



An Assessment of Municipal Water Conservation Policy

in Greater Phoenix, Arizona, 1980-2007

Annie Gustafson¹, Kelli Larson², Paul Hirt¹, and Lilah Zautner²

Arizona State University, Global Institute of Sustainability

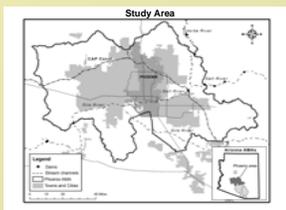
¹Department of History and ²School of Geographical Sciences



Introduction: Evaluating Conservation Policy

This poster evaluates historic changes in municipal conservation programs since the 1980 Groundwater Management Act (GMA) as well as variation in water consumption – Gallons Per Capita per Day (GPCD) – across ten of the largest municipalities in the Phoenix region. Understanding urban water use and demand management is essential for sustaining the desert region and meeting the goal of the GMA: *no net loss of groundwater (safe yield) by 2025*. In order to mitigate groundwater overdraft, the GMA stipulates 5 successive management periods over which Active Management Areas (AMAs) must incrementally plan to achieve safe yield. As the Phoenix AMA prepares to embark on the 4th management plan, we examine the shifts in demand management over the 1st 3 management periods, the types of conservation programs across municipalities, and reductions in per capita water use in the region.

Following from a review of policy documents, interviews, and historic as well as contemporary water use data, our analysis reveals that cities with a high number of conservation programs do not exhibit lower rates of per capita consumption. Rather than heeding calls to establish a “culture of conservation,” legislative and institutional changes to the municipal conservation program over the past 25 years have enabled consumption.



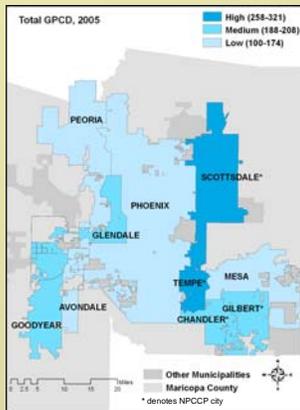
In particular, the introduction of the Non Per Capita Conservation Program (NPCCP) in 1995 represents a shift from a performance-based program focused on reducing per capita water use to a prescriptive program emphasizing voluntary conservation. Further, demand management programs in the region are predominately focused on education and outreach efforts, which often fail to change water use behaviors.

Changes in Municipal Conservation Policy in the Phoenix Region (AMA)

	Management Period		
	1st: 1980-1990	2nd: 1990-2000	3rd: 2000-2010
Statutory Requirement of Program	Achieve reasonable reductions in per capita use	Achieve additional reductions in per capita use	Achieve additional reductions in per capita use
Large Municipal Providers Must	Reduce Total GPCD by 6% or 11% in service territory based on 1980 water use data	Meet Total GPCD targets based on provider's "conservation potential"	Meet individual GPCD targets for different water use sectors; Total GPCD requirement eliminated
Changes and Amendments	1986: Exemption of small municipal providers from conservation requirements	1995: Alternative NPCCP Program substitutes Reasonable Conservation Measures (RCMs) for Total GPCD requirements	2007: Modified NPCCP will replace Total GPCD program in 2010
Events Contributing to Changes	Extreme groundwater overdraft and federal threat to cancel CAP funding lead to passage of Groundwater Management Act (GMA)	High rates of non-compliance in Total GPCD program and complaints from municipal providers about utility of GPCD as a compliance measure	After 10+ yrs of litigation between ADWR and private water company, AZ Supreme Ct. asks ADWR to create alternative conservation prog.
Significance of Changes	AZ dedicated to reducing groundwater pumping to "safe yield" and conservation programs instituted for all water users	State allows non-complying cities to join a conservation program that does not require "reductions in per capita use"	Municipal per capita water consumption remains high and state admits safe yield will not be achieved

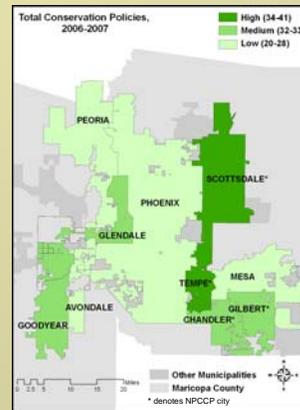
References:
• Anne Schneider and Helen Ingram, "Behavioral Assumptions of Policy Tools," Journal of Politics, Vol. 52:2 (May 1990).
• Interview quotes obtained from transcriptions of interviews conducted with a water conservation specialist from each of the ten cities included in this study, 2006-2007.

Per Capita Water Use



❖ New and growing municipalities in the West exhibit lower rates of water use than in the East Valley.
❖ NPCCP cities exhibit higher consumption than Total GPCD cities, despite high expenditure on a larger number of conservation programs.

