A Rain Water Harvesting of Hilly Region with Special References to Patan Tahsil of Satara District (Maharashtra)

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Introduction

At the dawn of a new century we are at a critical juncture in the area of water management. According to the report of the world commission on water for the 21 century, renewable blue water flows will be insufficient to meet all Industry, Domestic and agriculture needs by 2020, Primarily due to growing water pollution, population growth, urbanization and in appropriate management practices A new generation of water managers is needed with new mindset that can develop and implements innovative policies and practices Many governments International institutions and experts have started to address the urgent need to establish new development agenda in the field of water management. Water management can defined as the discipline that seeks the proper balance between the demand for water and the availability of water with the satisfaction of political, sociological, economic environmental and ecological consideration. The crops per drop implications of supplemental irrigation in rainwater farming systems experiencing temporally unreliable rainfall are very large. This paper focuses on the hilly tehsil of satara district. There is need for the Conservation of rain water for the Future

Study Region

As of 2001 India census, Patan had a population of 11,619. Males constitute 52% of the population and females 48%. Patan has an average literacy rate of 78%, higher than the national average of 59.5%: male literacy is 83%,and female literacy is 73%. In Patan, 12% of the population is under 6 years of age.Patan, (Patan T; 17° 20' N, 73° 50' E; RS Karad 24 m. SE; p. 3,630) on the Karad-Kumbharli road at the junction of the Koyna and Kera rivers about twenty-five miles south-west of Satara was formerly a sub-divisional head-quarters. The town consists of two parts (i) Rampur and (ii) Patan. The Patankar family was originally in twobranches, of which the elder branch alone flourished. The younger branch represented by Hanmantrav resided in Rampur. His mansion, a fine large house was completely destroyed by fire in 1874. Next to it on the south is the mansion of Sardar Nagojirav Patankar, a first-class sardar and honorary magistrate who exercised civil jurisdictionin his area. The mansion with strong high stone walls and ramparts and a gateway flanked by bastions, is well maintained. A rose plantation garden has been laid out close to it. The Patankars were the deshmukhs under the Marathas of the whole surrounding district and had charge of Dategad fort three miles to the north-west. During the struggles between the Peshvas and the Pratinidhis they did pretty much what they pleased.

Objective

1. To study the storage capacity of rain water in patan tahsil.
2. To study the increase available water of dry season in patan tahsil

Methodology

In this research Secondary data is rainfall from Tahsil office of patan for last 20 years (1991 to 2011) physiographical information is collected through Iso, one inch toposheet maps and climotiological data is collected from various weather stations mounted study region.

Results and Discussion

Water is one of the most important natural resources and basic need of mankind. Water resources are important for any country. Proper use and conservation of water resources is important aspect for every citizen of country. Fresh water supply, and water management is also important.

There is 1869 billon cubic meter water quantity available in India and utilization of total water is 1122 billon cubic meter every year in India. There are 6 lakhs 39000 villages in India and every year new villages are increasing. Yet more than 4000 villages are waiting for average facilities for fresh water supply. Indian population is increasing day by day. This resulted in increasing in demand of fresh water. Misuse we of fresh water in every sector is also increasing day by day and it course causes serious problem like of fresh water.

So to solve this problem there should optimum, correct management of portable water be done. There is 71% of water on the earth surface. This water is available in various water forms like – Ocean, Sea, Rivers, Lake, Wells, etc.

Population explosion, it's effect is global warming, pollution are responsible in imbalance of environment and its direct effecting an amount of rainfall, irregularity in precipitation which of rain cause water scarcity in summer season.

International Status -:

It is needed that all the people in the world should be provided with clean & healthy water supply. For this

purpose the proper management about the use of water & its supply is necessary. Each drop of water is worth saving. It is necessary to preserve the natural resources of water in the environment. To protect and develop these natural resources already available become important task in preservation of water. The water must be neatly covered up, it should be purified with the help of germicides and should be distributed through the pipelines from lakes, rivers etc. To prohibit the pollution of water is also to preserve it.

