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“ A GEOGRAPHICAL ANALYSIS OF ROOFTOP RAINWATER HARVESTING IN MALSHIRAS TAHSIL “

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ABSTRACT:

Water is the most important natural resource on the earth surface. 71% area of the earth is covered by water. Out of these 97.41% water on the earth is concentrated in ocean, which is salty and not useful for domestic and commercial purpose. Remaining 2.5% water is in the form of ice, atmospheric water and fresh water. Only 0.20% water is fresh water which is available for all types of human activities and also for others.

As water is very important for life. It is essential to supply them throughout the year. For that we have to collect and store it in rainy season and use it in dry season. Rain water harvesting is the only way one can collect and store the rain water and then it can be used in scarcity period. In this view the present paper aims to measure the potential of rooftop rain water harvesting in Malshiras Tahsil.

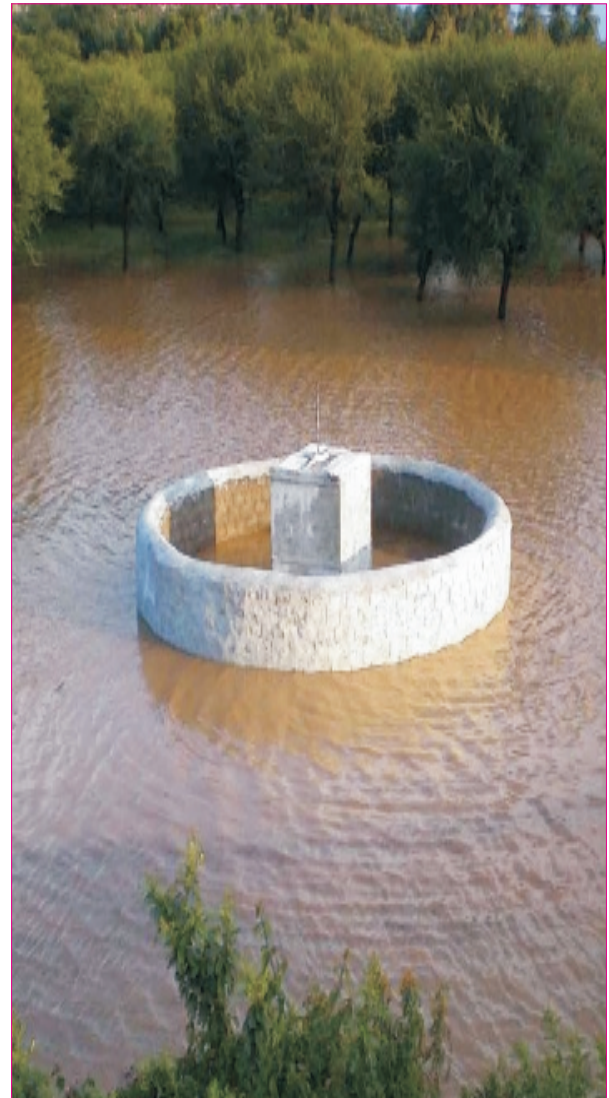
KEYWORDS: Rain water harvesting , scarcity, domestic , commercial.

INTRODUCTION:

Water is important basic need of life on the earth. It exists in solid, liquid and vapour form. For human being it is required for drinking , washing & for domestic animals. Hence it should be sufficient in quantity and at the same time it should be clean and pure. According to Indian standards 135 litres of clean and pure water is required for a person for a day.

Rainfall is the main source of water supply for all types of living beings and also human activities. It is not received daily and not distributed evenly throughout the year. Rainy days are the only days of the year when water is received. But these days are very less . Due to this we experience shortage of water in dry season. For that we have to collect and store it in rainy season and use it in dry season. Rain water harvesting is the only way by which one can collect the rain water.

Rain water harvesting is a technique of collection and storage of rain water into natural reservoirs ,



tanks or the infiltration of surface water in to subsurface aquifers. India has a long traditional of rain water harvesting. But now a days the problem of scarcity of water is more acute. Demand of water is increasing day by day with increase in population. According to Ministry of Water Resource, water shortage in India will become more pervasive by 2025.

The term water harvesting is first described by Geddes 1963 as “the collection and storage of any form of water either runoff or creak flow for irrigation. There are many evidences shows that people in ancient period tried to harvest the water and different types of harvesting structures were developed according to rainfall and ecological condition of the region. Rain water harvesting can be classified into two types.

