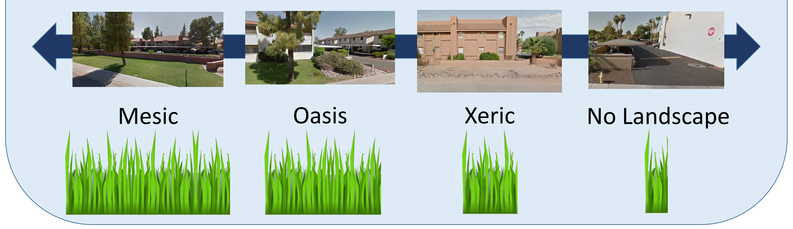
The Effect of Apartment Landscapes on Water Consumption

Liliana Jimenez, DCDC Internship for Science-Practice Integration Yujia Zhang, Graduate Mentor
Peter Smith & Richard Bond, City of Tempe Supervisors

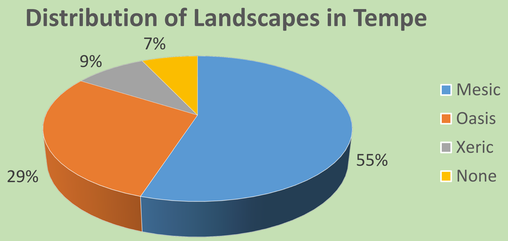
Goals

This research compares the water consumption of approximately 10% of the apartment complexes (n=46) in the City of Tempe, Arizona, in relation to 1 of the 4 types of landscape. The goal is to understand the relationship between landscaping and water consumption in apartment complexes. The four landscape types have been defined as mesic , oasis, xeric, and no landscape. Mesic is comprised mostly of grass and non-native species. Oasis is a mix of mesic and xeric landscaping. Xeric contains gravel and native plant species. No landscape has no turf or plants.



Methods

46 apartment complexes were randomly sampled using GIS. The complexes include the following landscape types in Tempe.



Number of parcels and number of units on the property.

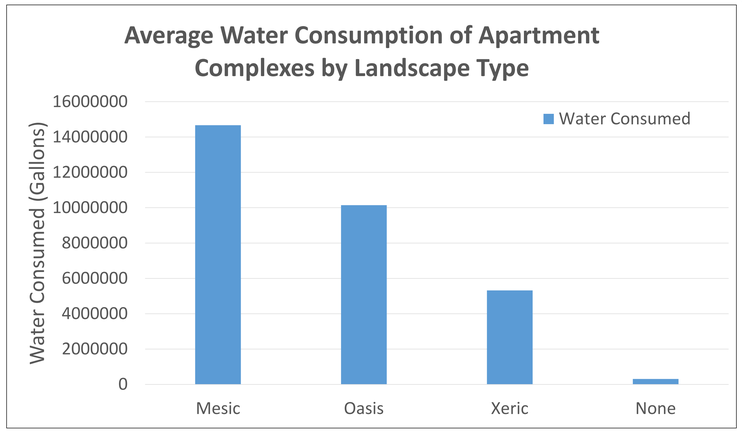
Data compilation and analysis and creation of graphical representations.

Current aerial photographs and address confirmation.

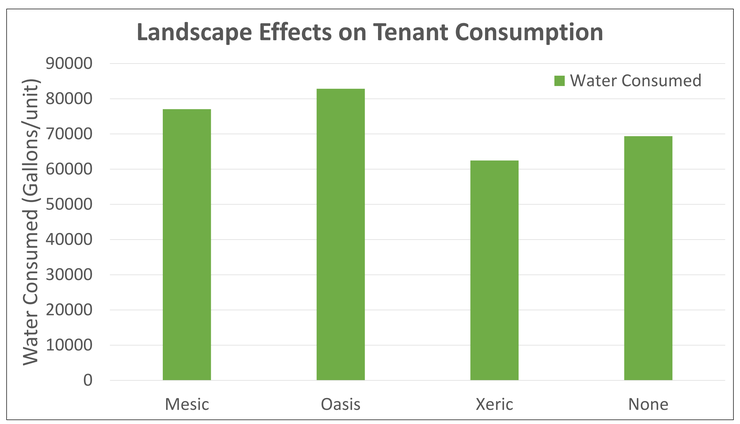
Water consumption data and billing history.

The data was normalized by averaging the water consumption per apartment complex by the number of units on the property.

Results

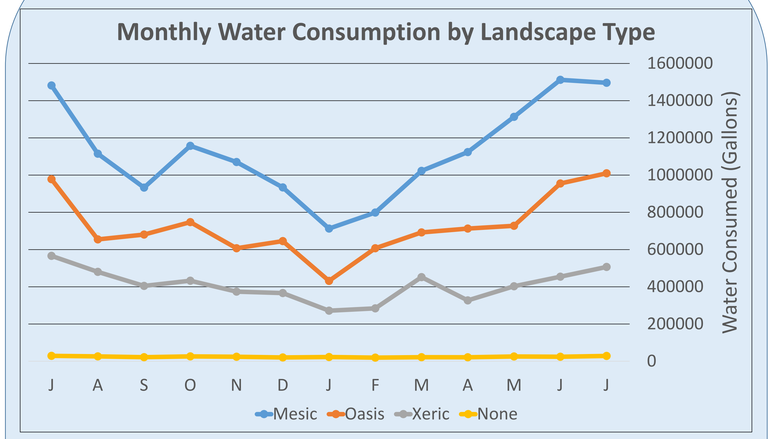


The water consumption data was taken from the amount of water serviced to the various water meters located on an apartment complex's property. This figure above represents the average amount of water consumed for the entire year by apartments within one of the landscape types.



A facet of this project was dedicated to understanding if landscape choices had any effects on tenant consumption that could potentially lead to higher pricing. This figure was made by taking the average amount of water consumed per unit on each apartment, then categorized by landscape type. The high consumption by the oasis units is potentially caused by the great variance in the landscape proportions. Oasis landscapes are a mix of mesic and xeric landscaping, and they vary on how much mesic vs. xeric is implemented. This research defined oasis landscapes as any type of landscape that was between a 4:1 and 1:1 ratio.

Conclusion



The water consumption data for each apartment was gathered from the same temporal scale, July 2014 through July 2015, in order to decrease the variance due to weather inequities. This also allowed for a better understanding of how weather and seasons affect apartment complexes' water consumption throughout the year.

The results yielded in this research show that there is indeed a relationship between landscape choices in apartment complexes and their water consumption. Mesic landscapes, which has the most grass and non-native plant species, used substantial amounts of water compared to the other landscaping types. This may have large scale impacts on the water consumption habits for the City of Tempe, as over 50% of apartment complexes in the city have implemented mesic landscaping. Oasis landscaping is often implemented to compromise between xeric and mesic landscaping since it incorporates both, however, the water consumed by oasis landscapes is still significantly high when compared to complete xeric landscaping. Xeric landscaping is meant to be less water intensive, while still providing the presence of a pleasant landscape and would cut down on a complex's water consumption by nearly one-third. Should the water system in the City of Tempe become stressed, removal of grass from landscapes would yield significant water conservation.

Acknowledgements:
This material is based upon work supported by the National Science Foundation under Grant No. SES-1462086, DMUU: DCDC III: Transformational Solutions for Urban Water Sustainability Transitions in the Colorado River Basin. 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).