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POTENTIALITY OF RAIN-WATER HARVESTING IN EDUCATIONAL INSTITUTE TO ESTABLISH A RAINCENTER

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ABSTRACT

Every year the educational campus faces the large water problem in summer season & to reduce this problem by some amount the college spends large money on water tankers. Educational institute are playing crucial role to encourage society in developing Rain Water Harvesting System. In this direction if they develop their campus as a Model for Rain water harvesting i.e. Raincenter, then this will be constant source of inspiration for students and Civilians.

In this paper potentiality of Rain Water Harvesting is worked out for Bharati Vidyapeeth Educational Complex Morewadi Kolhapur. Three tools of Rain water harvesting i.e. Roof top Rainwater Harvesting in Storage Tanks; Ground water Recharge through Contour Trenches, Soak pit and Nala Bund; Runoff Storage in farm Pond, found beneficial for self sufficiency in water.

KeyWords: Rainfall, Raincenter, Farm Pond, Contour Trenches, Rain Water Harvesting System

I. INTRODUCTION

Water has its influence on the traditions, customs, economy and politics of this country. Raincentre is permanent exhibitions used to spread literacy in water conservation in society. People came to know-how to harvest rain through such centre. They equip the civil society to take leadership in the movement to conserve water. They begin the process of rebuilding a society of water literates. The raincentres are yet another milestone in campaign on Jal Swaraj.

Educational institutes can play important role in spreading water literacy by establishing raincenters. That proves to be important step to encourage society. Especially technical institute should take lead in this activity. Before establishing raincenter its potentiality should be checked so as to design cost effective system for long term use. To establish as a raincentre, potentiality of Bharati Vidyapeeth's Educational campus Morewadi Kolhapur is checked.

Every year the campus faces the large water problem in summer season. In summer season the college spends on water tankers. Also the college is situated at water scarcity area as well as the rain water waste through the runoff.

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II.STUDY AREA

Bharati Vidyapeeth's educational Campus, Kolhapur is located at the south-west part of Maharashtra state, 228 km south of Pune, 615 km north-west of Bangalore. It extend from 74 14'00"E Longitude to 16 41'30" N latitude. The average Height of the campus 687.29 meter. The temperature has a relatively narrow range between 10 °C to 35 °C. Climate is a blend of coastal and inland elements common to Maharashtra. The average annual Rainfall of the area is 985 mm. Campus get good water supply in winter and also in the rainy season, but has to face water scarcity problem in summer. Hence there is acute need of implementing Integrated Rain water harvesting program.

Even though the annual rainfall figures are high, runoff goes waste. As campus is located on the hill, with rocky strata, runoff flows off immediately; hence ground water recharge is also affected.

Figure 1.Bharati Vidyapeeth's College Campus, Morewadi (Kolhapur)

1. DATA BASE and METHODS:

a) Water Demand for Campus:-

To design raincenter, water demand for the campus is taken into account. There are two professional institutes and one secondary school. Total population of campus is worked out as 3000 students.

Daily Water demand for college campus = Water demand X Population X Days

=45 X 3000 X 300 = 4,50,000 LPD

Water Demand for Campus Annually= 4,50,000 LPD x 300 Days=13,50,00,000 Lits

It is decided to harvest maximum rain water from all its sources, which can be beneficially used for drinking, for sanitation, gardening etc.

Calculation of water availability from Roof Top Area and Paved and Unpaved Surface Area:

In the campus almost all buildings are RCC buildings with Flat roof. The total Roof Top Area is about10146 Sq M. To collect the water or to recharge the ground water table, surface area is measured in two categories i.e. paved and unpaved Surface.

Calculation of quantity of water-With referring above data, the amount of water collected from roof top area and surface area is worked out.

