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INTI INTERNATIONAL UNIVERSITY

Faculty of Science, Technology, Engineering and Mathematics

RE-USE OF GREY WATER TOWARDS EFFECTIVE WASTE WATER MANAGEMENT

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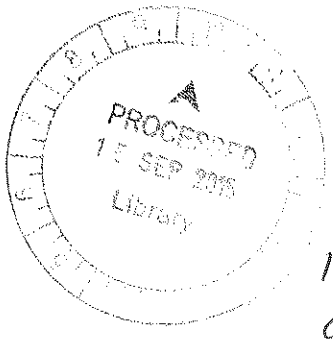

DECLARATION

I, Chin Yik Woon hereby declare that the art of work that presented by this report entitled "re-use of grey water towards effective waste water management" is totally a record of my original work done and my own investigation under the guidance of my academic supervisor, Mr. Munir Hayet Khan. Except for point of reference, the reference that was used in this report were plucked from the data and resources from journals and published data. The result embodied in this project has yet to be published by anyone of other University and Institution or to be found in the internet.

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ABSTRACT

The world is facing water quality crisis. Increasing population growth, development, urbanization, extensive food production, poor water usage practices and wastewater management are the reasons of the heart of global water crisis nowadays.

Alteration is essential and has to be made and new renewable water resources are in progress to be discovered and reuse of wastewater has the potential to combat the water stress demand. This paper is to determine the water quality of the grey water around Student Accommodation in Inti International University campus.

The objective of that is to identify the possibility of the greywater to be reused. In this paper, laboratory works are carried out, data is analysed based on National Water Quality Standard Malaysia, Department Of Environment Water Quality Index Classification and Drinking Water guidelines by World Health Organization, applications of reused wastewater are recommended and some international experiences of wastewater reuse and wastewater treatment are discussed in this paper as well.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Water is essential for all living species on the Earth. Every daily activities involve water usage, for example, showering, cooking, washing and so on. Furthermore, more than 75%of human body is made up by water. We can see that water is crucial and essential for body mechanisms. Even though two third of Earth is made up by water, not every drop of water can be used or consumed.

Wastewater is the water that has been adversely affected by human activities or anthropogenic influences. It is also the flow of used water from community and that includes industrial waste, household waste and storm water. Nowadays people have adequate infrastructures and effective technologies to deliver and supply fresh water, however people take it for granted and waste water absent-mindedly. The way people produce food uses up 70-90 percent of available fresh water and after that water is returned and discharged with additional nutrients and contaminants.

Moreover, water is polluted by agricultural activities and industrial waste. Over 50% of the world's hospital are occupied with patients suffering illness from contaminated water (Emily Corcoran, 2010). Every water resources are interconnected, therefore the ecosystem is affected with impacts on fishery, food chains and so on. An effective and sustainable wastewater management should be carried out.

Wastewater can be in solid and liquid forms. Typically wastewater is in grey or black colour and cloudy form. Household waste contains detergent, paper, pathogenic substances and other substances that people would flush into sewerage system. Industrial waste contains dyes, acids, alkalies, highly toxic chemical and so on. At home, the waste will be collected and stored at septic tanks and ultimately wastewater will be discharged back to environment. Wastewater always produces foul smelling odours because of the presence of decaying substances. It contains many pollutants which pose threats to environment and public health if the wastewater is left untreated or not treated in proper way, therefore a proper and efficient wastewater management should be provided to ensure that the water released back to ocean is clean and within standard requirement.

Wastewater includes domestic effluent of black water (waste from toilet with urine, faeces, and excreata) and grey water (waste from kitchen and bathing), water from commercial institutions, industrial waste, storm water, urban run-off, and agricultural waste (UN Water Analytical, 2014). In another words, wastewater contains pathogens, organic compounds, chemicals, nutrients and heavy metals. These components are carried along in water and affects the water quality.

Domestic waste is basically the waste from residential area whereas industrial waste is the waste from factories and industries. Generally domestic waste can be divided into two categories, grey water and black water. Black water is the waste from toilet, in other words, it contains urine and faecal matter (human waste) whereas grey water is basically the waste other than toilet, for example, from kitchen, laundry and bathroom. Hence, grey water is less contaminated and it is believed to have great potential to be reused for non-potable activities, the activities that does not require fresh water.

1.1 Problem Statement

Recently the world is having water quality crisis due to continuous population growth, urbanization, development, food production, increased living standard, poor water use practices, illegal waste handling and ineffective wastewater management system. Effectiveness of wastewater management has a direct impact on biological diversity of aquatic ecosystem and also human life support system.

Service coverage of access to toilet facilities is increasing, but waste streams are being paid less attention on how it is collected and treated prior discharging to environment. As a result, majority of the wastewaters are disposed directly without any treatment and concern. This affects the aquatic biodiversity and also spread the waterborne disease to humans, animals and plants.

For example, the city of Accra, Ghane, has very less sewer connections of all households and majority of them have no septic tanks. At time to time, the tanker car will empty and discharge the waste at a coast, Lavender Hill which is located adjacently to housing and fishing areas.

Figure 1. 1 Unloading waste at Geneva (Robert Bos, World Health Organization (WHO), Geneva, 2006)

According to fourth World Water Development Report, only 20% of the wastewater receives proper water treatment (UNESCO, 2010). There are so many activities that involves usage of water. Yet, there are many people wasting water and not realizing that fresh water is so precious and population is growing, hence, water demand is drastically increased. Fresh water resource is directly polluted and this causes fresh water has getting lesser and lesser and finally to be a problem to supply.

A change is required in water politics not only to stop any further damages to ecosystems and aquatic diversity but also to show the importance of effective wastewater management and emphasize that wastewater can be a resource for future water security.

To meet the water needs, efficiency of using water has to be enhanced and alternative water resources has to be found. Nowadays, people starts to open their minds and try to explore the usefulness within used water, wastewater.

Grey water is defined as urban waste without any input from toilet, urinal or bidet, it is mainly from bathroom and kitchen. "Greywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers" (IAPMO, 2000). It can be contaminated by soaps, shampoos, toothpastes, oils, greases and so on. Although toilet waste is not interfered with grey water, pathogens still can exist in grey water because of diaper or other reasons.

Anyway, the concentration of pathogen is definitely lower than black water. In fact, if it is treated properly, it can be reused for garden irrigation, water closet flushing, domestic installation and so on. It can replace the use of fresh water in many non-potable activities. Therefore, grey water is believed to be one of the potential new sources to combat the needs.