

An Experimental Study on Greywater Reuse for Irrigating a Green Wall System

Authors : Mishadi Herath, Amin Talei, Andreas Hermawan, Clarina Chua

Abstract : Green walls are vegetated structures on building's wall that are considered as part of sustainable urban design. They are proved to have many micro-climate benefits such as reduction in indoor temperature, noise attenuation, and improvement in air quality. On the other hand, several studies have also been conducted on potential reuse of greywater in urban water management. Greywater is relatively clean when compared to blackwater; therefore, this study was aimed to assess the potential reuse of it for irrigating a green wall system. In this study, the campus of Monash University Malaysia located in Selangor state was considered as the study site where total 48 samples of greywater were collected from 7 toilets hand-wash and 5 pantries during 3 months period. The samples were tested to characterize the quality of greywater in the study site and compare it with local standard for irrigation water. PH and concentration of heavy metals, nutrients, Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), total Coliform and E.coli were measured. Results showed that greywater could be directly used for irrigation with minimal treatment. Since the effluent of the system was supposed to be drained to stormwater drainage system, the effluent needed to meet certain quality requirement. Therefore, a biofiltration system was proposed to host the green wall plants and also treat the greywater (which is used as irrigation water) to the required level. To assess the performance of the proposed system, an experimental setup consisting of Polyvinyl Chloride (PVC) soil columns with sand-based filter media were prepared. Two different local creeper plants were chosen considering several factors including fast growth, low maintenance requirement, and aesthetic aspects. Three replicates of each plants were used to ensure the validity of the findings. The growth of creeping plants and their survivability was monitored for 6 months while monthly sampling and testing of effluent was conducted to evaluate effluent quality. An analysis was also conducted to estimate the potential cost and benefit of such system considering water and energy saving in the system. Results showed that the proposed system can work efficiently throughout a long period of time with minimal maintenance requirement. Moreover, the biofiltration-green wall system was found to be successful in reusing greywater as irrigating water while the effluent was meeting all the requirements for being drained to stormwater drainage system.

Keywords : biofiltration, green wall, greywater, sustainability

Conference Title : ICSWRM 2018 : International Conference on Sustainable Water Resources Management

Conference Location : London, United Kingdom

Conference Dates : February 15-16, 2018