On earth these is 141 crores cubic km of the saturation of water available but 97% of the water is salted water and 2% is in the form of solid ice. Only 0.9% of the water is worth drinking of can be utilized by living being and trees and crops. This 0.9% of water available in the from rivers and lakes etc. A person needs five liters of water per day. Daily every person needs 40 liters of water for various purposes. In last 30 years the use of water as been increased to great extent.

National Status:

Indian population has grown up beyond limits. That's why the demand for drinking water is increased as well. In India there is each imbalance of nature on a large scale. In india from June to September the rainy season occurs. In summer the saturation of water decreases and in some regions there is a scarcity of water on a very large scale.

These are so many uses of water as well. For day to day use and fulfil necessary needs water is required. Drinking water needs to be purified. We should also take care so has to prohibit the pollution of water. The proper management of water leads to enhancement of the quality of water. It is necessary that we should preserve water which is available in a rainy season and use it in summer when there is scarcity.

Water is useful for drinking and cooking purposes mainly. On earth water is available amply but the distribution of water is not even across the all regions of the world. Where there is drinking water amply available, there is no question of scarcity of water. But where these are a less saturation of water, there the problem of water is very severe and serious. In India so many villages are affected with the scarcity of water.

Significance of the study:-

As compared to world. There is very less amount of water available in India. In Maharashtra availably of water is less and distribution of water in Maharashtra done through taluguas is very unequal.

Fresh portable water is a basic need fresh water is also important for healthy life but many villages of India are not getting fresh portable water. Bharat Nirman Yogna in 1991, Rajiv Gandhi Rashtriya Paygal Abhiyan in 2001, by Prime Minister are made to make people aware of the value of water 24 March is declared on the world level the water preservation day. The basic needs of human being; in order to fulfil this primary need the research project is being attempted.

Rainfall in Patan Thasil:

Sr.no	Year	Rainfall in M.M
1	1991	4932
2	1992	4604
3	1993	5693
4	1994	7400
5	1995	3790
6	1996	3653
7	1997	5476
8	1998	3716
9	1999	4582
10	2000	3593
11	2001	3369
12	2002	2748
13	2003	2552
14	2004	3888
15	2005	5557
16	2006	7453
17	2007	6072
18	2008	4692
19	2009	4297
20	2010	3824
21	2011	5530

Table 1: Yearly Rainfall Data 1991 to 2011

Sr.no	Dam	Storage capacity
1	Wang	77.29 m.c
2	Morana	39.55 m.c
3	Uttermand	25.65 m.c
4	Tarali	5.85 m.c
5	Deughar	337.21 m.c
6	Koyana	105 tmc
7	extra	600 m.c

Table 2: Water Storage Capacity in Patan Tahsil

Importance of Rain water harvesting:

Patan tahsil are most impotant factor on development of Satara district. Patan tahsil depend on agriculture and agriculture are depend in water .most rainfall occurring in patan tahsil average rain fall in 2011 is 5530 mm but storage capacity is very small various water wastage so need the water harvesting

Benefits of Rain water harvesting:

1.Water harvesting can serve as a supplement to municipal water. In times of low water availability, water held in catchment may be used for gardening or other non-potable needs.

2.Using harvested water contributes to water conservation and reduces water demands in urban areas.

3.Rain water harvesting can reduce storm drainage load.

4.Rain water harvesting technologies are flexible and can be built to meet almost any requirements; construction, operation and maintenance are not labour intensive.

5. Some building divert rainwater to help with functions such as toilet flushing

Methods of Rainwater Harvesting :

Rainwater harvesting is a technology used for collecting and storing rainwater from rooftops. The land surface or rock catchments using simple techniques such as jars and pots as well as more complex techniques such as underground check dams. The techniques usually found in Asia and Africa arise from practices employed by ancient civilizations within these regions and still serve as a major source of drinking water supply in rural areas. Commonly used systems are constructed of three principal components namely the catchment area, the collection device, and the conveyance system.

