Effectiveness of Water Conservation within Tempe's HOA/NA Grant Program

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Background

In a desert biome with 182,498 residents, Tempe, AZ must be conscious of water consumption. Each year, the city consumes over 2 trillion gallons of water. From past research using data on lot size, meters, and household size (census), city and household consumption is generally known. However, little research has focused on neighborhood consumption data; specifically Homeowner Associations (HOA) and Neighborhood Associations (NA), which would add to a more comprehensive analysis of the city's total consumption.

Annually, Tempe provides $30,000 in grant funding to HOAs and NAs aiming to implement a water consumption project. Looking at 2009-2017, this research project analyzed the impact of the city's rebate program, focusing on the most and least successful projects, by examining the consumption of grant receiving HOAs and NAs and to determine if their project was successful in conserving water. Estimated water budgets before and after project installation were also calculated and graphed to provide data on what the selected neighborhoods should consume compared to actual.

Methods

- ORACLE → Meter information and water consumption data over the years 2009-2017
- → Assessed conservation projects funded by rebate program
- Arc GIS → Mapped square footage of HOA and NA irrigated landscape
- → Data compilation and graph creation
- → Examined temperature experienced over study period (as a control variable)

Acknowledgement

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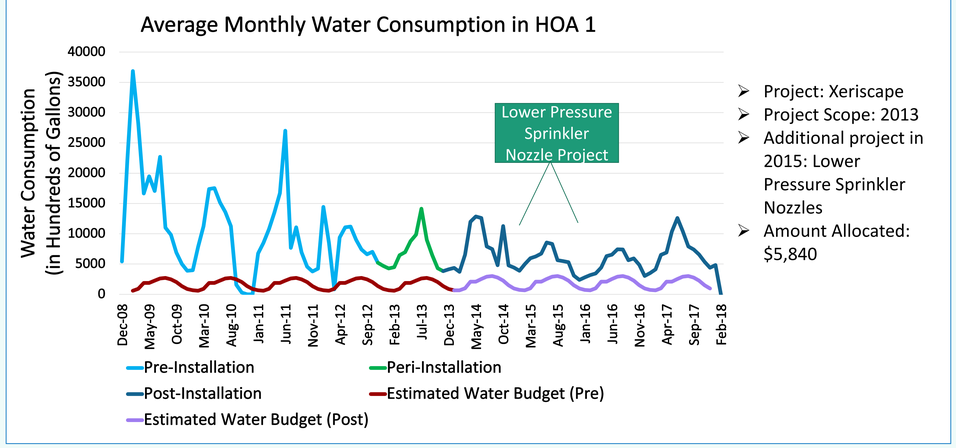
What impact did the City of Tempe's rebate program have on water conservation in participating neighborhoods?

Most Successful Project

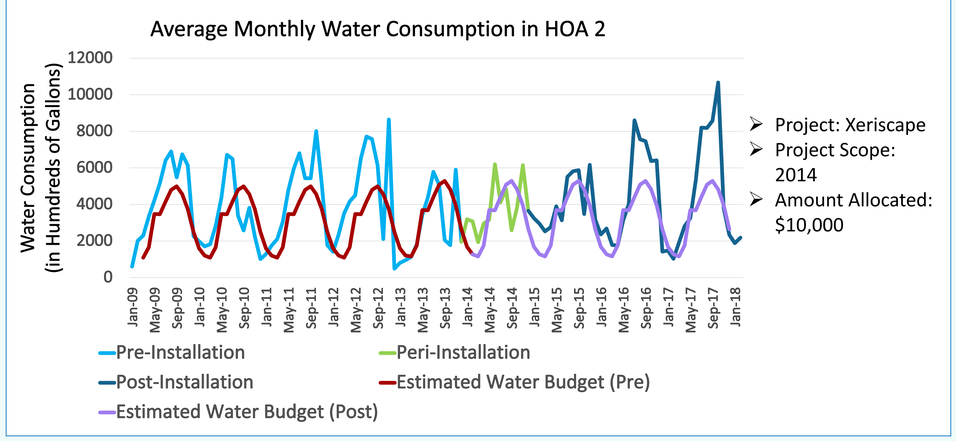


- Project: Xeriscape
- Project Scope: 2013
- Additional project in 2015: Lower Pressure Sprinkler Nozzles
- Amount Allocated: $5,840

Legend:
Pre-Installation: Water consumption before project installation
Peri-Installation: Water consumption during project installation
Post-Installation: Water consumption after project installation
Estimated Water Budget (Pre): Calculated pre-installation consumption
Estimated Water Budget (Post): Calculated post-installation consumption

Possible Data Errors:
- Water meter was not read for a certain month; readings occur monthly
- HOA implemented project later than their designated year
- No data found in Oracle Billing Program

Least Successful Project



- Project: Xeriscape
- Project Scope: 2014
- Amount Allocated: $10,000

Conservation Project Recommendations

Lower Pressure Sprinkler Nozzles
- Equipment must be matching to be effective; size and pressure of equipment is equivalent
- Reduces the amount of water consumed when irrigating landscape

Xeriscape
- Requires little to no maintenance and irrigation
- Works better on a large scale

Smart Controllers
- Weather based
- Accessible remotely

WATER USE IT WISELY

Analysis

Most Successful Neighborhood: HOA 1

This HOA proposed Xeriscaping areas by replacing several sections of grass with gravel in 2011. Average monthly consumption dropped post-installation. Their project was successful as the trend continued to stay lower than pre-installation. In 2015, the HOA was granted another project to replace all neighborhood sprinklers to lower pressure nozzles. This furthered the decrease in consumption. The uptick in 2017 may be due to a hot summer and this will need to be monitored by the city this summer.

Least Successful Neighborhood: HOA 2

This HOA proposed Xeriscaping areas around the neighborhood. Small sections within two large plots of turf were converted to Xeriscape. While Xeriscape does exceptionally well at a large scale, this project was too small to create a change. Pre-installation, the neighborhood's consumption was relatively stable. Per-installation showed a drop in water consumption. However, the years post-installation consumption increased, reaching higher values than those experienced pre-installation.

Conclusion

This poster focused on a case study of the most and least successful projects, specifically Xeriscaping, but research looked at 11 different HOA conservation projects spanning 2009-2016. Each neighborhood is expected to complete their conservation project within the year after receiving their money allocation; however, there is no certainty of that as there is no accountability. Water meter readings and graphs should show that a project was implemented and successful (HOA 1).

Similarly to HOA 2, most neighborhoods experienced the same consumption rates or increased after the conservation project was implemented. The fluctuations in both cases were congruent with fluctuating temperatures and overseeding. Overseeding is a technique of planting grass over existing grass which requires a large amount of water resulting in higher consumption rates during that reading period. Research showed that Tempe needs to add another layer to the grant program to create accountability for recipients. As DCDC's main purpose is to analyze and understand stressors and how they impact water resources in order to make informed environmental decisions, this study provides DCDC with relevant and viable information to aid in decision-making regarding water resources and possible techniques to conserve water within neighborhoods.