

Annasaheb Dange College of Engineering and Technology, Ashta.

A report on

Rainwater Harvesting



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Preface

Water is one of the most essential resources required for the sustenance of life on our planet. Despite covering more than two-thirds of the Earth's surface, only a fraction of this water is readily available for human use. Furthermore, the increasing population, rapid urbanization, and changing weather patterns have put immense pressure on our existing water resources, leading to water scarcity and frequent droughts in several regions of the world.

In this context, rainwater harvesting has emerged as a sustainable solution to alleviate water scarcity and reduce dependence on groundwater and other traditional water sources. By collecting and storing rainwater during the monsoon season, we can ensure a regular supply of water throughout the year, even during dry seasons.

This report on rainwater harvesting by our institute aims to highlight the significance of this practice and its implementation in the present scenario. Through this report, we also intend to educate and create awareness among individuals and communities about the benefits and techniques of rainwater harvesting, and how it can be an effective tool to tackle water scarcity.

The report covers various aspects of rainwater harvesting. We hope this report will serve as a useful guide for individuals, communities, and policymakers to take up rainwater harvesting as a sustainable solution for water conservation and management.



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1. Weather condition of Ashta City:

In Ashta, the wet season is warm, oppressive, windy, and overcast and the dry season is hot and partly cloudy. The rainy period of the year lasts for 6.5 months, from April 30 to November 15, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Ashta is July, with an average rainfall of 9.3 inches. The rainless period of the year lasts for 5.5 months, from November 15 to April 30. (<https://weatherspark.com/y/107887/Average-Weather-in-Ashta-India-Year-Round>).

Rainfall data:

