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WATER CONSERVATION: RAIN WATER HARVESTING PROJECT FOR COLLEGE CAMPUS

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Abstract: *The paper discusses rainwater-harvesting implementation at an educational institute from rural part of Maharashtra. The authors have carried out the research work in the year 2018-19 & 2020. The selected institute belongs to an drought prone area hence it is considered to be useful research for the water conservation efforts taken by government and other private entities. Initially all relevant data has been collected through various verifiable sources and is used for optimization of rainwater harvesting task. The data collected was number of Students, no of bore well, roof area, average rainfall and coefficient of runoff. Then product of roof area, average rainfall and coefficient of runoff etc. The implementation part is helpful for minimizing the duplication of ground water table. The ultimate aim of the work is to reduce the dependency of occupants on other water resources.*

Key Words: **Rainwater harvesting, Quantity of rainwater collection, Bore well recharge.**

1. INTRODUCTION

Rain water harvesting is well-known system for water conservation. In the present work rain water is collected from roof top of all buildings of an engineering college Tuljapur Dist. Osmanabad (India). This area falls under hot and dry climate zone and Osmanabad district is drought prone district of Maharashtra state. Water scarcity is existing in hot summer season for four months every year. The rainfall intensity is varying every year from 400 mm to 900 mm from past data. It's important to increase availability of water in summer season the collection storage and well recharge are technique implemented in this paper. The following graphs shows the location of Tuljapur in Maharashtra state.

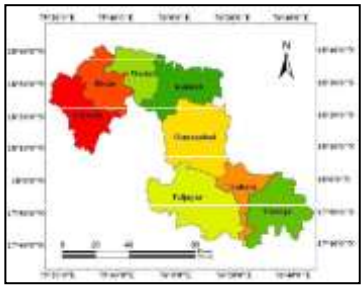

Fig. 1 location of Tuljapur City.

2. Literature Review

(Morey et al., 2016) *they publish a paper, "Rain Water Harvesting System", in April 2016*, evaluated that Over the years of the rising population practices that increase demand of water supply have growing industries and the expansion of agricultural.

(College, 2013) *published paper, "Rooftop Rain Water Harvesting for Groundwater Recharge inan Educational Complex",in 2013,*they evaluate the rainwater harvesting locally collects and stores rainfall through different technologies, for future use to meet the demands of human consumption or human activities.

(Julius et al., 2013), *publish paper on, "Rainwater Harvesting (RWH) - A Review", in Aug 2013*, stated that As the world population increases, the demand increases for quality drinking water. Surface and groundwater resources are being utilized faster than they can be recharged.

(Mahajan et al., 2016) *"Economic Aspects Of Rainwater Harvesting, A Case Study On D.Y.Patil Knowledge City" in Dec 2016,* studied that the proper plan and assessment of a water collecting framework is important to enhance framework execution and the soundness of the water supply. The principle plan parameters of a water gathering framework are precipitation, catchment range, accumulation proficiency, tank volume and water request. Its operational parameters incorporate water utilize effectiveness, water sparing proficiency and cycle number.

(Access et al., 2011) *in research article, "Rain Water Harvesting and Ground Water Recharging in North Western HimalayanRegion forSustainable Agricultural Productivity", in 2010*reveals the study of low cost traditional water harvesting structures that helps in improving thesocio-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.

3. Methodology:

As a part of background information rainfall details of Osmanabad have been collected. The following figure shows four zones as zone-I high rainfall, zone-II transition zone, zone-III average rainfall, zone -IV assure rainfall zone. The osmanabad district under zone IV.

