

Checking the Adequacy of Rainwater Harvesting System for Housing and Landscaping

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ABSTRACT

Rainwater harvesting is the collection of water volume from raindrops. Rainwater harvesting has been the main source of water supply for potable and non-potable uses in the old days because the water conveyance systems were not used for water distribution and the method used for rainwater harvesting was simple and primary (rainwater was mostly collected from roofs and some was collected directly from the sky). Usage of the collected water volume from rainwater harvesting was direct and without any treatment. Presently, the water supply systems have improved but the demand is increasing due to the population growth, and development. Rainwater can be used for potable and non-potable uses. The potable uses include drinking, cooking, bathing and washing. Usually, the rainwater used for this purpose must be treated to remove the contaminants. Non-potable uses include flushing toilets, watering garden and washing floor where treatment of rainwater is not required for these purposes. The volume of rainwater collected from rainwater harvesting system varies from place to place and depends on weather. In the present study, a rainwater harvesting system was installed in the Faculty of Engineering, University Putra Malaysia, Malaysia. The system is composed of the catchment (roof), gutter, pipe, steel tank and treatment unit. From 20 different rain events, the collected volume of the rainwater from different events ranges between 0.17 m^3 and 2 m^3 . The daily water consumption is monitored for one month and compared with the collected rainwater volume. The volume of collected rainwater is found to be adequate to meet the non-potable uses. In a tropical country like Malaysia it is easy to collect 2 m^3 in a single rain while 10 m^3 is collected annually in Zambia, Africa from a roof of almost of the same size. The rainwater harvesting can be used for landscaping and the computation made to determine the volumes of yield and consumption shows that rainwater is also adequate to meet the requirement for landscaping in rainy months.

Keywords: Rainwater, adequacy, housing, non-potable uses, landscaping

1. INTRODUCTION

World's population has been constantly increasing and so has the water demand. However, supplies from water resources are limited and estimated to be 2% from the total available water in nature. The population growth has direct influence on the water supply demand rates. For example, worldwide water demand has increased six folds between 1990 and 1995 while the population has only doubled and the demand of the agricultural sector is almost 70% of the total demand (Apan 2000). The rate of the growth in the urban area is about four times that of the rural areas. Based on this fact, the rainwater harvesting in housing areas with abundant rain can help to overcome the water shortage and be in line with sustainability development. With the development and growth of urban populations, the paved and roof area will increase and this situation is ideal for implementing rainwater harvesting techniques. Rainwater harvesting had been the main source of water supply for potable and non-potable uses in the old days because the water supply systems were not developed yet. The method of harvesting rainwater at that time was simple and primary. Usage of the collected water volume from rainwater harvesting was direct and without any treatment. The rainwater was mostly collected from roofs and some was collected directly. Based on the size of the catchment, rainwater harvesting systems can be divided into medium and small. The medium size is a system which collects rainwater from catchment areas in educational institutions, airports, army camps, and others. Small systems collect rainwater from the roof of houses. Water can also be collected from open areas and stored in a depression of land or basins.