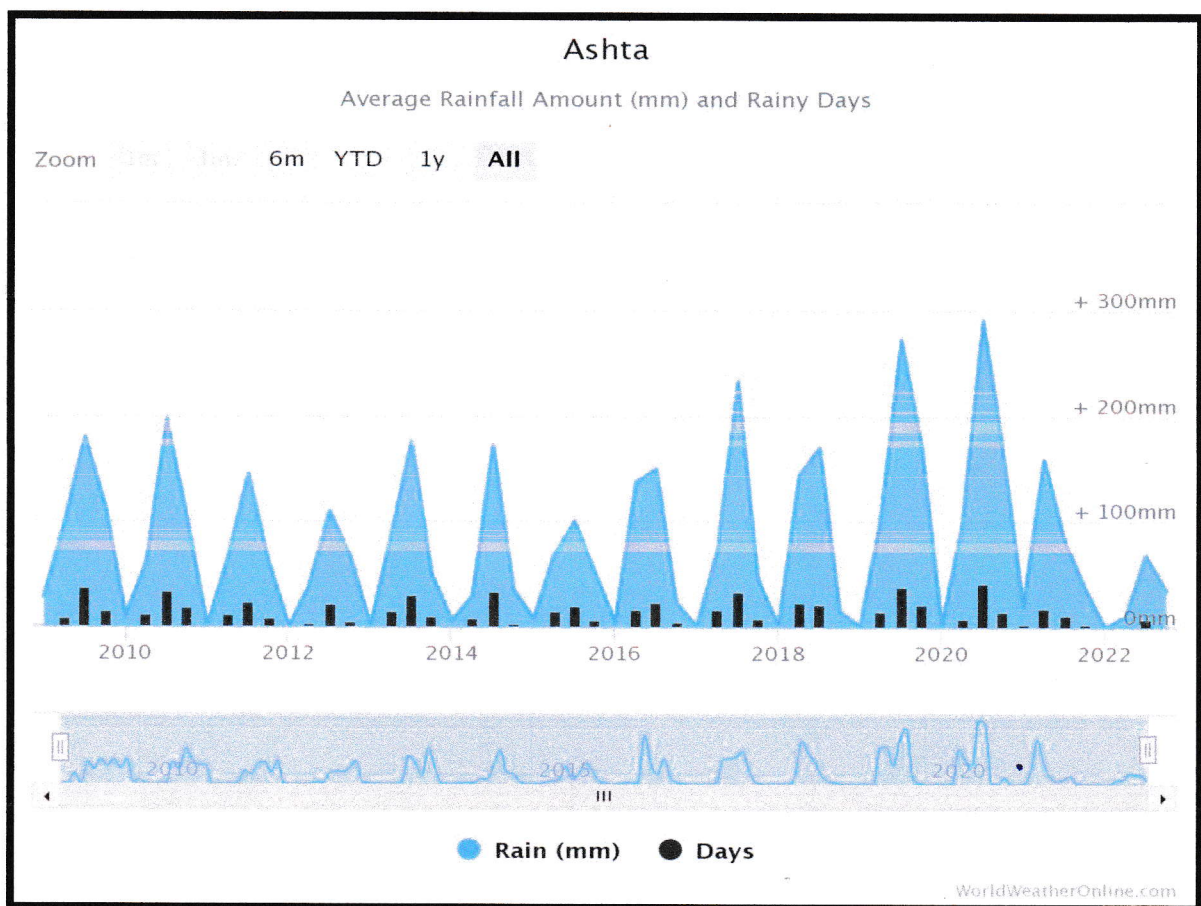


Fig 1: Yearly Rainfall and Rain Days Averages

(<https://www.worldweatheronline.com/ashta-weather-averages/maharashtra/in.aspx>)

Average rainfall of the region in last 10 years: 789 mm/yr. (climatedata.org)

2. Executive Summary:

This report on rainwater harvesting by our institute provides a comprehensive overview of the benefits and techniques of this sustainable solution for water conservation and management.

The report highlights the importance of rainwater harvesting in the present scenario, where water scarcity is a growing concern due to increasing population, rapid urbanization, and changing weather patterns. By collecting and storing rainwater during the monsoon season or even by utilizing it as a potential source for ground water recharge, we can ensure a regular supply of water throughout the year, reducing dependence on groundwater and other traditional water sources. The report covers various aspects of rainwater harvesting, including the types of harvesting systems, its benefits, the process of installation, and maintenance.

The benefits of rainwater harvesting include cost savings on water bills, reducing the load on storm water drainage systems, improving groundwater recharge, and providing a source of water during emergencies. The report also highlights the need for policy interventions to promote rainwater harvesting at the community level



3. Introduction about campus:

The campus of the Annasaheb Dange College of Engineering and Technology (ADCET) is located in Ashta city in Sangli district of Maharashtra state. There are seven departments and hostels of residence for the students. Hence, total strength of campus including students, teaching staff and supporting manpower will be more than 3,000 and its still under the expansion project adding more number of students and faculty. Lots of new departmental building and infrastructures are under construction. The state experiences the four seasons in year. The Sangli is located around latitude $16^{\circ} 51' 6''$ N and $74^{\circ} 33' 36''$ E longitude. This region falls in semiarid tract of Deccan plateau. The average monsoon rainfall 359 mm and number of rainy days are 32 with maximum rainfall in 24 hrs. is 300 mm. The net annual ground water availability of Sangli district is 92300 ha-m.

The integrated campus of 'Sant Dnyaneshwar Shikshan Sanshta' occupies the area around 28 acres in Ashta city. It includes office building, several departments, library building and hostels for both boys and girls.

