ASU SCHOOL of SUSTAINABILITY

ARIZONA STATE UNIVERSITY

In Partial Fulfillment of the Requirements for the Degree of

Doctor of Philosophy

Yun Ouyang

Will defend his Dissertation Prospectus

Relationship of Single-Family Residential Water Use with Its Determinants: A Multi-scale Study in Phoenix Metropolitan Region

Abstract

The urban water supply in Phoenix metropolitan region is challenged by population growth, urbanization, and climate variability. Urban water supply is limited by local water source availability and by prior preservation of water rights by other users, and hence it is unlikely to explore new water resources at a reasonable cost. Water demand management has been recognized as a new approach aimed at maximizing the benefits of water use while minimizing the demand for new water resource development. To effectively manage urban water demand, there is an imperative need to understand how different factors affect urban water demand. In this research, I will focus on single-family residential water use, which accounts for more than half of the urban water demand.

The relationships between residential water demand and its determinants may be dependent on the scale of observation. However, the mechanisms inducing such potential scale dependency are not well understood in general, and, to my knowledge, have not been examined in specific cases. The research topic of my dissertation study is: how do socio-economic and environmental factors affect water use of single-family homes at multiple spatial scales in Phoenix metropolitan region? Employing panel data methods, I will examine the relationships between single-family residential water use and socioeconomic and environmental factors at three different spatial scales: household, census tract, and city. Four categories of factors are considered: household characteristics, housing characteristics, climate factors, and water price. A cross-scale comparison will be carried out regarding how these relationships change with spatial scale. In addition, an agent-based model will be built to simulate how household water use behavior brings out the city-scale water demand. Different plausible scenarios will be defined to examine how future single-family residential water use in Phoenix will be with possible combinations of values of the factors in these scenarios.

This research will improve our understanding of scale-dependency embedded in the relationship of single-family residential water use with different socio-economic and environmental factors. The agent-based model to be built in this research can be useful as a platform to examine how future single-family residential water use pattern will change in different settings.

October 18, 2011
10:00 AM
Wrigley Hall 481
800 S Cady Mall, Tempe, AZ 85281

Faculty, students, and the general public are invited.

Supervisory Committee:
Dr. Elizabeth Wentz (Co-Chair)
Dr. Benjamin Ruddell (Co-Chair)
Dr. Marcus Janssen (member)