

## **TREATMENT OF DOMESTIC WASTEWATER IN KUCHING CITY – ECOLOGICAL SANITATION**

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### **ABSTRACT**

In Kuching, partially treated black water from septic tanks and grey water are discharged into storm water drains and subsequently into the rivers. Discharge from households was the main pollution source of the Sarawak River. The option of urban ecological sanitation was explored by the Sarawak Government. Ecological sanitation involves separating wastewater at source and recycling of the nutrients. A pilot project of ecological sanitation was implemented. Grey water from selected households were channeled to a grease trap and then pumped to biofilters before flowing through a constructed wetland with two species of ornamental plants before discharge. The objective of this study was to determine the efficiency of the biofilters and the constructed wetland. Results of six months of sampling indicated that there was significant improvement in water quality in terms of dissolved oxygen (DO), total suspended solids (TSS), reactive-phosphorus (RP), total-phosphorus (TP), ammonia-nitrogen (AN), total nitrogen (TN), biochemical oxygen demand (BOD<sub>5</sub>), chemical oxygen demand (COD) and fecal coliform counts. The influent DO of below 1 mg/L improved to 3.4 - 4.6 mg/L in the effluent. Removals of BOD<sub>5</sub> and COD were the highest with means of 99 and 95% respectively. Removal of nitrogen were also high, 86% (AN) and 81% (TN) respectively. Total removal of TSS was 81%. Removal of phosphorus, though not as high were 64 (RP) and 61% (TP). The biofilter contributed most of the total removal especially organic matter (97% for BOD<sub>5</sub> and 92% for COD) followed by nitrogen (78% for AN, 62% for TN) and then phosphorus (66% for RP and 61% for TP). The wetland contributed 53% of total removal of TSS and 22-41% of nutrients and 46% of the total increase in DO. The fecal coliform count in the influent was reduced by 99 % after the biofilter treatment. In terms of BOD<sub>5</sub>, COD and TSS, the effluent complied with the effluent standard A of Environmental Quality Act 1974 (Sewage and Industrial Effluents). Furthermore, WQI indicated that the effluent quality of water improved from Class V to Class II. Therefore, this cost effective method of urban sanitation is highly recommended.

**Keywords:** Domestic wastewater; Ecological sanitation; Wastewater treatment; Household wastewater

### **INTRODUCTION**

With 21% of the 2.2 million population of Sarawak concentrated in Kuching City, treatment of domestic wastewater in the city is a challenge. Partially treated black water from septic tanks and grey water are being discharged into storm water drains and subsequently into the rivers. It was reported that the main pollution source of the Sarawak River was the discharge from households [1]. According to Ling et al. [2], the wastewater flow at two major housing