Demand Management

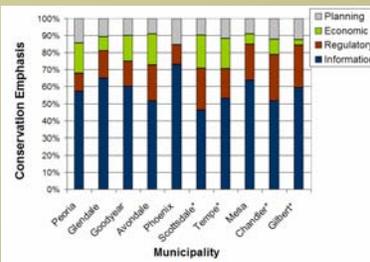


❖ Larger and older municipalities in the East Valley have more conservation programs than in the West.
❖ Cities in the NPCCP program (with no GPCD standard) have the most conservation programs, most of which are information-based outreach programs.

Types of Conservation Policy

Conservation programs rely on varying assumptions about what motivates change in water use habits (Schneider and Ingram 1990), and this is relevant to a given policy's effectiveness. The chart below illustrates different emphases on program types by city, and the accompanying notes provide example programs, patterns, and challenges for each.

Economic-based programs include water pricing structures and monetary rebates for replacing high flow plumbing fixtures and turf. While the City of Phoenix does not rely on financial incentives for conservation, wealthy Scottsdale has a strong emphasis on this type of program.



Interview Quote: "The low cost of water... it's too cheap... The cost is so low that people don't treat it as a valuable resource."

Planning policies include municipal demand management and drought plans, which are important for mitigating vulnerability to water shortages in a rapidly growing desert metropolis. Some relatively young cities in the region have only recently established such plans.

Interview Quote: "Because we have had planning for water resources, we have different ways of using the water [and] recycling the water. Other parts of the state don't have that."

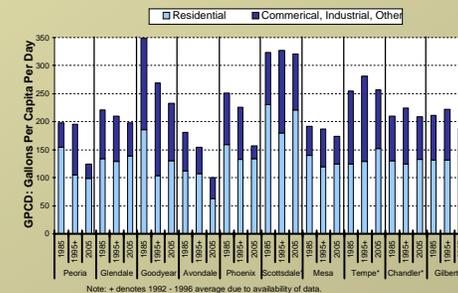
Informational programs include print, radio, and TV messages about conserving water and public education initiatives in schools and communities. These are the most prevalent type region-wide, despite the weak link between knowledge or information and behavior change.

Interview Quote: "People don't have any idea how to program their [irrigation] timer. They just don't get it... so they over-water."

Regulatory policies are legally enforceable ordinances such as those prohibiting water waste and thirsty plants including turf. Landscaping mandates are typically limited to new development, and no watering restrictions have yet been implemented during the current (more than decade long) drought.

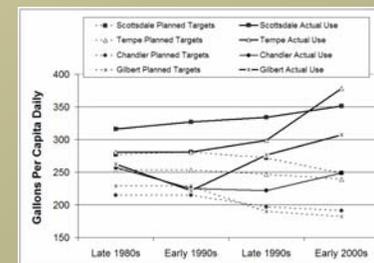
Interview Quote: "The developers... want everything to look really green and really lush."

Changes in Water Use: 1985, 1995+, & 2005



• Residential water use accounts for approximately 2/3rds of municipal water consumption, although the proportion varies across the region and over time.
• In areas with rapid population growth and new development with efficient infrastructure, especially in the West Valley, total GPCD has declined.
• Between 1985 and 2005, cities on the Total GPCD program decreased per capita water use by an average of 15%, whereas cities in the Non Per Capita Conservation Program only decreased their use by an average of 1.5%.

Comparing Water Use and Conservation Targets in the NPCCP Cities



Trends & Patterns

All of the cities on the NPCCP program failed to meet regulatory compliance rates over time.

Throughout the study period, the NPCCP cities exceeded their respective conservation targets by an average of 17%.

Impact of Urban Water Conservation Policy

In a metropolitan area where municipal demand accounts for almost 40% of total water use, understanding residential water use patterns and conservation policies is essential for managing a scarce resource, especially in the face of rapid population growth and expected climate changes. Comparing conservation programs to water consumption, the highest-ranking cities among the top 10 in Phoenix were those that joined the Non Per Capita Conservation program in 1997. The NPCCP program requires the adoption of a suite of "reasonable conservation measures," most of which are voluntary information-based programs. In 1999, state officials acknowledged the legislative goal of safe yield is unattainable by 2025 in the Phoenix AMA. The weakened regulatory program inhibits the ability of water providers to meet policy standards for reducing demand, thereby exacerbating the region's vulnerability to water shortages.

Acknowledgement: This material is based upon work supported by the National Science Foundation under Grant No. SES-0345945 Decision Center for a Desert City (DCDC) and DEB-0423704 Central Arizona Phoenix Long-Term Ecological Research (CAP LTER). Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation (NSF).