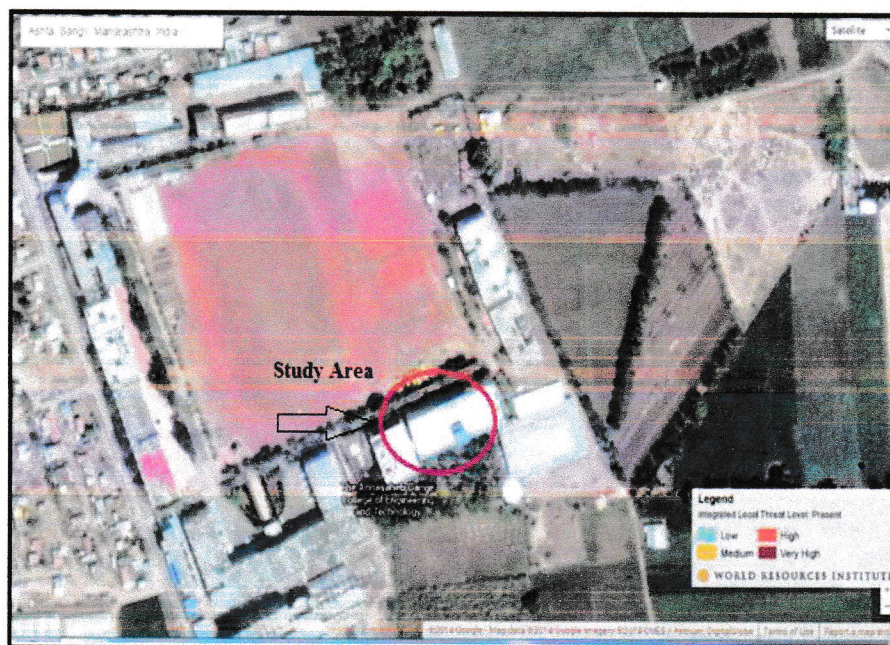


Fig 2: Rooftop rainwater harvesting



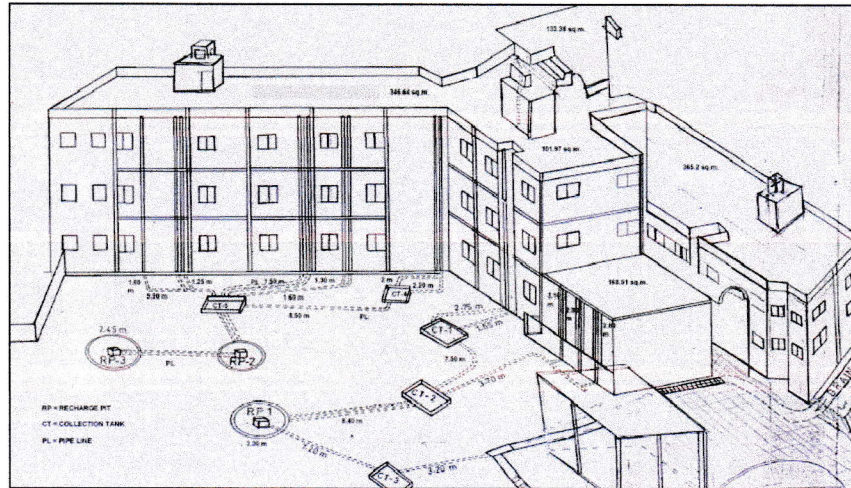


Fig 3: Rooftop rainwater harvesting scheme

Table No.1 Calculation of Rooftop Area of A, B, C Building

Sr. No	Name Of Building	Rooftop Area (m ²)
1	A Building(main building)	3396
2	B Building(Library)	584
3	C Building(civil dept)	1367
Total		5347



4. Water Calculations (Three buildings):

The total amount of water that is received in the form of rainfall over an area is called the rainwater endowment of that area. Out of this, the amount that can be effectively harvested is called the water harvesting potential. Among the several factors that influence the rainwater harvesting potential of a site, climatic conditions specially rainfall and the catchment characteristics are considered to be the most important (Ref. figure).