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Amount of water collected = A X R X C X C'

where, A = roof top area; R = Annual rainfall in mm; C = Coefficient for roof surface

C' = Coefficient for evaporation, spillage and first flush wastage

i) Amount of water collected from roof-top

From RCC slab = 9851.42 X 985 X 10^{-3} X 0.85 X 0.8

= 6,598.48 m^3

= 65, 98,480 lit

From A. C. sheets = 295.54 X 985 X 10^{-3} X 0.8 X 0.8

= 186.308 m^3

= 18,308 liters.

Total water collected from Roof Top area= 65, 98480 + 18,308 = 66, 16,788 lit

ii) Amount of water collected from Surface:

From paved surface = 148.37 X 985 X 0.8 X 0.8 = 93,532.44 lit

From unpaved surface = 40457.54 X 985 X 0.3 X 0.8=95, 64,162.45 lit

Total water collected from campus = 95, 64,162.45 + 93,532.44 + 66, 16,788

= 1, 62, 74,482.89 lit

c) Rain Water Harvesting Methods Selected:

1. Planning of Use of Water from Roof Top for Drinking Purpose:

- Roof Top Water collected is planned to store at central RCC storage tank.
- **Required drinking water** = Water demand X Population X Days= 18,00,000 Liters.
- Water available from roof top area is 66,16,788 Lits., whereas drinking water demand is only 18,00,000 liters. It proves that self sufficiency can be achieved in supply of drinking water.
- Size of RCC water tank is suggested as 3m x 3m x 2.25m.

2. Planning of Use of Water from Surface Area:

A detailed total station survey of the campus is carried out and Contour map is prepared. Location of Farm pound, Nala Bund, Contour trenches and recharge pits are selected, with reference to the contour map. It is decided to plan a Farm Pond and Nala bund so that this water can be beneficially used for gardening and sanitation in summer. Nala Bund is planned for dual prose i.e to recharge the ground water and for gardening.

Sr.No.	Name of Structure	Planning for Storage/Recharge
1.	Nala Bund	80,00,000 lit
2.	Farm Pond	32,40,000 lit
3.	Recharge Pit	8,13,532 lit
4.	Recharge Trenches	7,21,020 lit
	Total	1,27,74,552 Lit

Table 1: Planning of water to be conserved in campus.

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Results and Discussions:

Demand of total drinking water supply can be easily fulfilled from Roof top rain water Harvesting. Thus Self sufficiency can be achieved in Drinking water.

Quantity of water stored can be used beneficially for gardening and other purpose during summer season.

Ground water level can be raised significantly by adopting various ground water recharge methods such as contour trenches, recharge pits etc.

It is found that by there is high potential of water available by adopting various Rainwater Harvesting methods self-sufficiency can be achieved

Established Raincenter will be always constant source of inspiration for students researchers.

Additional benefits are saving in water charges by Corporation and Charges for water Tankers.

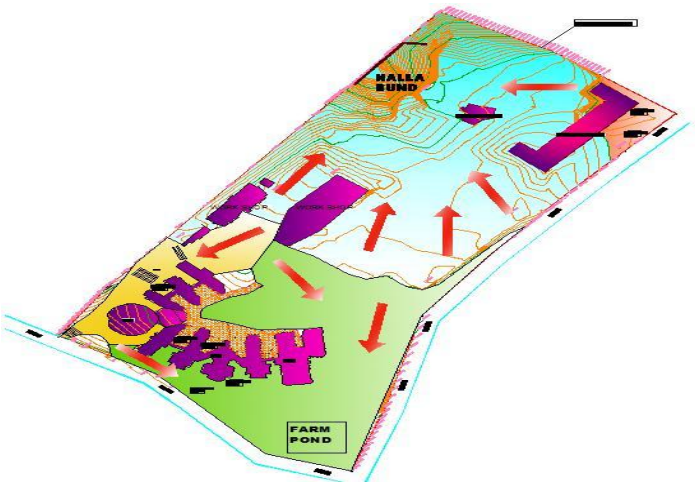

Figure 2:-Layout of Raincenter

Figure 3:-Layout of Plane table & contour survey

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