



SUSTAINABLE DEVELOPMENT OF RAINWATER HARVESTING IN DROUGHT PRONE AREA OF MAHARASHTRA, INDIA

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ABSTRACT

Rainwater is the primary source of all fresh water. Rivers, lakes, ponds and ground water are all secondary sources of fresh water as they are all stores and channels of rainwater. So, in order to meet demand, then what we actually need to do is harvest the rain. Water harvesting has aimed at understanding the value of rain and to make optimum use of rainwater at the place where it falls. We have a lot of rain, yet we do not have water. This is because we have rainfall in short spells of high intensity. Due to this intensity and short duration of heavy rain most of the rain falling on surface tends to flow away rapidly leaving very little for the recharge of ground water means harvesting the rain. So it is necessary for users to collect and store rainwater.

Keywords : Rainwater harvesting, Ground water recharge, Sustainable development etc.

INTRODUCTION

Water is becoming a scarce commodity and it is considered as a liquid gold in this part of the country. The demand of water is also increasing day by day not only for Agriculture, but also for household and Industrial purposes. It is estimated that water need for drinking and other municipal uses will be increased from 3.3 MHm to 7.00 MHm in 2020/25. Similarly the demand of water for industries will be increased by 4 fold i.e. from 3.0 MHm to 12.00 MHm during this period. At the same time more area should be brought under irrigation to feed the escalating population of the country, which also needs more water. But we are not going to get one litre more water than we get at present though the demand is alarming. The perennial rivers are becoming dry and ground water table is depleting in most of the areas. In Maharashtra, the depletion is about 30-50m in the last 30-40 years. Country is facing floods and drought in the same year in many states. This is because, no concrete action was taken to conserve, harvest and manage the rain water efficiently. The rainfall is abundant in the world and also in India. But it is not evenly distributed in all places. India being the monsoon country, the rain falls only for 3 to 4 months in a year with high intensity, which results more runoff and soil erosion. Total rain occurs only in about 100 hours out of 8760 hours in a year. It also erratic and fails once in 3 or 4 years. This is very common in many parts of the country. Maharashtra is a drought-prone state. Almost 70 percent of the State's geographical area lies in semi-arid region rendering it vulnerable to water scarcity.

Hence to mitigate water problem / drought etc, there is an urgent need to follow our ancestral way of water harvesting and the latest technologies adopted in Soil and water conservation measures on watershed basis including roof water harvesting etc.

OBJECTIVES

1. To study the tradition of rainwater harvesting in the study area
2. To study the sustainable development of rainwater harvesting in drought prone area of Maharashtra

DATA SOURCE AND METHODOLOGY

The present study is based on secondary data obtained from district Gazetteers, socio economic review of Satara district and Central Ground Water Board 2000 Guide on Artificial Recharge to Ground Water in India.



THE STUDY AREA

Although Maharashtra is one of India's most developed states, a large part of its population suffers severe and chronic water scarcity. The problem is not generally experienced or even realised in upper middle class enclaves of cities like Mumbai and Pune. However, as you move away from these privileged areas, women walking or standing in queue to collect water is a familiar sight across the state.

Drought Prone regions of Maharashtra

In the drought prone region of Maharashtra every year number of villages where the water is required to be supplied with the help of tanker service is increasing. The minimum annual rainfall in Maharashtra is of the order of 400 mm. which means every square kilometer of Maharashtra land receives four-lakh cubic meter (400 million liters) of water. Considering this availability of water and the density of population of Maharashtra (average) it may become clear that for densities as high as 1000 persons per square kilometer the requirement of water will be of the availability of water; the problem is related to collection, storage and management of available water. In the management of water, self – help is the best help. Simple and chip methods of harvesting rainwater, through house rooftops, small check dams, farm ponds are drastically transforming lives in Indian villages.

In nearly 70% of the state's villages (around 27,600 villages), water is either not available within 500 metres or is not available 15 metres below the ground. Or it is not potable (World Bank, Promoting Agricultural Growth in Maharashtra, Volume 1, 2003, henceforth WB-AGM).

Around a fourth of the state's rural households do not have secure access to drinking water (NSSO 1999), and nearly half the rural households in the state do not get safe drinking water.

Tradition of Rainwater Harvesting

Evidence of irrigation with water harvesting system can be found in Kautilya's Arthashastra, written in the 3rd century BC. The book indicates that people knew about rainfall regimes, soil types and irrigation techniques. Archeological and historical records show that Indians were constructing dams, lakes and irrigation systems in the time of Chandragupta Maurya (321-297 BC.). Indians over centuries developed a range of techniques to harvest every possible form of water – from rainwater to groundwater, stream to river water, and floodwater. Indians over centuries developed a range of techniques for harvesting every possible form of water, from rainwater, stream and river water as well as floodwater. They are having tapped water from hill streams or springs known as kuhls carrying a discharge of 15-100 liters per second. In Meghalaya, a 200-years old system of tapping stream and spring water for irrigating plants by using bamboos still exists.

Numerous dams (bandharas) of a permanent or temporary nature, earthen or masonry were built across rivers and streams in Maharashtra. These structures would raise the water level to enable water to be channeled to field through canals, or impound water to form a large reservoir. They were found especially in the hilly areas of Khandesh and Nashik districts, in the upper reaches of rivers and streams, and also in Solhapur, Ahemadnagar, Kolhapur, Satara and Pune.

