The Florida’s Showcase Green Envirohome (FSGE) incorporates many green technologies. The FSGE is built to meet or exceed 12 green building guidelines and obtain 8 green building certificates. The study focused on the sustainable water cistern and new on-site sewage treatment and disposal (OSTD) system. Also, a cost-benefit optimization model focused on designing a residential home which incorporated a green roof, cistern and graywater systems was developed.

The FSGE captures its stormwater runoff from the green roof, metal roof and wood decking area and routes it to the sustainable water cistern. Graywater from the home (after being disinfected using ozone) is also routed to the sustainable water cistern. This water stored in the sustainable water cistern is used for irrigation of the green roof, ground level landscape, and for toilet flushing water. This study was done in two phases. During phase one, only stormwater runoff from the green roof, metal roof and wood decking area is routed to the sustainable water cistern. During phase two, the water from the graywater system is added to the sustainable water cistern. The sustainable water cistern quality is analyzed during both phases to determine if the water is a good irrigation water and also if it is suitable for use as toilet water.

When the water stored in the sustainability water cistern is harvested in the house for toilet flushing, the nutrient concentrations in the water has slightly higher concentrations compared to the potable water which is typically used in a conventional home. Thus, the black water leaving the home will have higher concentrations of nutrients compared to a conventional home’s black water. Therefore, the FSGE design is to evaluate a new OSTD system. The sorption media selected for this study is the Bold and GoldTM filtration media. The Bold and GoldTM filtration media is a mixture of tire crumb, sand and sawdust. This new OSTD system has sampling ports through the system to monitor the wastewater quality as it passes through. Also, the effluent wastewater quality is compared to that of a conventional system on campus.

The cost-benefit optimization model had two forms, the base and the grey linear model. The base model used average cost of construction while the grey used an interval for the cost of construction and green roof energy savings. Both models included a probabilistic term to describe the rainfall amount. As more risk was assumed in the model, the more rainwater was expected. A typical Florida home was used as a case study for these models. Also, some of the variables were varied to determine their effect on the results.

Major: Environmental Engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 2008, University of Central Florida

Committee in Charge:
Dr. Ni-Bin Chang, Chair, Civil, Environmental & Construction Engineering
Dr. Andrew Randall, Civil, Environmental & Construction Engineering
Dr. Martin Wanielista, Stormwater Management Academy

Approved for distribution by Dr. Ni-Bin Chang, Committee Chair, on June 23, 2010.

The public is welcome to attend.