

# A STUDY OF ECOLOGICAL SANITATION AS A WAY TO COMBAT URBAN WATER STRESS

(Date received: 19. 7. 2007)

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## ABSTRACT

Water supply is one of the basic infrastructure requirements. Water treatment and supply are often granted a much higher priority than wastewater collection and treatment, despite the fact that wastewater deserves a greater emphasis due to the impact of its poor management has on public health. A new commitment to give wastewater the same priority as water supply is a very positive development. A pilot project of greywater ecological treatment is established in Kuching city since 2003. Such treatment facility opens up an opportunity of wastewater reclamation for reuse as secondary sources of water for non-consumptive purposes. This paper aims in exploring the potential of the intended purposes in the newly developed ecological treatment project. By utilising the Wallingford Software model, InfoWorks WS (Water Supply) is employed to carry out a hydraulic modeling of a hypothetical greywater recycling system as an integrated part of the Kuching urban water supply, where the greywater is treated, recycled and reused in the domestic environment. The modeling efforts had shown water saving of more than 50% from the investigated system reinstating that the system presents an alternative water source worth-investing in an urban environment.

**Keywords:** Ecological Sanitation, Greywater, Kuching City, Recycling, Urban, Water Supply

## 1.0 BACKGROUND

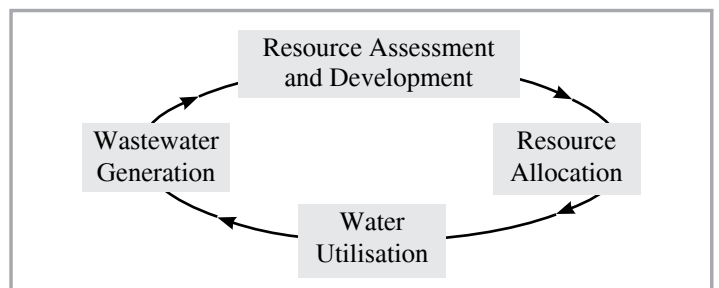
Kuching is the capital city of the Sarawak State in Malaysia. The authorised water supplier, Kuching Water Board abstracts freshwater sources from upstream Sarawak River to supply clean water to 580 000 population. Though Sarawak River system, where more than 97% of freshwater abstraction for Kuching city, is fortunately rich in its reserve and hydrology, this advantaged physical environment is increasingly challenged when placed in the context of the dynamic social environment of Kuching city. Being the capital city of the Sarawak State, Kuching city is the fastest growing area placing great pressure on the water supply and has seen a rapid growth in water demand.

Effectively managing its demand and supply requires a sustainable approach that manages the natural resource together with community demands, both consumptive and uses, and not forgetting also the environment needs. The local practiced water supply management still focuses on strategic direction and priorities revolved around water supply, infrastructure, water reticulation and management of water storages. Sustainable water supply into the future would embrace the concept of Integrated Water Resources Management (IWRM) where the new challenge requires a very different response.

The current water uses are construed along the lines of a one-time use of water, draining them into the sewer and back into Sarawak River as wastewater sink. The system is conceptualised as a flow-through system (see Figure 1). Little attention is placed on the safe management on the huge volumes of wastewater.

To cater for a change for sustainable and ecologically efficient use of water supply, water resources and wastewater management must come together in addressing the water cycle under the IWRM processes. Diversifying the supply options is one way to reduce dependency on sole sources of supply [1]. In order to decrease the pressure on the finite water resources, wastewater

need not be throwing away after one time use but can be prompted for reclamation of household wastewater. Recycling and reuse of wastewater can be a water source for non-consumptive purposes where lesser quantities of potable water are used for purposes other than drinking. This lowers water supply costs, as potable water is expensive in treatment costs and the needs of storage facilities management.



**Figure 1: Schematic of local water resources management**

Much of the water used in daily life ends up as wastewater. Greywater is produced when water is discharged from household appliances and water using fixtures such as shower, baths, washing machines, kitchen and laundry sinks. It excludes water discharged from toilets and urinals (black water). Rough estimate in a water-conserving household in Germany, for example, approximately 60 liters of greywater are generated per person daily [2]. Presently, the wastewater from households in Kuching is partly treated. Only the black water undergoes a partially treatment in septic tanks before the overflow being discharged to the storm water drains. The greywater is released untreated to the storm water drains which runs into Sarawak River. Therefore the water quality of drains, streams and rivers in Kuching are highly polluted. Greywater contains a number of bacteria that may include disease causing organisms.