

Sustainable wastewater management

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Valorization

Access to adequate potable water has remained a problem in many developing countries. While this situation has received significant attention in some countries, many other countries continue to experience limited access to this resource. Lack of access can be associated with many conditions such as limited resource, polluted resource, limited technology among others. However, greywater which is less polluted is mostly discharged untreated into the environment in areas which do not have proper sewer networks. These unregulated discharges can then lead to environmental pollution of both soil and freshwater resources leading to environmental hazards. The high volumes of greywater discharged and the low level of contamination makes greywater a good resource that can be harnessed to augment water supplies in areas of limited access. The limited supply of water has a huge effect on sanitation practices and this can lead to bad sanitation practices which in the long run affect the environment and the individual. The research presented in this thesis provides an overview of greywater reuse in Ghana and forms the foundation for future studies in the area of greywater treatment and reuse in sub-Saharan Africa. This study, therefore, provides a stronger theoretical basis for future studies into greywater treatment and reuse schemes within the sub-region from both the socio-cognitive and technical points of view. It may also serve as an introduction to students, scholars, institutions and interested parties into greywater treatment and reuse.

It further underscores the importance of reusing greywater to supplement water use activities at the household level. Greywater treatment and reuse is a strategy that can reduce the pollution loads to the environment and further augment water supplies for other non-consumptive purposes. Adopting this greywater and treatment system can also lead to reduced water demand from freshwater resources and improved sanitation practices in water-stressed areas.

The economic consequence of lack of water or environmental pollution can translate into many deleterious effects such as the reduction in labour and productivity. The environmental challenges also caused by agricultural waste remain a concern to many in developing countries. The results reported in the thesis emphasize the increasing environmental pollution resulting from the discharge of untreated greywater into the environment. This study identified an agricultural waste that can be converted into suitable material for treating greywater. The application of this local material can promote local acceptability of the concept of greywater treatment and reuse and further create business opportunities for individuals and groups to exploit this material for economic benefits.

The study identified non-potable reuses as the preferred method of reuse application. Concerning beliefs, attitudes and behavioural control that influence the choice of reuse application, the study identified perceived behavioural control and attitude as the dominant significant antecedent of behavioural intentions toward reusing greywater for non-potable purposes. The inclusion of background factors also identified educational level as a distal factor that contributed to the behavioural intentions to reuse water for non-potable purposes. The study further established the willingness of households to begin implementing greywater treatment and reuse practices by adopting treatment systems. The outcome of this study led to the conclusion that personal norms played a major role in the willingness of household heads to begin greywater reuse. Therefore, interventions aimed at promoting greywater reuse should target personal norms rather than other factors. Such campaigns should use messages that appeal to the personal norms of the individual.

This study contains valuable information surrounding the approach, strategy, potential pitfalls, appropriate treatment media and media performance in greywater treatment and reuse in developing countries. It is the first of its kind in Ghana documented in peer-reviewed publications and addresses the lack of data in the area of greywater reuse as a method of wastewater management practice in Ghana and the sub-region. Additional studies further investigating the real implementation of this concept and the environmental auditing of the impact of unregulated greywater discharge are needed to inform stakeholders on the way forward. Such a study should involve policymakers, environmental experts, development agencies and water quality experts.

Previous studies in some developed countries have used a singular approach in exploring greywater reuse and little has been known about how individuals make their decision to use or not to use greywater. Little has also been known about what informs the choice of the reuse application for greywater in these developed countries. To the best of our knowledge, no previous study has directly assessed these factors using socio-cognitive models in developing countries. In sum, a lot of the innovation lies in the statistical techniques used in this study which was a two-prong approach of socio-cognitive models and laboratory analysis. The lessons learned in this study such as the role of personal norms, level of education and gender has reinforced our understanding of the approach to adopt in implementing greywater and reuse strategies.