

The Study on Greywater Usage in the Mosque

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Abstracts

Water is important as it one of the main source of living. Water has close relationship in Islamic perspectives where it has been mentioned many times in the Holy Quran. Water is not only serves for household uses but also for religious activities especially for ablution. Ablution is a ritual that has to be performed by the Muslims before the daily prayer begins and the amount of consumption is quite high. According to UNESCO, increase in population growth causes increasing in water demand which become an alarming issue to the world. Due to scarcity of water in the future, many countries have started to promote grey water reuse to ensure the availability of the resources.

Keyword: Ablution, greywater management

1 Introduction

Water is the fundamental to body functions such as digestion, maintaining body temperature and regulating the blood pressure as it is made up of approximately 60% of body weight of an adult male. According to UNESCO, increase in population number causes increase in clean water demand which has become an alarming issue to the world. Due to scarcity of water in the future, many drought-prone countries have started to promote grey water reuse to ensure the availability of the resources. Hence, the main objective of this paper is to study the low cost management of greywater by reusing it as an alternative source because it gives benefits to the users as well as to achieve a sustainable living.

2 Water in Islam

The Quranic verse states that, “*from water every living creature was created.*” Thus, water is characterized as the most sacred element as life-giving, sustaining and purifying means. (Mohammad Zakir Hossain, 2015) Water has been mentioned many times in Islam and it is proven in the verses that it is a gift from God that every living creature can have it to sustain their lives. [Sura, The Bee (16:65)].

Water in Quran can be divided into symbolic and practical aspects. Water is closely related to the planning of Islamic architecture during the ancient time where majority of the city was built around the mosque with ablution area surrounding it. The most significant Islamic building is

Sabil Kuttab during the Mamluk era. The building is a structure with drinking fountain at the ground floor and Quranic School on the first floor for those who is thirst in knowledge and for drinking. Hence, the Quran verses had formed the culture and the tradition of the city dwellers indirectly. (G. Francesca)

Water is the symbol of purification where the believers have to perform ablution before the prayers begin. Ablution is the doing of cleaning certain part of the body by using uncluttered water. The Hadith explains the details of procedures for ablution that has to be followed by the believers.

Steps to perform ablution:

1. One is prepared with the intention that *Wudu* is to get ready for *Salah*, and say "***Bismillah***"
2. The hand is washed starting with right hand up to the wrist for three times to ensure that the water reach between the fingers as well as washing the left hand.
3. The mouth is rinsed three times thoroughly by taking the water on the right hand.
4. The right hand which holding the water is splashed into the nose and blew it out three times.
5. The entire face including ears, forehead and the chin are washed three times repeatedly
6. The right arm is washed completely from wrist to the elbow for three times, ensure that all parts of the arm have been washed and repeat with left hand.
7. The palms of the wet hand are moved lightly over the head from the top of the forehead to the back of the head and to the neck, then bring the hands back to the forehead.
8. The grooves and holes of the ears are rubbed with the same water with wet finger index, while the wet thumbs are passing behind the ears from bottom to the top.
9. Lastly, both feet and ankles are washed three times begin with right foot and make sure that the toes and the foot are covered with the water.



Figure 1 Steps in Ablution

(Imam Mohamed Baianonie, 2005)

With the advancement of science and technology, the mosque in the urban area uses tap water for ablution where most of the people leave the tap open due to inconvenience. A research has done in the mosque of International Islamic University of Malaysia that the average amount of water used for ablution is about 7L/ Cap.day. Moreover, majority of the water from ablution are directly discharge into the drain without any effective management. (A.M. Abdullah, A.M. Suleyman, A.R. Nur Asilah, 2014) Yet, the world is only consists of 2.5 per cent of fresh water supply which is the total available to sustain living. (U.S.G.S) The increasing demand of clean water supply and water scarcity in some countries has become the global issues. Water scarcity happens when one uses less than 1000 m³ of water per day.

As Prophet Muhammad (saw) once said, “The Muslim Ummah is like one body. If the eye is in pain then the whole body is in pain and if the head is in pain then the whole body is in pain.” Thus, it is the Muslims responsibility to use the water wisely to sustain for the next generation. The Holy Book keeps reminding the believers that it is God who provides the needs. The Holy Quran also advices the Muslims to be considered when using water during ablution even the water resource is abundant. (Quran 17:26-27 and 25:67). However, there is special case where water scarcity happens where the believers are allowed to clean by earth as it is considered pure. (Dr Husna Ahmad OBE, 2015) Therefore, greywater reuse has been carried out in the mosque in some countries especially drought-prone area in order to conserve the availability of the resource.

