



In Partial Fulfillment of the Requirements for the Degree of

Master of Science

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Will defend her thesis

Supply-Enhancing Water Reuse: A Quantitative and Spatial Assessment of Opportunities in Maricopa County, Arizona

Abstract

Wastewater reuse is emerging as an integral component of sustainable water management, particularly in southwestern United States, given its potential to reduce the strain on high-quality freshwater sources by providing a wider portfolio of water supply choices as well as its ecological benefits in restoring diminished stream flows and reducing the concentration of pollutants. However, a serious impediment to planning for wastewater reuse has been the lack of consistent reporting and accounting for generation of treated wastewater and its reuse in a spatially disaggregated manner relevant for water planners. This thesis is based on an analysis of 31 municipal wastewater treatment facilities in Maricopa County, Arizona, for which monthly data provided by the Arizona Department of Environmental Quality are complete. Using this data, the reclaimed water generated and reused at each facility was mapped with reference to the underlying municipal and water provider boundaries. Spatial analyses were then conducted to conjunctively assess the relationships between reclaimed water facility locations, institutional boundaries, quantity and quality of seasonal flow, and adjacent land use water demand to reveal potential reuse options. The results delineate reuse opportunities allowable under state quality regulations and describe the imbalance in reclaimed water availability among municipalities and water providers. Specifically, the results show municipalities serving larger land areas have the most reclaimed water generated and therefore the potential to transfer water to cities with less diversity in their supply sources. The overwhelming majority of land uses adjacent to the facilities are vacant or open space, which by definition has zero water demand. This spatial isolation from potential end-users implies the need for alternative solutions like groundwater recharge, or else significant conveyance infrastructure costs could be required. Given data limitations, this study does not provide a complete assessment of wastewater reuse options in Maricopa County.

Its contribution lies in developing a prototype that demonstrates the imbalance between wastewater generation and reuse in a spatial context and how, given stronger organization and tabulation of reclaimed water data in Arizona, the methodology developed can be used to reveal the physical and institutional relationships of this water source for policy and decision-making.

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Faculty, students, and the general public are invited.

Supervisory Committee:
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