Urban Water Innovation Network

Transitioning toward sustainable urban water systems

National Science Foundation
WHERE DISCOVERIES BEGIN

Project B1-1 (CSU)

Application of the Integrated Urban Water Model to Evaluate Strategies for Urban Water Demand Reduction

THE MODEL

IUWM allows users to forecast urban water demand and project potential savings from conservation and use of alternative water sources over varying climatic conditions and land uses.

The model can also modify the parameters for practices including: graywater, stormwater and wastewater reuse; irrigation conservation; projections for changes in population and land use; and costs associated with conservation and demand reduction practices.

STRATEGIES

- Indoor conservation
- Fit-for-Purpose water supply
- Graywater resuse for toilet flushing and irrigation
- Stormwater capture and use
- Wastewater treatment plant effluent reuse
- Irrigation conservation

PROJECT CONTACT

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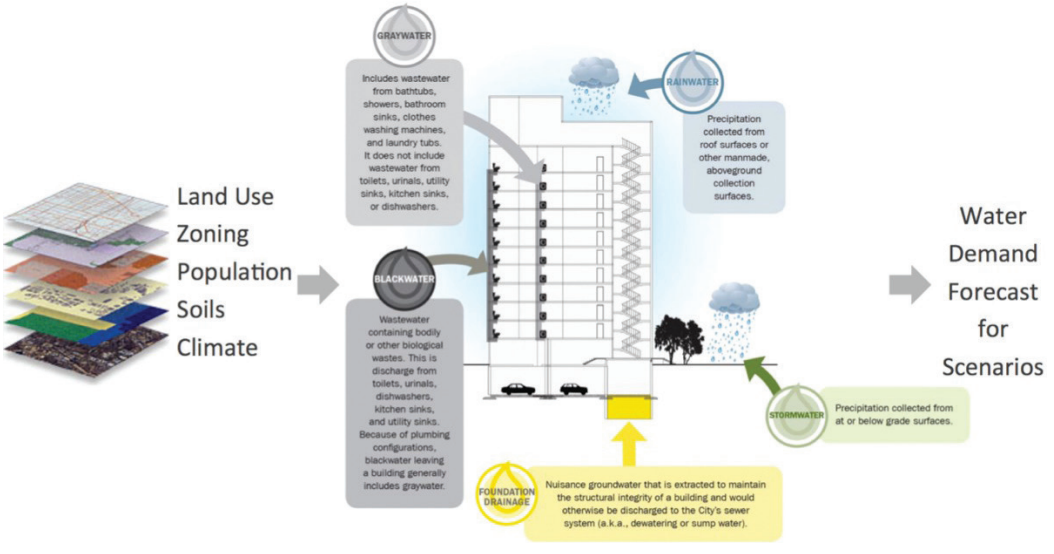
Water supply and demand assessment under alternative climate, land use and population scenarios is an area of great interest among urban planners and water managers.

The Integrated Urban Water Model was developed for urban water demand and savings forecasting with urban water conservation and recycling practices. The purpose of the mass balance model is to allow evaluation of alternative urban water management strategies under varying climatic conditions at a municipal or regional scale.

IUWM has been deployed as an online tool and as a web service, thus enabling accessibility, ease of use and applicability at the municipal scale.

IUWM facilitates the development of urban water demand forecasts through automated retrieval of publicly available data inputs through a geographical information system (GIS) interface, thus relieving the need for manual input of data.

Indoor residential demands are forecast based on end-use at the census block level with population and household data retrieved from the United States census. Combined residential/commercial, industrial, and institutional (CII) irrigation demands are forecast based on daily evapotranspiration and land cover data.