- 1- Open surface rain water harvesting.
- 2-Rooftop rain water harvesting.

STUDY AREA_

Malshiras tahsil is one of the tahsil of solapur district of Maharashtra state. It is located in the western part of solapur district. Malshiras is located in 74° 45/ E to 75° 16,/E longitude and 17° 40/ N to 17° 56/ N. Latitudes. It is bounded by Pandharpur to the east, sangola to the south , man tahsil to the west and Indapur tahsil to the north.



OBJECTIVES_

- 1-To find the potential of rooftop rain water in malshiras tahsil.
- 2-To study how much runoff of rooftop rain water is in sample villages.
- 3-To analyze the potential of harvested rain water to recharge the ground water.

METHODOLOGY AND DATABASE_

The present study based on field work and secondary information collected from related departments. A general survey of village is carried out to get a rooftop area of houses. Following formula is use to find out of the potential of rooftop rain water.

FORMULA-

$$P = R \times A \times C_r$$

ROOFTOP RAINWATER HARVESTING - (RTRH)

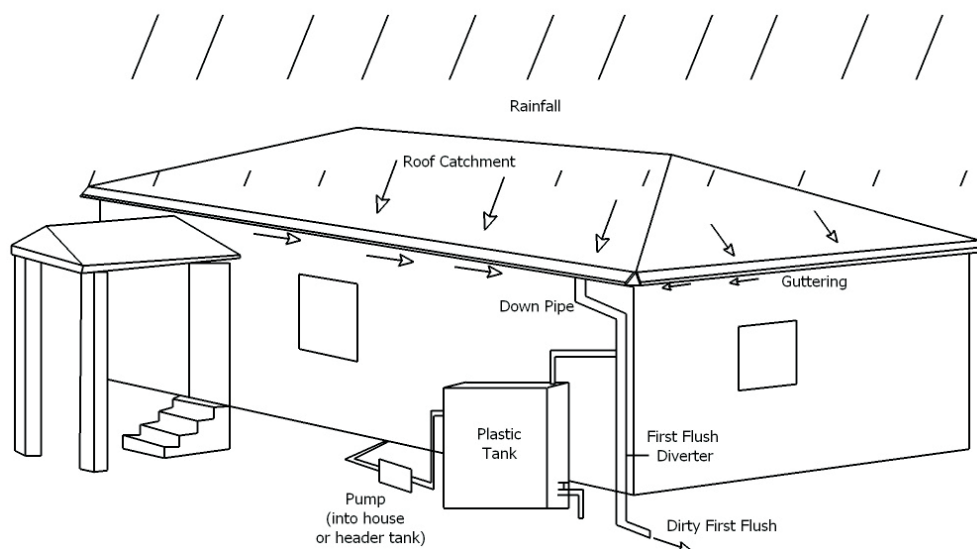
If the roof of the houses, buildings are used to harvest the water then it is termed as rooftop rain water harvesting. The roofs of the buildings are small as compare to open surface. This method requires less capital hence people can adopt this method to store the rain water. Educational sector , industrial sector can also adopt this method for supplying , drinking, cleaning and gardening etc. The water collected from roofs is generally in pure form. Hence it did not require any purification method except boiling. It also minimise the

strain on water supply department like grampanchayat , municipal council. This type of harvesting can be applied anywhere i, e, in heavy rainfall , less rainfall region and stored water can be used in dry season.

ROOFTOP RIAN WATER HARVESTING SYSTEMS_

There are number of method to collect and store rooftop rain water . In domestic rooftop rain water harvesting system, rainwater from the house roof is collected in a storage tank and used for domestic purpose in a scarcity period. Following are the components of rooftop rain water harvesting.

- 1- Catchment.
- 2- Gutters.
- 3- Downpout .
- 4-Filter.
- 5- First flushing.
- 6- Storage tank.



1)_CATCHMEENT The roof of houses cab be used for catchment. The catchment of the water harvesting system is a surface which directly . receive the rain water. A roof is made up of by iron sheet , cement concrete , tiles etc.

2) GUTTERS Gutters are the channels to collect and transport rain water to the storage tank. Gutters can be semi-circular , rectangular and it is made up of locally available material such as plain galvanised iron sheet. PVC material , bamboo or betel tank. The size of the gutter should be depend upon the flow during the higher intensity rain.

