

Pilot Study on Development of Mobile Water Treatment System for Flood Prone Area

¹Theeba D/O M.Rajasegran, ²Easther George Kiluk, ³TohWeiKian, ⁴Foo Qiao Lin, ⁵Lee Pui Chee and ⁶Lakhveer Singh

^{1,2,3,4,5,6}Faculty of Engineering Technology,
Universiti Malaysia Pahang
LebuhrayaTunRazak, 26300 Gambang, Kuantan, Pahang, Malaysia

Abstract—Supplying clean drinking water to the flood victim is the major problem during the flood season due to the heavy weight of the water which makes it hard for supplying enough clean drinking water to the victims. In this project, we develop a mobile water system for flood prone area which is called Ultra Micro Bamboo Filter (UMBF). The flow rate of this system is 5.56mL/s and the system have weight of 14kg and dimension of 42cm length, 82cm height and 28cm width. Ultra Micro Bamboo Filter (UMBF) was designed to be mobile and to filter out flood water to drinkable water for flood victims. The UMBF consist of 5 parts which are fabricated into an arrangement of sand filter, ceramic filter, activated carbon, hollow fiber and the UV. Each of the parts was screwed to an aluminum which has been shaped to fit to a bag and pipes were used to connect all the parts so that water flows from one to another. Every parts have their own function where the sand filter were used to removes suspended particles such as leaves, twigs, or large, NanoAg+ Carbon block are used to remove sediment, improve taste and odor reduction, the ceramic filter and hollow fiber were used to filter out the dangerous bacteria and pathogen, and the UV is used to kill pathogenic bacteria. In this project, water was collected from the drain besides Block T in Universiti Malaysia Pahang. The water was then poured directly into the first part where it flows throughout the UMBF according to the arrangements of the parts. The results of this project shows that the bacteria such as E.Coli and total Coliform were absent after the water were treated. Furthermore, the total suspended solid reduce from 42 mg/L to 1 mg/L, Nitrate-nitrogen was reduce from 13.4mg/L to 8.1 mg/L, the color, iron and zinc were not detected which was from 25HU, 0.27 mg/L, and 0.00011mg/L after the water was treated with UMBF. All the parameter tested complies with the drinking Water standard asset by Ministry of Health Malaysia.

Index Terms:Ultra Micro Bamboo Filter (UMBF), Physical, Chemical, Biological, Pressure and Gravity

I. INTRODUCTION

Water supply is one of the key natural resource bases that are inevitable for sustainability of human and environmental health. Water scarcity will affect more than 2.8 billion people in 48 countries by 2025[1]. The most devastating natural disaster experienced in Malaysia is flood. The estimated area vulnerable to flood disaster is approximately 29,800 km² or 9% of the total Malaysia area, and is affecting almost 4.82 million people which is around 22% of the total population of the country [2,3]. In Malaysia, it has been estimated that at least 3.5 million people live on flood plains and are vulnerable to flood of varying probabilities [4]. Malaysia has a lot of places with potential of flood water disaster and lack of clean water is usually a major problem. Flood has impacts of climate change on water availability. Surface water withdrawal can be directly affected by water quality degradation; wells pumping can be cut off for sanitary reasons groundwater quality as well as for security reasons such as floods threats [5]. Even though there was water everywhere, there was no clean drinkable water available for them. Widespread pollution of the water, frequently increasing during storms and flooding, have been linked to rises in viral infections, caused by either direct contact or ingestion of contaminated waters[6].

Furthermore, the main problem during the floods was the transportation and the supply of clean drinkable water for victims. Only a limited number of clean water was able to be transported to the victims. This is because boats and big trucks were the only source of transportation which can pass through the roads. Water plays an important role as it necessary for the chemical and biological processes in the human body where the body consists of 70-80% of water. Without water, human can only survive for three to five days or the worst case they might die in a matter of days. These show