A) Catchment Areas:

Rooftop catchments: In the most basic from this technology, rainwater is collected in simple vessels at the edge of the roof. Variations on this basic approach include collection of rainwater in gutters which drain of the collection vessel through down-pipes constructed for this purpose and the diversion of rainwater from the gutters to containers for sittling particulates before being conveyed to the storage container for the domestic use. As the rooftop is the main catchments area,the amount and quality of rainwater collected from roofs constructed with galvanized corrugated iron, aluminium or asbestos cement sheets, tiles and slates, although thatched roofs tied with bamboo gutters and laid in proper slopes can produce almost the same amount of runoff less expensively (Gould,1992). However, the bamboo roofs are least suitable because of possible health hazards .Similarly roofs with metallic paint or other coatings are not recommended as they may impart tastes or colour to the collected water. Roof catchments should also be cleaned regularly to remove dust leaves and bird droppings so as maintain the quality of the product water (figure :1)

Land surface catchments: Rainwater harvesting using ground or land surface catchment areas is less complex way of collecting rainwater. It involves improving runoff capacity of the land surface through various techniques including collection of runoff with drain pipes and storage of collected water. Compared to rooftop catchments techniques, ground catchments techniques provide more opportunity for collecting water from a larger surface area. By retaining the flows(including flood flows)of small creeks and streams in small storage reservoirs(on surface of underground)Created by low cost (e.g., earthen) dams ,this technology can meet water demands during dry periods. There is a possibility of high rates of water ions due to infiltration into the ground and because of the often marginal quality of the water collected, this technique is mainly suitable for storing water for agricultural purposes. Various techniques available for increasing the runoff within ground catchment areas involve: i) clearing or altering vegetation cover ,ii)increasing the land slope with artificial ground cover, and iii) reducing soil permeability by the soil

Clearing or altering vegetation cover: Clearing vegetation from the ground can increase surface runoff but also can induce more soil erosion. Use of dense vegetation cover such as grass is usually suggested as it helps to both maintain an high rate of runoff and minimize soil erosion.

Increasing slope: Steeper slopes can allow rapid runoff and rainfall to the collector. However, the rate of runoff has to be controlled to minimize soil erosion from the Catchment field. Use of plastic sheets, asphalt or tiles along with slope can further increase efficiency by reducing both evaporative losses and soil erosion. The use of flat sheets of galvanized iron with timber frames to prevent corrosion was recommended and constructed in the State of Victoria, Australia, about 65 years ago (Kenyon, 1929; cited in UNEP, 1982).

Soil compaction by physical means: This involves something and compacting of soil surface using equipment such as graders and rollers. To increase the surface runoff and minimize soil erosion rates, conservation bench terraces are constructed along a slope perpendicular to runoff Flow. The bench terraces are separated by the sloping collectors and provision is made for distributing the runoff evenly across the field strips as sheet flow. Excess flows are routed to a lower collector and stored (UNEP, 1982).

Soil compaction by chemical treatments: In addition to clearing, shaping and compacting a catchment area, chemical applications with such soil treatments as sodium can significantly reduce the soil permeability. Use of aqueous solutions of a silicone-water repellent is another technique for enhancing soil compaction can induce greater rates of soil erosion and may be expensive. Use of sodium-based chemicals may increase the salt content in the collected water, which may not be suitable both for drinking and irrigation purposes.

B) Collection Devices

Storage tanks: storage tanks for collecting rainwater harvesting using guttering may be either above or below the ground precautions required in the use of storage tanks include provision of an adequate enclosure to minimize contamination for human animal or other environmental contaminants and a tight cover to prevent algal growth and the breeding of mosquitoes. Open containers are not recommended for collecting water for drinking purpose. Various types of rainwater storage facilities can be found in practice. Among them are cylindrical firrocement tanks and motor jars. Small-scale enterprises and donor agencies .The introduction and rapid promotion of Bamboo reinforced tanks, however, was less successful because the Bamboo was attacked by termites, bacteria and fungus. More than 50000 tanks ware built between 1986 and 1993 (mainly in Thailand and Indonesia

) before a number started to fail , and by the late 1980 , the Bamboo reinforced tank design , which had promised to provide an excellent low – cost alternative to ferrocement tanks , had to be abandoned.

