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Rain Water for Drinking Purposes

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Abstract - *Several studies have demonstrated that because of contamination following contact with the catchment surface, stored rainwater often does not satisfy WHO guideline standards for drinking water especially with respect to microbiological quality. This does not mean that rainwater is dangerous for drinking purposes. Many people in rural areas around the world depend on rainwater for drinking and other domestic purposes and the number of reported cases of serious health problems related to rainwater supplies are very few. This paper analyses the cost-benefit of rainwater use.*

Key Words: **Rainwater, water quality, drinking purposes**

1. COLLECTION SYSTEMS OF RAIN WATER

Several studies have demonstared that because of to contamination following contact with the catchment surface, stored rainwater often does not satisfy WHO guideline standards for drinking water especiThe collection systems for the rainwater can be either roof-based or land-based. However, the roof-based systems are preferable to the land-based systems as they are not prone to biological or chemical contamination [1]. The roof can be utilized to harvest rainwater and the roof material used ought to be non-porous and smooth. This enhances the efficiency of the roof system for two main reasons: first, it absorbs a lesser amount of water and second, it reduces the possibilities of debris as well as microbes being deposited in the roof's seams and pores [4]

Gutters, piping and downspouts are another system of collecting the rain water that has been harvested from the roof [5]. They convey the water to various tanks in which it is stored before the treatment process. Vieira et al. (2014) recommends the use of a gutter made up of seamless aluminum. Some of the factors to consider in the design of gutters, pipes and downspouts include the following: first, the gutter should have a continuous slope to the downspout [4]. Second, a gutter screen or leaf guard should be installed in the gutter to prevent the collection of debris, leaves and twigs [4]. Lastly, the piping system should be capable of complete draining during the rainfall and plastic material should be used in the pipes [4].

One of the most common land-based collection systems is the use of the first-flush diverters. They are installed on each and every downspout that discharges rainwater into the storage tank [6]They help to keep off dirt, dust, bird/animal droppings and chemical contaminants out of the storage tank [6] During a major rainfall season, most of these impurities are washed off.

2. TREATMENT OF RAIN WATER

Rainwater is treated for purposes of removing any existing contaminants that may pose a health risk to its users. As such, an appropriate system for treating the water should be designed and installed. There are three main methods that can be used in the treatment of rainwater: chlorine disinfection, filtration and UV disinfection. Chlorine disinfection is effective in the removal of giardia, viruses and harmful bacteria from the rainwater [2] Nonetheless, it is known to have a limited impact against the elimination of cryptosporidium [2]

Filtration is significant in the elimination of particular matter, microorganisms as well as dissolved substances that may be present in the water [1] The filtration devices vary depending on the amount of particles and or microorganisms sought to be removed. Some of the filter system may require the use of power supply for them to work effectively and efficiently. It is important to note that with a proper management of the tanks and water catchment areas, it will not be necessary to utilize filters in the maintenance of physical, chemical and microbial quality of the rainwater [1].

UV disinfection is done through ultraviolet light irradiation. It eliminates any protozoa, viruses or bacteria present in the rainwater [1]. However, it does not removal any chemicals from the rainwater. The maintenance mechanism of the UV systems is relatively low as the inclusion of chemicals is not necessary. Some of the UV systems have warning alarms that can be used to determine any faults in the equipment used. The effectiveness of the UV treatment is only attained if the rainwater is clear and devoid of particles [1] .As such, before its use, the supplies of the rainwater ought to be filtered. It is recommended that the rainwater treated with UV systems should be used within the shortest time possible as opposed to being stored in tanks.

3. COST BENEFIT OF RAIN WATER

According to Tang (2009), rainwater meets the standards set by the world health organization (WHO) for the quality of

drinking water. Some of the costs involved in the collection of rainwater include but are not limited to maintenance costs and preliminary construction cost of rainwater collection system [3] Its benefits include the following: decrease in the outbreak of epidemics and the associated health expenses; energy and time saved from water collection and an enhancement in the household expendable returns [3]. This cost-benefit analysis indicates that the benefits of the rainwater far much outweigh the disadvantages. Therefore, it is economically viable to use rainwater as compared to ground water, piped water or water supplied by individual vendors since its expenses are much lower than the benefits.

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