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## Evaluating optimal demand reduction strategies using the Integrated Urban Water Model for three U.S. cities

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## **Evaluating optimal demand reduction strategies using the Integrated Urban Water Model for three U.S. cities**

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**Abstract:** Understanding urban water demand under varying climatic conditions, land use change and population growth is critical for municipal water supply planning. The Integrated Urban Water Model (IUWM) is a mass balance municipal water use and forecasting tool that quantifies residential, commercial and outdoor irrigation demands. In addition, IUWM simulates indoor and outdoor conservation strategies, and has explicit capacities to evaluate the potential for water reuse and recycling from graywater, wastewater, and stormwater runoff. Water demand in cities is influenced by regional climate, development patterns and water use behavior. This study investigates the effects of alternative water demand reduction strategies under localized drivers of water demand. The IUWM model was calibrated for three U.S. cities with distinct climatic conditions, water use behavior, and land cover characteristics. The performance validity of the model was evaluated at city block group to municipal scales. A global sensitivity analysis method was used to understand the primary drivers of water use across the study cities. A suite of water reuse and conservation scenarios were simulated in IUWM to identify effective strategies that can counterbalance demand due to population growth.

**Keywords:** Integrated urban water management, household water conservation, water reuse, water demand forecasting