

# GRADUATE SEMINAR SERIES SPRING 2009

CIVIL AND ENVIRONMENTAL ENGINEERING  
TENNESSEE TECHNOLOGICAL UNIVERSITY

BY

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**“Inter-relationship of Water Cycle, Landscape, Microclimate and Energy Use in Urban Environments”**

**Tuesday, February 17, 2009**  
**11.00AM-12.00NOON**

**PRESCOTT HALL ROOM 425**

## **Abstract**

Landscape changes induced by urbanization have been found to influence urban water cycle components including evapotranspiration (ET), runoff and water use. The cascading effects of altered landscape and modified water cycle fluxes and stores on microclimate and energy usage are uncertain, yet critical for urban planning and design, water management and policy making. In the semiarid urban west, landscape changes in residential areas meant to reduce water might result in ET rate modification altering the microclimate and air temperature, which may cascade to increased energy use for cooling in the summertime and feedback to increased water use at power generation facilities. In order, to quantify the relationship of interconnected landscape, water cycle, microclimate and energy usage there is a need for a modeling system to represent landscape and surface characteristics specific to location and time. A methodology capable of modeling the interconnected urban scenario via a three-step process was developed in the dissertation research. The modeling system was applied to quantify the effects of residential landscape conversion from traditional irrigated turf grass to low-water use vegetation on heat fluxes, microclimate, energy use, and water use. The results indicated the use of low-water use vegetation increases sensible heat flux and decreases latent flux, which is accompanied by an increase in air temperature and a 1.5% increase in energy usage, although the outdoor water use is reduced. The conclusion of the study was the need to analyze sustainability of urban development using more than one impact, integrated into a composite sustainability index.

## **Speaker Bio**

Dr. Indumathi Jeyachandran graduated with a Ph.D in Civil Engineering with specialization in Water Resources Engineering. Dr. Jeyachandran's expertise and research interests include Hydrology, Water Resources Sustainability, Remote Sensing & GIS. Currently working as a postdoctoral researcher specializing on hydro climatology alteration caused by large man-made water projects.