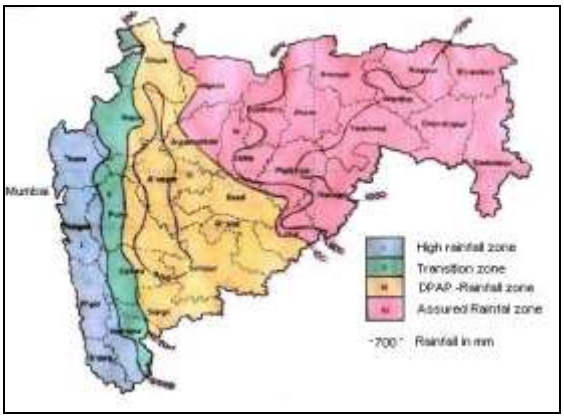

Fig. 2Rainfall zones in Maharashtra state

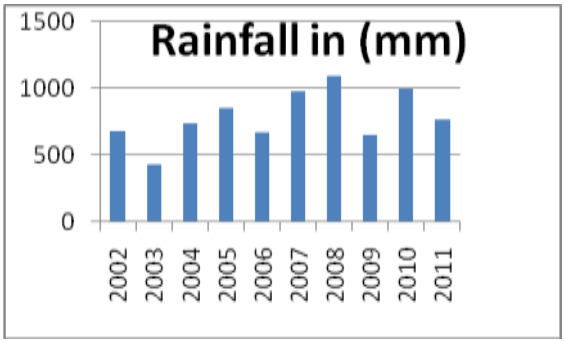

Fig 3.Graphical representation of average annual rainfall of Tuljapur City.

The following figure shows the layout plan of college campus building and hostel buildings rainwater from roof top is to be collected from all buildings. Tis covers land area of 17.22 Acers.

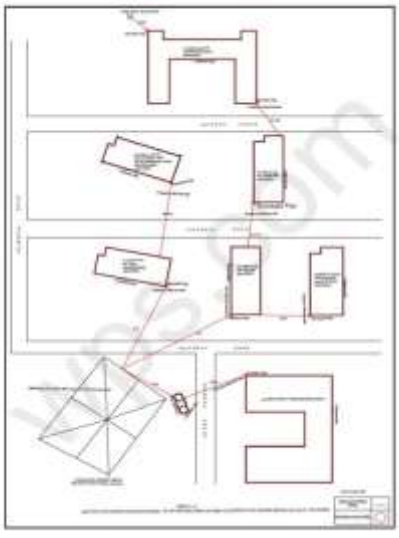

Fig 4. Details of rainwater harvesting plan for building of Shri. Tuljabhavaniengineering college Tuljapur

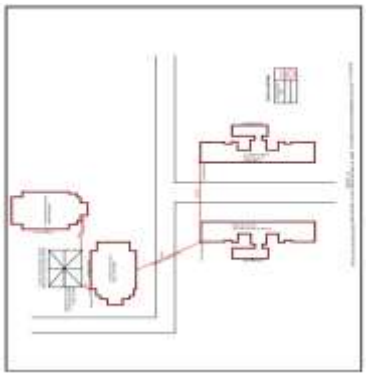

Fig 5. Details of rainwater harvesting plan for building of Shri. Tuljabhavani engineering college Tuljapur.

3.1 The runoff coefficient for various catchment.

Table -1: Runoff Calculation

Sr. No.	Name of Department	Roof Area	Qty of rain water collected in lit
1	Administrative Building	1296	838317.6
2	Library Building	577.55	373588.21
3	EC and ETC Building	586.48	379364.588
4	Mechanical Building	621	401693.85
5	Civil Building	555.72	359467.48
6	Fluid Mechanics Building	587.44	378045.014
7	Workshop Building	1646.39	1064967.37
8	Sport Building	107.33	69426.41
9	Computer Centre	173.82	112435.46
10	Boy's hostel No 1	657.54	212664.87
11	Boy's hostel No 2	657.54	425329.74
12	Girl's Hostel (old)	650	420452.5
13	Girl's Hostel (New)	555.30	359195
		Total	**5394948**

3.2 Water Use:

The collected rainwater from roof top is send to recharge of tube well in front of Administrative buildings and remaining part is stored in RCC tank of 1,00,000 Ltr. Capacity. Constructed at back end of civil engineering near computer centre since the natural slope of all campus comes at this one site.This water storage tank is covered with steel BCR mesh along with green coloured net shade for this cover will

control rate of evaporation and will stop entry of leaves and other materials into water tank.The complete cost of project 2857974rs.The pay back periodperiod of these project calculated based upon cost of water provided by water tanker at Rs 100 / 1000 ltrs.

4. Result & Discussion:

The total rain water collected in rainy season is 5394948ltrs. Considering 5 % of water for initial cleaning. The reaming water is distributed for well recharge 2697474 Ltrs. And water storage purpose 2697474 Ltrs.

The rain water from hotels 1417642 Ltrs.Can be stored for summer season. It's uses can be reduced by controlling it's supply and water pressure.

5. Conclusion:

The rainwater harvesting of college campus carried out in this work shows that rainwater can be successfully utilized for it's uses in summer season. The project pay back period is 2 years. This route project is feasible and commercially visible option for water conservation.

6. REFERENCES

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