C) Conveyance Systems

Conveyance Systems are required to transfer the rainwater collected on the rooftops to the storage tanks. This usually accomplished by making connection should be given to the fact that, when it first starts to rain, dirt and debris from the rooftop and gutters will be washed into the down – pipe. Thus, the reality clean water will only be available some time later in the storm. There are several possible choices to selectively collect clean water for the strong tank. The most common is the down- pipe, flap. With this flap it is possible to direct the first flush of water flow through the down- pipe , whil later rainfall is diverted into a storage tank. When relatively clean water can be collected. A great disadvantage approach would be to automate the opening of the flap as described below. A funnel- shaped insert is integrated into the down-pipe system. Because the upper edge of the funnel is not in direct contact with the side of the down-pipe, and a small gap exists between the down-pipe walls and the funnel, water is free to flow both around the funnel and through the funnel. When it first starts

Cultural Acceptability

Rain water harvesting is an accepted freshwater augmentation technology is Asia while the bacteriological quality of rainwater collected from ground catchment is poor that from properly minted rooftop catchment systems, equipped with storage tanks having good covers and taps is generally suitable for drinking and frequently meets, who drinking water standards such water generally is of higher quality than most traditional and many of improved water sources found in the developing world. Contrary to popular beliefs rather than becoming stale with extended storage.

Specification:

Maintenance is generally limited to the annual cleaning of the tank and regular inspection of the gutters and down pipes, maintainers typically consists of the removal of dirt laves and other accumulated materials, such cleaning should take place annually before the start of the major problems and should be repaired immediately, in the case of ground and rock catchment additional care is required to avoid damage and contamination by people and animals and proper fencing is required

Advantage:

Rainwater harvesting technologies airs simple to install and operate. Local people can easily retrained to implement such techno legs and construction materials are also readily available, rainwater harvesting is convenient in the since that it proved water at the point of consumption and family members have pull control of their own systems which greatly reduces operation and maintenance problems .Running costs are almost negligible. Water collected from roof catchments usually is of acceptable quality for domestic purposes. As it is collected using existing structures not specially constructed for the p[purpose rainwater harvesting has few negative environmental impacts compared to other supply project technologies, although regional or other local factors can modify the local climatic conditions rainwater can be a contentious sources of water supply for both the rural and poor. Depending upon household capacity and needs both the water collection and storage capacity may be increased as needed within the available catchment area.

Effectiveness of technology

The feasibility of rainwater in a harvesting in a particular locality is highly dependent upon the amount and intensity of rainfall. Other variables, such as catchments surface, usually can be adjusted according to house hold needs. as rainfall is usually unevenly distributed throughout the year, rainwater collection methods can serve as only supplementary sources of household water. The viability of rainwater harvesting systems is also a function of the quantity and quality of water available from other sources, household size and per capita water requirements and budget available. The decision maker has to balance the total cost of the project against the available budget, including the economic benefit of concertizing water supplied from sources, likewise the cost of physical and environmental degradation assonated with the development of available alternative sources should also be calculated add added to the economic analysis.

If rainwater is used to supply household appliances such as the washing machine even the tinsel particles of dirt may cause damage to the machine amend the washing. To minimize the occurrences of such damage it is advisable to install a fine filter of aspen which is used drinking water systems in the supply line upstream of the appliances. For use in wash basins or bath tubes, it is advisable to sterilize the water using a chlorine dosage pump.

Conclusions:

Harvesting rainwater in Patan Tashsil will be useful for the following purposes during dry season & it will save unnecessary wastage of money in making water available during summer.

1.Drinking Water
2.Agriculture
3.Industry
4.Household Work (washing & cleaning etc)

References:

Satara Gazetteer
Water management books
Internet.(www.water manangement. com)
Irrigation department in Patan