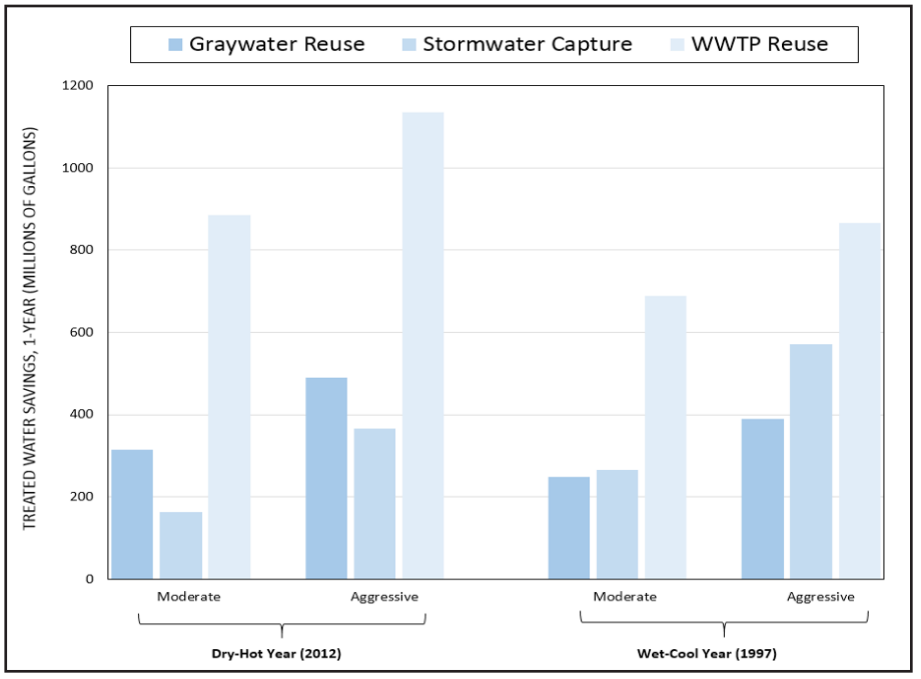


Figure 1: Annual savings of potable water expected in wet and dry years from alternative water sources

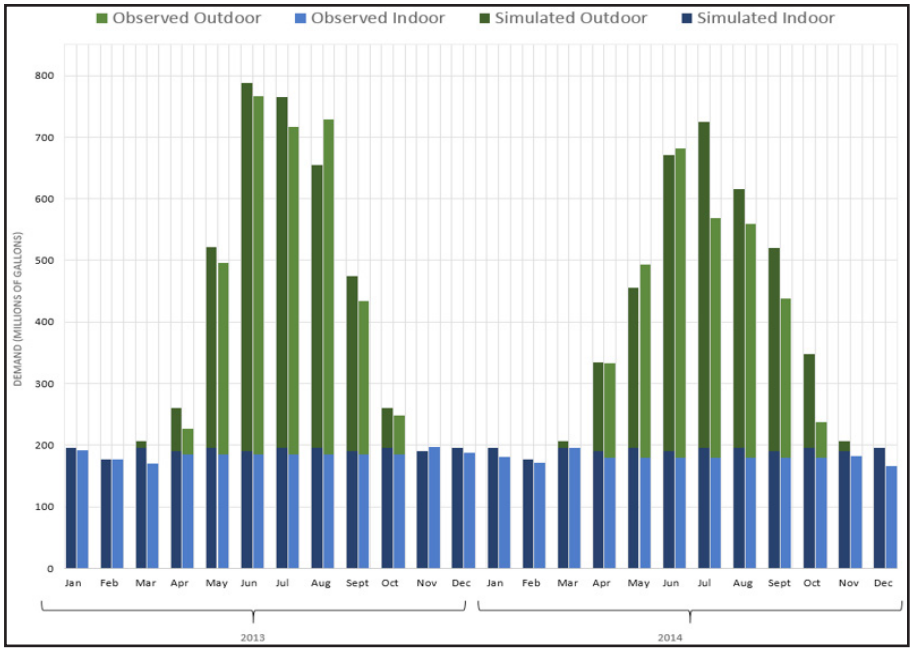


Figure 2: Calibration results of IUWM versus observed data from the city of Fort Collins, Colorado.

DATA REQUESTS

- Indoor water use separated by residential and CII (5 – 10 years duration)
- Outdoor water use separated by residential and CII (5 – 10 years duration)
- Shapefile for service area for which data is provided

DATA USE

Historical indoor and outdoor water use will be used to calibrate IUWM to the modeled city and verify forecasts of indoor and outdoor demand. This will enable estimation of baseline conditions so that scenarios of water demand reduction, population change, land use change and climate change can be evaluated.

OUTPUTS

Application of IUWM will provide guidance on most appropriate water conservation and reuse strategies in a particular urban area based on water demand reduction and cost. Other benefits can also be evaluated including reduction of wastewater and stormwater discharges. Scenarios of water conservation and reuse can be evaluated under varying climatic, population and land use changes.

ADDITIONAL RESOURCES

Integrated Urban Water Model:
www.erams.com/iuwm

UWIN Project Page:
https://erams.com/UWIN/b1-1-csu/