Nowadays people are more alert about conservation of water and water scarcity. The amount of usable water is decreasing due to unavailability of pure water for day to day use. Both surface and groundwater is contaminated by untreated wastewater discharged from improper onsite wastewater treatment system, nutrient laden agricultural runoff and increasing use of fertilizer in fields. This elevated nutrient level is increasing the maintenance and operation cost of water treatment plant. So it is an important task to remove those nutrients from wastewater and other water bodies by applying environmental friendly process.

In the USA, about 25% homes are still depending on on-site wastewater treatment (OSWT) due to unavailability of centralized treatment process. In Florida, OSWT is managed by the Florida Department of Health (FDOH). By realizing the importance of water conservation, USEPA already determined the maximum contaminant level (MCL) for nitrate and nitrite in water bodies. Many researches are conducted to evaluate the performance of EPA recommended treatment process (i.e. traditional standard drain field) for OSWT. The UCF research group also performed an experiment to understand the efficiency of traditional standard drain field. At the same time the research group developed an innovative wastewater treatment process named B&G treatment bed as a comparison with traditional standard drain field. This paper mainly focuses on performance of these two treatment processes.

The B&G is a novel treatment process by its functionality for nutrient removal. The process generally used a media mixture developed by the research group of UCF. This mixture will act as organic carbon source to support denitrification process while nitrification process does not demand such carbon source. Even it is observed that this mixture can remove nutrient by physical-chemical process. The recirculation sand filter (RSF) of traditional drain field is also filled by another mixture of media. Both media mixtures are developed by batch experiment in UCF laboratory. The performance of the B&G is compared with the traditional treatment process practiced in USA. These media mixtures can be good supporting media for microorganisms growth and development. All the major nitrogen and phosphorus species removal is observed by collecting sample in a weekly fashion. The pathogens removal efficiency is also observed. The sample is analyzed by a certified laboratory (i.e. Environmental Research and Design, ERD) in Orlando, Florida to maintain the best quality of this research. The presence of microorganisms is identified by using PCR. A model is also used to understand the denitrification end depth in the drain field.

Major: Environmental engineering

Educational Career:
Bachelor's of Civil Engineering, BS, 1999, Ashanullah University of Science and Technology  
Master's of Environmental engineering, MS, 2008, University of Central Florida

Committee in Charge:
Dr. Ni-Bin Cheng, Chair, Civil, Environmental and Construction engineering  
Dr. Martin Wanielista, Civil, Environmental and Construction engineering  
Dr. Gour-Tsyh Yeh, Civil, Environmental and Construction engineering  
Dr. Andrew Randall, Civil, Environmental and Construction engineering  
Dr. Lie Zhai, Chemistry and Nano Science Center

Approved for distribution by Dr. Ni-Bin Cheng, Committee Chair, on April 15, 2010.
The public is welcome to attend.