

## **Public Good or Commodity? Institutional Differences in Water Management Strategies and Conservation Outcomes in Tucson and Phoenix**

Turner, V. K.

Water, like many natural resources, has been conceptualized — and managed — as either a public good or a commodity. These conceptualizations are reified by institutional forces that yield dichotomous water pricing goals: conservation and revenue. Tucson and Phoenix illustrate this dichotomy well. Tucson uses an inverted block rate pricing structure in which price increases with usage are associated with conservation. Conversely, Phoenix uses a declining block rate structure in which price decreases for use above a certain threshold and does not encourage conservation. Both cities have become increasingly vulnerable to water shortages as rapid urban growth continues and the uncertainties of climate change complicate water supply models. Nevertheless, Tucson has chosen to embrace conservation and Phoenix has not. Facing similar environmental concerns, differing institutional values account for differences in approaches to water management and conservation in the two cities. Water management choices also have different environmental justice outcomes, rendering certain groups more vulnerable to water shortages than others. This paper illuminates the institutional differences driving water management decisions in Tucson and Phoenix and the resulting social justice ramifications using archival evidence, correspondence with water agencies, and secondary literature sources. Institutions imbedded in more liberal traditions, like those in Tucson, are more likely to conceive of water as a public good and to address conservation through pricing structures. Moreover, these liberal tendencies will better equip the city to address environmental justice issues associated with conservation.

School of Geographical Sciences, Arizona State University-Tempe, PO Box 870104, Tempe, AZ 85287-0104



# Pricing for Conservation: Response to Growth and Drought in Tucson and Phoenix

Kelly Turner

Department of Geographical Sciences, Arizona State University

Decision Center for a Desert City/IGERT



## Introduction

In the face of population growth during drought conditions since the mid 1990s, Phoenix and Tucson have fundamentally different water pricing schemes. Phoenix retains a flat pricing structure—the cost of water remains constant at any consumption level. Tucson adjusted progressive pricing structure—customers pay higher rates for increased levels of consumption—in order to strengthen the conservation incentive. This project compares changes in pricing structures implemented by the City of Phoenix and the City of Tucson water providers during this period of growth and drought. Changes in residential water use illuminate the relative effectiveness of a flat pricing structure versus a progressive pricing structure in promoting conservation. This information is a component of a larger effort to examine the cultural and institutional forces that have created divergent policies about conservation in Tucson and Phoenix.

## Phoenix and Tucson face rapid growth and drought conditions.

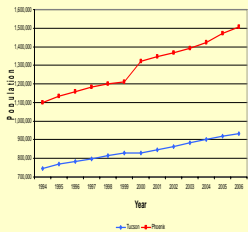


Figure 1: Population Increase in Metro Tucson and the City of Phoenix, 1996-2006. Geographic area in both cases roughly corresponds with provider service area.

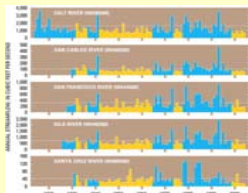


Figure 2: Annual mean streamflow at 5 long-term streamflow-gaging stations in central and southern Arizona, 1999-2004. Source: The United States Geological Survey, Hydrologic Conditions in Arizona During 1999-2004: A Historical Perspective (2005).

## Data

This project uses Water Infrastructure and Finance Authority of Arizona (WIFA) residential water price rate data from 1999, 2003, 2005 and 2006. The cost per 1000 gallons of water at increasing consumption levels was determined in order to compare the cost of water at different price rates and structures. Consumption data reflect the average monthly water use per customer.

## Results

### Water Rate Structure Differences

#### Phoenix Flat Structure

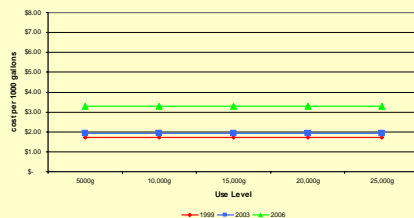


Figure 3: Flat pricing structure for the City of Phoenix Water in 1999, 2003, and 2005.

#### Tucson Progressive Structure

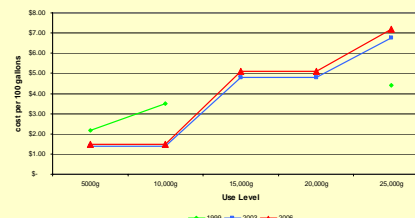


Figure 4: Progressive pricing structure for the City of Tucson Water in 1999, 2003, and 2005.

### Water Rate Structure Impacts

#### Household Water Consumption

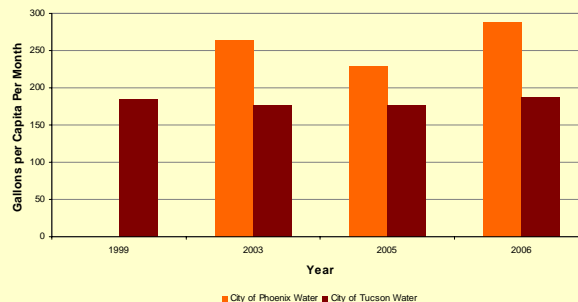


Figure 5: Comparison of average water consumption per customer per month for the City of Tucson and City of Phoenix water providers in 1999, 2003, 2005, and 2006.

## Discussion

- The flat rate charged by the City of Phoenix Water increased between 1999 and 2006. The City of Tucson Water exaggerated the progressive price structure already in place—the price for lower levels of water use decreased while the price for higher levels of water use increased.
- The gap between water consumption by City of Phoenix Water users and City of Tucson Water users increased during that time period.
- Households using less than 10,000 gallons per month pay less for water in Tucson than in Phoenix.

## Future Research

The different responses to growth and drought manifest by the City of Tucson and the City of Phoenix water providers' price structure underscore the two cities' different attitudes toward conservation. These findings motivate in-depth qualitative analysis of the cultural and institutional forces that underlie water policies and behaviors. The focus of future research is on the social equity consequences of water conservation policies.

## References

Water and Wastewater Residential Survey for the State of Arizona. Water Infrastructure Finance Authority: 1999, 2003, 2005, 2006.

## Acknowledgment

This material is based upon work supported by the National Science Foundation under Grant No. SES-0345945 Decision Center for a Desert City (DCDC). Any opinions, findings and conclusions or recommendation expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).