3 Definition of greywater

All waste made from the household including ablution is called greywater. It is found from the washing dishes, showers, sinks and laundry which form the largest part of household waste. Components that are present in the greywater are dependent on the lifestyle of the residents and the choices of household detergent used. Typically, greywater consists of high amount of easily degradable organic matters such as fat, oil and other substances from cooking, soap and detergent. Greywater has low concentration of pathogen where the bacteria are found because of the presence of the easily degradable organic compounds. Apart from that, nutrients content in greywater is relatively low, but certain greywater has high concentration of phosphorous as softening agent in the water. Metals and other toxic pollutants might be present through the pipe system and it can affect the human behavior. (R. Peter, WRS Uppsala AB, 2004)

4 Greywater Treatment

Proper management of greywater in the mosque brings benefits to the society. Firstly, the water quality will be improved since there is lesser waste water being discharged into the drain. On the other hand, it can be used for other purposes such as surface irrigation or toilet flushing through diversion system. As the matter of fact, the greywater and clean water supply form a closed relationship where all of the components in the waste water are being reuse.

Waste water treatment system is divided into three processes which are physical process, chemical process and biological process. In the physical process, huge amount of suspended or floating materials are going through precipitation process. The cost effective way to filter it is through screening where suspended material is settled down. Besides, flotation process is used widely to filter out the oils and fats to ease the following process which is absorption. Activated carbon is used in the absorption process. (U. Nangkula, N.H. Aisyah, 2014) Activated carbon contains tiny pores which is treated with oxygen and make it highly porous surface with areas of 300 to 2000 square meters per gram. Coloured or odourous substances are taken either in gases or liquids states. (A. Lucy, C.Juliet , P. Meena, 2010)

Next, removal of particles that is colloidal including heavy metal, phosphorus compounds and toxic substances through chemical process. By placing some chemical substance to undergo the flocculation and coagulation processes, the properties of the materials change. It is a costly process due to chemical material is needed to supply for the reaction to occurs. Biological process is the method where microorganisms are used as activator for decomposition of the materials in the waste water. Its effectiveness, efficiency and low cost process make it the choices among physical and chemical process. Throughout the greywater treatment system, it combines the three processes to achieve clean and usable water. (U. Nangkula, N.H. Aisyah, 2014)

5 Examples of Greywater Treatment

A comparison was conducted between urban and rural area to understand the ways of human dealing with greywater especially in low and middle-income countries. Greywater usually is being discharged into the drains in the urban and peri-urban area and there is lack of attention given regarding greywater management system. Greywater is considered as one of the source of pollution as it contains pathogens in it.

5.1 Case study in Qebia Village, Palestine

International Development Research Centre (IDRC) has installed a physical greywater system treatment in order to cater the greywater treatment needs for the household purposes. The filtration is a concrete and brick tanks which made up of crushed stone as filter medium with hard limestone. Septic tank with oil trap was the first compartment where greywater was channeled by a pipe and flow into a screened manhole. T-shaped outlet with the top is exposed to the atmosphere and the other is placed 30cm at the bottom of the tank. The greywater was then channeled to the second and third tank through up-flow method of gravel filter. The treated greywater was then stored at the fourth compartment with a submersible pump installed to bring the treated greywater up to a multilayered aerobic filter. Lastly, the flow of the treated greywater was controlled and passes through layers of filtration such as sand, coal and gravel to a storage tank before it is being channeled and supply to the irrigation network. (Burnat and Eshtayah 2010).