More than 70,000 percolation tanks have been built in Maharashtra after the severe drought of 1971-72. All such small catchments of percolation tanks have been converted into green patches. Underground bandharas have been constructed in various parts of Maharashtra, viz. 87 tehsils of DPAP areas with 400-700 mm annual rainfall located in parts of Sangli, Satara, Pune, Sholapur, Ahmednagar, Nashik, Aurangabad, Usmanabad, Beed and Buldana.

Sustainable Development of Rainwater Harvesting in Drought Prone Region

- Rainwater harvesting systems can provide water at or near the point where water is needed or used. The systems can be both owner and utility operated and managed. Rainwater collected using existing structures (i.e., rooftops, parking lots, playgrounds, parks, ponds, flood plains, etc.), has few negative environmental impacts compared to other technologies for water resources development. Rainwater is relatively clean and the quality is usually acceptable for many purposes with little or

even no treatment. The physical and chemical properties of rainwater are usually superior to sources of groundwater that may have been subjected to contamination.

- Rainwater harvesting and artificial recharge of ground water has been advocated and practiced in the hard-rock regions of Maharashtra to arrest falling ground water table. Per capita consumption of water has increased with respect to time and water requirements for agriculture, industrial and recreational needs have also increased with the same pace.

- Percolation tanks have special value in Maharashtra drought prone areas of holding up the ground water but after the monsoon season. It has now been accepted that construction of such percolation tanks would be an essential part of drought prone area amelioration programme. Such programmes will not give the maximum benefit unless the downstream open wells are constructed and as far as possible facilities should be given to the small and marginal farmers to utilise the ground water from the percolation tanks.

- Committee in its discussions with the Maharashtra authorities came across a peculiar feature. Dr. V. S. Page who has done a lot of rural development in Maharashtra mentioned that he had identified more than 3000 reservoirs and percolation tanks in the drought prone areas of Maharashtra which hold water, but that water is not now being utilised for irrigation. He suggested that the Committee should look into this problem. It is not unlikely that a similar situation exists in other parts of the country. The Committee recommends that immediately the present stage of use of the reservoirs in the various drought prone areas, the system of reclamation and the cropping pattern may be investigated quickly and at least within the next year a proper plan of maximising the use of such water drawn up. Planning and execution of integrated programmes for optimum use of land and water on watershed basis.

- The farm pond system has been advocated in the agriculture strategy for low rainfall areas for long years now. Substantially, in black soils (Vertisols) a farm pond has been recommended as an important auxiliary for supplemental water. Many States have already experienced with the system and must be having substantial experience in the cost benefit of the structure.

- In rain water harvesting three different groups of techniques are distinguished: (1) flood water harvesting from far away, large catchments, (2) rainwater harvesting from macro catchment systems utilising the runoff from a nearby slope for agricultural purposes (with or without interim storage) and (3) rainwater harvesting from micro catchments, where the water from an adjacent, small catchment is used for cropping. It is evident, that all three groups of water harvesting techniques need different geographic settings to be implemented. Besides the topography, the runoff conditions of the surface, the infiltration rates, the soil types of the run-on areas and the depth of the soil layer in the cropping areas are among the most important natural parameters for the implementation of any water harvesting system. Additionally, socio-economic factors have to be taken into due consideration.

- In the rainfed regions, the ultimate source of surface and ground water resources is the precipitation. It is very essential to carefully handle and store the runoff generated through rainfall in surface and ground water storage structures. The following Centrally Sponsored programmes/schemes/projects are being implemented with the assistance of Government of India for rainwater harvesting, conservation and recharging the aquifers during the X Five Year Plan (year 2002-03 to 2006-07) and XI Five Year Plan (2007-08 to 2011-12) periods:

1. Artificial Ground Water Recharging Scheme (AGWRS)
2. Integrated Watershed Management Programme (IWMP)
3. National Watershed Development Project for Rainfed Areas (NWDPA)
4. Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)
5. Rashtriya Krishi Vikas Yojana (RKVY)
6. National Food Security Mission (NFSM)
7. National Horticulture Mission (NHM)
8. Entry point activities for water harvesting structures under National Afforestation Programme (NAP) of Ministry of Environment and Forests

CONCLUSIONS

It is very important to make water everybody's business. It means a role for everybody with respect to water. Every household and community has to become involved in the provision of water and in the protection of water resources. Make water the subject of a people's movement. It means the empowerment of our Urban and Rural community, i.e., to manage their own affairs with the state playing a critical supportive role. Further involving people will give the people greater ownership over the water project including watershed development, Soil and Water conservation and water harvesting will go a long way towards reducing misuse of government funds. It will also develop the ownership (own water supply systems), they will also take good care of them. In this way it is possible to solve water problems facing the county in the 21st century.

Rainwater harvesting practised at the level of watershed management has done — and is still doing — a lot to improve the water situation in several districts in Maharashtra. The watershed is divided in many micro watersheds and rainwater is stopped and infiltrated into the soil of each one of them, starting from the top and going down into the valley. The groundwater reserves are recharged, which provides water for both, people and nature at the watershed level. This simple technology should be accompanied by training, along with work to reinforce the population's capacity to think and act for the common benefit.

Multiple Benefits Rainwater Harvesting in Drought Prone Region

- Reduction in the soil erosion as the surface runoff is reduced
- Decrease in the choking of storm water drains and flooding of roads
- Saving of energy, to lift ground water. (One-meter rise in
- Water level saves 0.40-kilowatt hour of electricity)
- Rainwater harvesting in urban and rural areas offers several benefits including provision of supplemental water, increasing soil moisture levels for urban greenery, increasing the groundwater table via artificial recharge, mitigating urban flooding and improving the quality of groundwater.

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