1) Total Roof Catchment Area = **5347 m²**

2) From data published by *climatedata.org*, the annual average rainfall in 'Ashta' region has been adopted as **789 mm**

Therefore Height of rainfall = 0.789 m = **789 mm**

3) The total quantity of rainwater that can be harvested annually is estimated as:

Volume of rainfall = Area of catchment x Height of rainfall x Runoff coefficient (0.8)

$$= 5347 \text{ m}^2 \times 0.789 \text{ m} \times 0.8$$

$$= \mathbf{3375.03 \text{ m}^3/\text{year} \text{ or } 3375026 \text{ litres/year}}$$

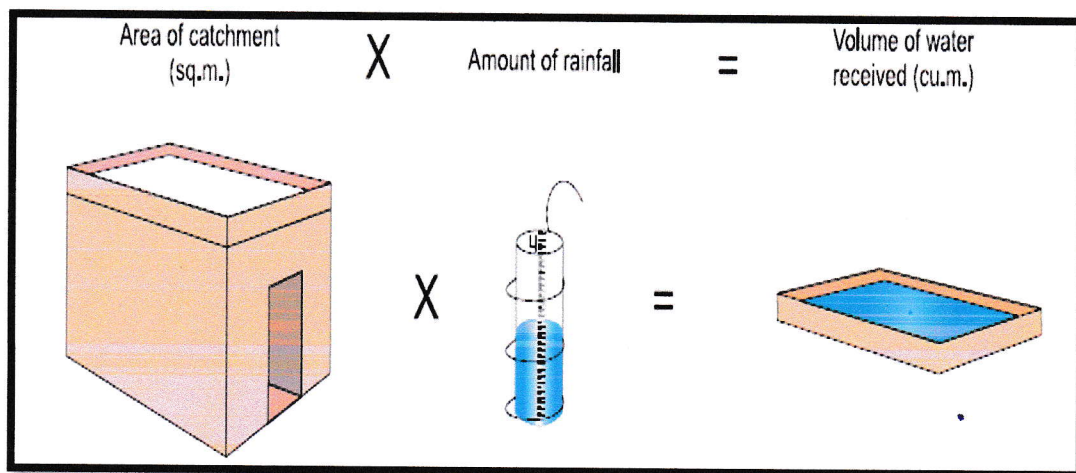


Figure 4: Representation of Water Calculation



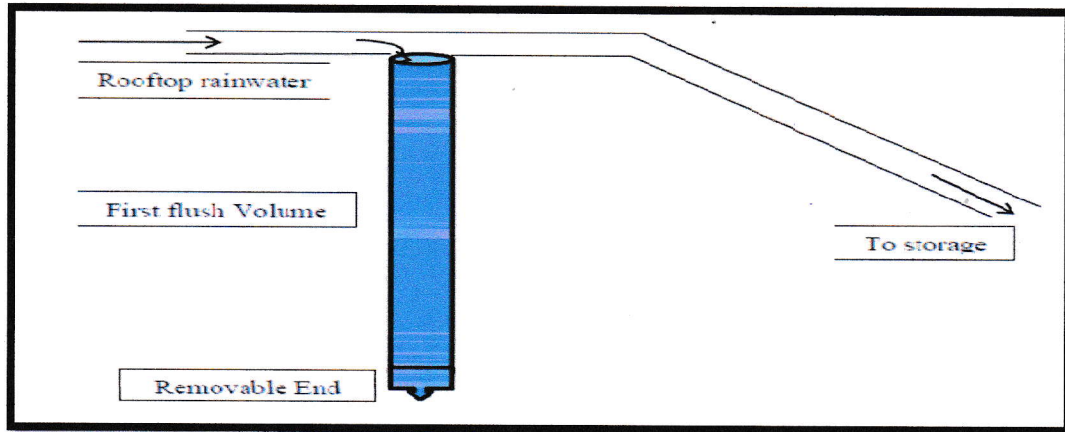


Figure 5: Representation of Water collection from rooftop.