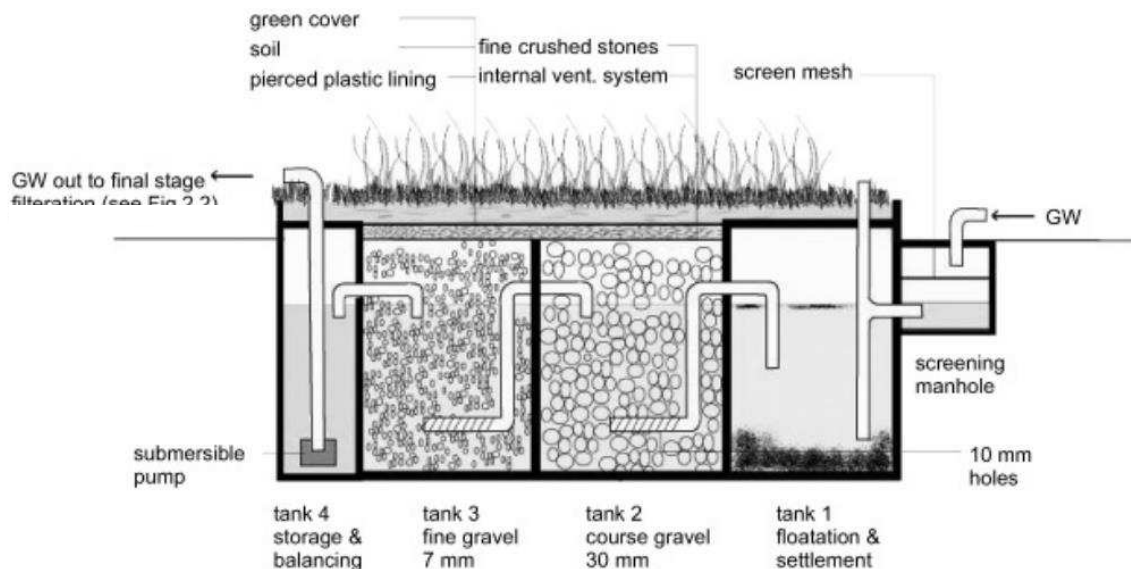


Figure 2 Physical greywater treatment in Qebia Village, Palestine

5.2 SmartWuDHU system

SmartWudhu is a greywater recycling system. It was designed by scholars of Tun Hussein Onn University which the system itself exhibit Islamic values with the advancement of engineering. The storage tank fitted with chlorination process while an output section will transfers the treated water for indoor and outdoor usage. Basic rule of Fiqh stated that used water is still considered pure but it cannot be functioned as purifying means. According to Singapore Islamic Council, 2007, water sample is considered pure as long as it does not have noticeable changes on its taste, color and smell.

There are two types of model that is suitable for new installation as well as retrofitting works. The major constituents are collection and storage for ablution water, filtration system, dispenser for chlorination process and treated water collection tank. In the closed-loop network of the water treatment system, there is sensors and pumps to help for the circulation of the water. Closed-loop system is able to save water through greywater discharge and prevent contagion presence from external sources.

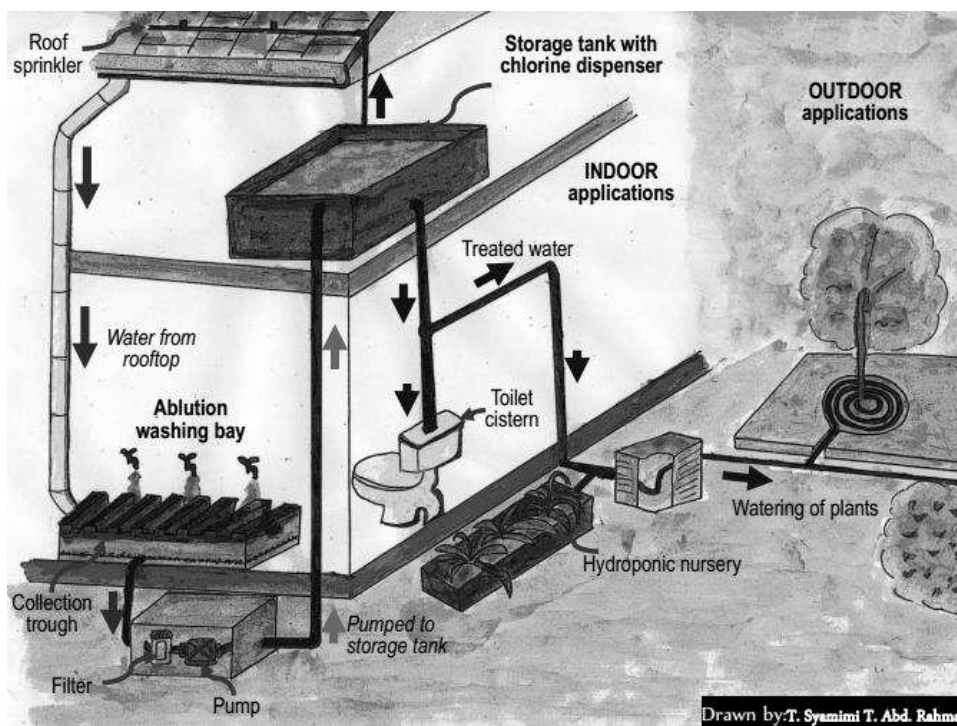


Figure 3 Illustration of losed-loop SmartWUDHU system

6 Conclusion

Water conservation is not just about dealing in large scale but it can be starts from individual practice at home. Understanding the basic properties and characteristics of greywater helps to further seeking a solution towards reuse of the greywater. Active participation may be imposed to the public in terms of managing the waste water before it is being discharge for treatment or some ways to reduce the chemical substances present. There are many cost-effective ways are recommended to filter greywater or discharge for reuse. In conclusion, greywater management system should be adapted worldwide to increase the public awareness which suit with the social and cultural aspects.

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