.3% of the piped water supply schemes get affected during summers. During drought years there is massive mobilization of water-tankers in summer months when acute shortage a water is felt. On an average 400 water tankers are deployed to cope up the demand of drinking water during summer in the district.

Most of the water supply schemes, whose discharge gets reduced during summers. Water holding capacity of the soils- is lows Soils are susceptible to excessive soil erosion. The crops experience drought like conditions and consequently the crop yields and discharge of water sources are affected adversely. Baories, dug wells, step wells, khatries and springs are the traditional water harvesting structures that have been used as source of drinking water in this region over the centuries. In many villages these systems have now fallen into disuse with the spread of piped water supply (Sharma 2006). The size of catchments limits the quantity of water collected. The water demand has risen many times. Most of these water sources are highly polluted (Sharma 2004). Every year a huge amount of money is spent by government on installation of new hand pumps in the water scarcity areas. These hand pumps are mostly installed in areas where there is road connectivity.

Rain Water Harvesting-A Viable Alternative

Rainwater harvesting can be implemented as a viable alternative to conventional water supply or small on farm projects. Rainwater harvesting, irrespective for the technology used, essentially means harvesting and storing rainwater in days of abundance, for use during the lean days.

Storing of Rainwater Can Be Done in Two Ways

1. In an artificial storage and
2. In the soil media as groundwater.

A demand-supply analysis is required while designing water-collection tanks. Factors such as amount and frequency of rainfall, run off coefficient of the collecting surface, number of users, daily requirement and dearth period are important for calculating the size and capacity of the storage tank.

In domestic rooftop rainwater harvesting systems, rainwater from the roof of house is collected in a storage vessel or tank for use during the periods of scarcity. Usually these systems are designed to support the drinking and cooking needs of the family at the doorstep. Such a system usually comprises a roof, a storage tank and guttering arrangement to transport water from the roof to the storage tank. In addition, a first flush system to divert the dirty water during the first rains and a filter unit to remove debris and contaminants before water enters the storage tank are also provided. Rainwater can be collected in large quantities in lined ponds for irrigation. HDPE or nylon, or with a semi-permeable coating of clay to reduce the seepage losses.The roof water, run off water (after filtration, for potable/household purposes) or spring water may be diverted to the pond. A large quantity of water, generally 50,000-20,00,000 litre can be harvested using such ponds/which in turn may be used for irrigation or for other household purposes. Moreover, it is durable and easy to construct with less maintenance cost (Samuel & Satapathy 2008).

To design a water-harvesting tank for irrigation purposes, the irrigation requirements of the cultivated crops have to be calculated first the knowledge of factors such as effective rainfall, evapo-transpiration, application efficiency and leaching requirement. Direct evaporation from the water surface in the tank has also to be taken care of and corresponding adjustments can be made in the size of the tank. Normally three types of ponds viz., embankment type, excavated (dugout) and dugout-cum-em-bankment type are constructed for collection of excess run-off.

Three steps are to be followed while designing a water-harvesting pond. These are hydrologic design, hydraulic design and structural design. Hydrologic design involves the estimation of peak rate of run-off volume from the catchments of the pond. The run-off is estimated for a design fre-quency of 25 years (Schwab et al. 1993.).

The hydraulic design includes determination of storage capacity and storage dimensions (length, width and height) of the pond and dimensions of spillway for safe disposal of excess inflow to the pond. Water should flow through the structure safely without overtopping the embankment, and when water leaves the structure is energy should be dissipated. Standard weir formula for determining the crest length is used.

Conclusion

It is found that sipaulin or nylon-lined ponds are more stable and have a longer and useful life. It can be made in any size and is also suitable for multiple uses of harvested water. It has been observed that the cost/litre for collecting rainwater/ spring water in UV-resistant plastic sheets is significantly less compared to other methods such as concrete, brick masonry, ferro cement, fibre-glass, etc. (Samuel & Satapathy 2008).

The water harvested in lined ponds can be utilized for multiple uses, such as irrigation, drinking water for cattle and other livestock, fishery, duckery, etc., thereby increasing its use efficiency.all the financial viability criteria such as IRR, NPV and BCR were found favourable for investment on plastic-lined water-harvesting tanks (capacity >40 m3) integrated-with micro-irrigation system and fish farming (Samuel & Satapathy 2008).

References

1. *Saha, R., Ghosh, P.K., Mishra, V.K. and Bujarbaruah, K.M. 2007. Low cost micro-rainwater harvesting technology (Jalkund) for new livelihood of rural hill farmers. Current Science, 97: 1258-1265.*
2. *Samuel, Manoj, P. and Satapathy, K.K. 2008. Concerted rainwater harvesting technologies suitable for hilly agro-ecosystems of northeast, India. Current Science, 95(9-10): 1130-1132.*
3. *Schwab, G. 0., Fangmeir, D. D., Elliot, W. J. and Frevert, R. K. 1993. Soil and Water Conservation Engineering. John Wiley, NY. pp. 212-213.*
4. *Sharma, M.R. 2006. Status Report on Traditional Drinking Water Sources in HP. Institute of Integrated Himalayan Studies,, Centre of Excellence, H.P. University, Shimla.*