Table No.2: Estimated water harvesting (in litre)

Sr. No.	Roof top surface (m ²)	Average roof top surface (m ²)	Estimated roof area	Estimated water harvesting(in litre/yr)
1	A Building(main building)	3396	3396	2143556
2	B Building(Library)	584	584	368620
3	C Building(civil dept)	1367	1367	862850
	Total	5347	5347	3375026



Figure 6. Field Work

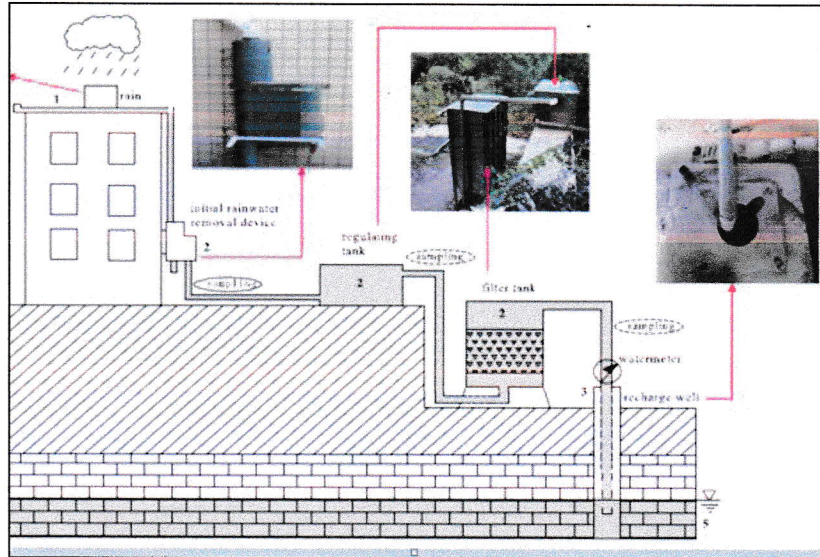


Figure 7: Schematic diagram of proposed aquifer recharge with roof runoff system at the ADCET, campus

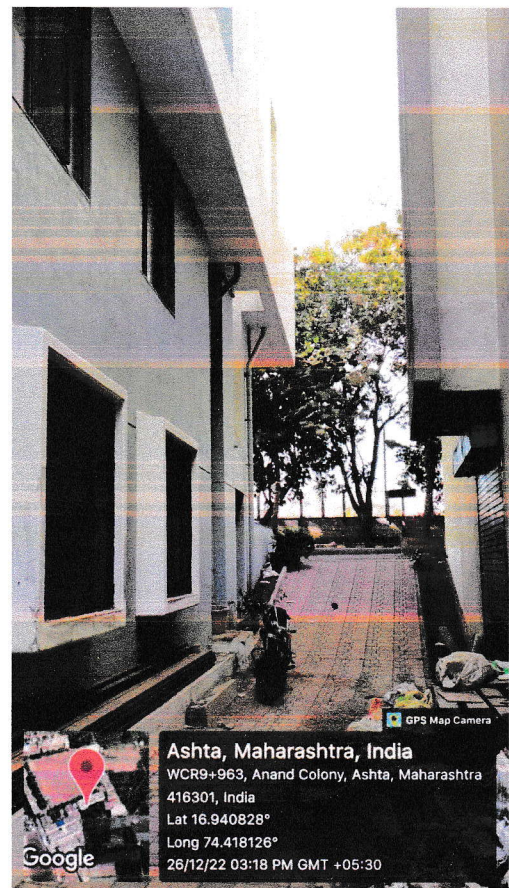


Fig. 8: Existing Rainwater Harvesting at ADCET, Ashta



For the design of artificial recharge system, critical rainfall scenario has to be considered. The rainfall data of Sangli over the previous four decades indicates that on an average, there are 43 rainy days in a year. However, about 75% of the rains occur within a period of three months (July - September), with maximum rainfall during the month of September, which accounts for 30% of total annual rainfall. Even during the rainy months, rainfall may be occurring only for a few days.

Collected Rainwater is utilized for following purposes:

- 1) Gardening
- 2) Ground water recharge