3)DOWN PIPE It carries rain water from the gutters to the storage tank. It is joined with the gutter and storage tank. PVC pipes of 2 to 3 inch diameter is used for downpipes.

4) FIRST FLUSHING A first flush system can be incorporated in the rooftop rain water harvesting system to dispose off the first flush water. So that it does not enter the tank.

5) FILTER The filter is used to remove pollutants from rain water collected over roof. A filter is filled with filtering material such as fibre , course sand and gravel layers to remove debris from water.

6) STORAG TANK The water collected from rooftop is stored in storage tank. Depending on space availability , tank could be constructed above ground , partly ground or fully underground. Some maintenance measures are required to ensure the quality of water stored in the container. While constructing a storage tank number of factors should be considered carefully like number of family members , mean monthly rainfall , type and area of roof , duration of scarcity and status of available water resources.

Advantage and Disadvantages of Rooftop Rain water Harvesting

ADVENTAGE- There are some advantages of Rooftop Rain water harvesting.

- 1_ The construction of rain water collection system is very easy. Any one can build the collection system by the locally available material.
- 2_ Water is easily accessible by rain water harvesting system.
- 3_ The construction is easy and cheap in maintenance.
- 4_ Rainfall is in purest form so it can be easily used for domestic purpose.
- 5_ It can be undertaken any type of climate.
- 6_ It can be reduces erosion , contamination of water with pesticide , sediment etc.
- 7_ Excellent source of water for irrigation with no chemicals.
- 8_ Promotes water and energy construction.
- 9_ Rise in groundwater level.
- 10_ Rain water harvesting technique has few negative environmental impact as compare to other technique.
- 11_ Provid self sufficiency to water supply.
- 12_ Rooftop rain water harvesting is less expensive.
- 13_ Mitigate the drought effect and achieve drought proofing.

DISADVANTAGES

- 1) The system needs some maintenance particularly in terms of cleaning.
- 2) Stored water can be polluted by leaf debris birds so particular care should be taken.
- 3) The supply of water from collection system is not only limited by amount of rainfall but also by the size of storage facilities.
- 4) Drought or long periods of time with no rain can cause serious problems of supply of water.
- 5) Rain water collection system require high initial investments.

Potential of Rooftop Rain water Harvesting in Malshiras Tahsil.

The potential of rain water from the roof is referred to the annual yield from a given roof area. Annual yield means the quantity of water collected from a given roof over a one year including all the rainy days. Potential of rooftop rain water harvesting in Malshiras tahsil is calculated by following formula.

FORMULA

$$P = R \times A \times Cr$$

Where

P = Potential of rooftop rain water in lit.

R = Annual rainfall in mm.

A = Area of rooftop in sq.mts.

Cr = Co-efficient of runoff.

For Co-efficient of runoff (Cr) following Standards are used.

Table 1.1

Sr. No.	Type of roof	Co-efficient
1	Roof of steel sheet	0.9
2	Roof of Asbestos	0.8
3	Roof of Tiles	0.75
4	Roof of Cement	0.7

Table 1.2
Potential of Rooftop Rainwater Harvesting in sample villages of Malshiras Tahsil.

Sr. no	Name of village	population	No of houses	Rainfall in mm.	Roof area in sq.mts	Potential of water cu m.
1	Akluj	34583	7371	622	Kaularu 4010.82 Sheet 283499.46 Cement 117476.0	1871.04 158702.99 51149056.62
2	Babhulgaon	1643	306	585	Kaularu 1484.42 Sheet 4405.68 Cement 3001.11	651.82 2319.59 1228.95
3	Bondale	1764	486	525	Kaularu 3253.38 Sheet 5705.80 Cement 4896.80	1281.01 2695.99 1799.57
4	Girvi	3326	609	609	Kaularu 3253.60 Sheet 9592.94 Cement 4692.82	1544.64 5465.09 2080.71
5	Maloli	5276	1013	646	Kaularu 5130.50 Sheet 11952.47 Cement 13643.70	2485.72 6949.16 6169.68
6	Mandave	6629	1207	633	Kaularu 6080.44 Sheet 13568.88 Cement 9110.86	2886.68 7730.19 4037.02
	Total	53221	11010	3644	504762.7	51358955.93

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