

RAINWATER HARVESTING IN KOTA SAMARAHAN

Nasser R. Afshar¹, Efarina. A. Hamit²

¹Associate Professor, Department of Civil Engineering, Universiti Malaysia Sarawak, Sarawak, Malaysia

²Student, Department of Civil Engineering, Universiti Malaysia Sarawak, Sarawak, Malaysia

Abstract

Water is vital to all forms of life on the Earth, from plants through to animals and humankind. Lack of access to fresh drinking water is one of the major and important constraints to health and development in many countries. Rainwater harvesting refers to the collection and storage of rain. It is still popular in places with limited water resources. Recent drought in a rainy climate throughout the world remind how quickly other countries can run short of water. Since Malaysia has high rainfall intensity, it does not mean that Malaysian should not worry about scarcity of water supply. Even the annual rainfall is high and sufficient enough to be consumed, most of the rainwater tend to flow away. The environmental issue such as flooding, global warming and pollution are getting serious day by day due to a rapid development processes in Malaysia. To pursue the need for a more sustainable development, it is possible to implement rainwater harvesting which has been recognized as one of the innovative solutions as an alternative water supply for non-, portable purposes. Designing water harvesting systems into new construction allows the homeowner to be more elaborate and thorough in developing a system. In the case of very simple systems, the payback period may be almost immediate. The objective of this study is to estimate the potential of rainfall to be stored for domestic use and design the rainwater harvesting system using gravitational force suitable for the selected house in Kota Samarahan area. It has been shown that the rainwater harvesting system can support the water demand of the selected house throughout a year even during the dry season. The cost of installation and yearly maintenance for proposed rainwater harvesting is lowered by 59.16 percent as compared with similar rainwater system which is installed on the ground level.

Keywords: Water, Rainwater harvesting, Water harvesting system, Demand and Storage capacity

1. INTRODUCTION

WATER is one of the most important substance in everyday life. About seventy one percent of the earth's surfaces are covered by water, with the remainder consisting of continents and islands which together have many lakes and other sources of water that contribute to the hydrosphere. Next to oxygen, water is essential component for all living organisms in daily life. Ninety- seven percent of all water on the earth surface is saline or seawater. Only three percent of glacier and groundwater contribute water to the world. Sea water can be converted to fresh water, but the process is very expensive. According to International Commission On Large Dams [1], Demand for water is steadily increasing throughout the world. During the past three centuries, the amount of water withdrawn from freshwater resources has increased by a factor of 35, world population by a factor of 8. With the present world population of 5.6 billion still growing at a rate of about 90 million per year, and with their legitimate expectations of higher standards of living, global water demand is expected to rise by a further 2-3 percent annually in the decades ahead, but freshwater resources are limited and unevenly distributed.

Malaysia receives rainfall from 2000 mm to 4000 mm annually where it is greatly influenced by two monsoon periods in November to March and May to September. Malaysia's water consumption is alarmingly high and increasing every year. Water consumption per capita per day increases about 7.6 liters per year. This increase in water consumption is not matched by an increase in water

reserves. Malaysia's water reserves per capita per day is declining at a rate of 5.8 liters per year. At this rate, Malaysia would be left with nearly no water reserves by 2025. Therefore, the study of rainfall harvesting plays an important role to a country such as Malaysia where the rain is abundant.

Rain harvesting can be defined as a collection of rainwater from catchment surface in order to increase the water availability whenever water shortage occurs. According to [2]-[3], The primary idea of water harvesting is for domestic and agricultural use. Rainwater harvesting is to ensure that the rainfall is used effectively before it has run away into the river or disappear due to evaporation.

2. WATER COLLECTION AND DISTRIBUTION SYSTEM

A simple system usually consists of a catchment area, and a means of distribution system, which operates by gravity. Water are collected on roofs, paved areas or the soil surface. Gravity moves the water to where it can be used. In some cases, small containers are used to hold water for later use. A catchment area is any area from which water can be harvested. The best catchments have hard, smooth surfaces, such as concrete or metal roofing material. The amount of water harvested depends on the size, surface texture, and slope of the catchment area.