Research Paper Engineering

Development of An Integrated Water Supply Management System for Bopal Gamtal Area of Ahmedabad.

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ABSTRACT

The technical aspects of this paper are supplying the alternative source of water to an area in a cost effective manner. The source selected is rain water and technique chosen is harvesting which is collection from rooftop of catchment area and storing it nearby open area. Firstly, required data are collected i.e. surveillance of the area and hydrological precipitation data. Water harvesting potentials for the houses are calculated and the capacity of the tank is estimated. Volume of tank has been estimated with the most appropriate method of estimation. Now this capacity of tank is estimated just for the drinking water purpose for individual houses, whereas the domestic use of water can be transported from the nearby lake of bopal gamtal area through an overhead water tank. The lake is too much contaminated and is not being used for any purpose due to discharge of sewage which spoils the quality of stored water. Thus treatment measures are suggested with the alternative design of outlets of lake so that rain water quality is maintained. Finally the costing of whole project is evaluated and is then compared with costing of actual water supply scheme running in that area.

KEYWORDS: Alternative source of water, Rain water harvesting, Optimum dimension of storage tank, Preventive measures, Economic evaluation.

INTRODUCTION

At the rate in which India is increasing, it will lead to high rate of consumption of most valuable natural resource "water" resulting in augmentation of pressures on the permitted freshwater resources. Ancient method of damming river and transporting water to urban area has its own issues of eternal troubles of social and political.

Although many solutions have proposed, there is much interest in the use of roof collected rain water. Rain water is chosen because of its excellent quality, potability, readily availability, cost effectiveness, minor treatment requirement, etc. Thus an ancient technique so called as rain water harvesting can be taken as a measure against water problems.

OBJECTIVE:

The main objectives of the present study are:
-To promote Rooftop rain water harvesting system
-To convince the community for utilization of water for domestic purpose
-To analyze the reduction in water related problems
-To estimate the unit cost of water based on the demand

HYDROLOGICAL ANALYSIS:

The following general formulas for discharge were used

Harvesting potential Q (m^3) = area of catchment A(m^2) amount of rainfall P(mm) runoff coefficient C.

Optimum dimension of tank can be taken as 2.5 x 2.5 x 2.5 m^3

CASE STUDY:

Sr.no	Component	Measurement	Unit
1	Total roof area	Area	32 m^2
2	Standard Height of building	Height	6.2
3	Water demand to be satisfied by rain water harvesting system	Number of persons in per family x time period x per capita drinking water required per individual	5 x 365 x 8 = 14,600 m^3
4	Average rainfall	Precipitation	700 mm
5	Co-efficient of rainfall	Assuming concrete floor	0.70
6	Water available from harvesting system	Roof area x rainfall x coefficient of runoff	32 x 700x 0.7 = 15.680 m^3

Area-Bopal gamtal area of Ahmedabad
Type of houses - Concrete slab, tiled and asbestos
Total No. of houses – 1000
Population - 5000

Individual house details covering men, women, children and livestock. It has also covered about the livestock and existing water sources at the house level.

No. of Bore wells – 4
Water quality –high TDS about 2500-3000

LAKE WATER AS A SOURCE TO AREA:
The water is supplied to bopal gamtal area using bore wells thus using groundwater in distribution. The problem arises as the high level of TDS present in the ground water. The treatment of this source proves to be very costly. The water in the lake is stored but is not used for any purpose. The inlet of the lake supplies runoff water from the area and the outlet moves that water in the sewage line of the system before using this area for rain water harvesting, it has to be properly treated.

The outlet of the lake does not serve well to the lake.it is designed to carry the overflow water but against its purpose the outlet brings the nearby sewage of colony inside the lake and as a result water quality is vanished as it mixes with the sludge.

PREVENTIVE MEASURE
The solution suggested is the siphon action of pipe flow in which the overflow water will surely empty up the lake but the sewage water will not enter into the lake. The water from the nearby areas water in the form of runoff will get stored in the lake and the sewage water will also not enter in the lake which successfully accomplishes our mission to store the clear rain water.

CONCLUSIONS:
The conclusion obtained from the above literature work can be summarized as:

The alternate source of supply of water can be used as a whole year source of water to the bopal gamtal area of Ahmedabad in the form of harvesting system.This harvesting system is used in three styles out here; Those are in the form of rooftop rain water harvesting, lake rain water as a source of domestic water, and the recharging of wells which are presently used by the people in the area. The projects proves to be very cost effective and has its benefits in many ways related to health issues, water borne diseases, medical expenses, water taxes, etc. The siphonic action of flow prevents the problem of backwater flow from the sewer line wchich pollutes the lake water and make it contaminated.

Costing and evaluation's results have proven to be excellent as compared to the actual present water supply costing.

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