Assessment of the Impact of Optimal Irrigation Scheduling with Rainwater Harvesting for Water Conservation and Runoff Reduction in Large Urban Areas

Jun-Hak Lee¹, Dong-Jun Seo² (djseo@uta.edu), Amir Norouzi², and Seongjin Noh²
¹Dept. of Earth & Environ. Sciences, ²Dept. of Civil Eng., The Univ. of Texas at Arlington, Arlington, TX, USA

MOTIVATION
- If lawn irrigation scheduling can be optimized location-specifically and adaptively to changing environmental conditions, one may expect significant water use reductions.
- While a great deal of research has been carried out on smart irrigation and rainwater harvesting (RWH) individually at scales ranging from a house to a subdivision, very limited knowledge currently exists on how the impact and potential benefits may scale when lawn irrigation and RWH are controlled at regional scales.

OBJECTIVES
- Develop a prototype system for integrated control of lawn irrigation and RWH for water conservation and stormwater management.
- Assess and demonstrate the potential impact and value of the system.

RWH & IRRIGATION CONTROL

Given the soil moisture state and rainwater available in the rain barrels, we solve for the optimal timing and amount of irrigation necessary to keep the lawn healthy while minimizing stormwater runoff and the cost of tap water.

WEATHER-SOIL-VEGETATION MODELING AND STATE UPDATING
- WSV model is modified from the climate-soil-vegetation model (Eagleson 1978).
- IC and states of WSV will be updated via advance data assimilation method (e.g., variational method) (Lee and Seo 2014).

WEATHER RESOURCES FORECASTING
- Medium-range forecasts of precipitation and temperature (i.e., up to 15 days into the future) will be used as input of computational models.

REFERENCES & ACKNOWLEDGEMENT

This material is based upon work supported by the NSF under Grant No. CyberSEES-1442735. This support is gratefully acknowledged.