

Residential Landscape Water Use, 1998 to 2003

Chris A. Martin, Linda B. Stabler, Kathleen A. Peterson, Sarah B. Celestian, Darin K. Mahkee, and Catherine K. Singer
 Department of Applied Biological Sciences, Arizona State University East, 7001 East Williams Field Road, Mesa, AZ 85212



Introduction

Average rainfall in the CAP LTER area is 180 mm (7") per year. Average annual potential evapotranspiration is 2062 mm (80.2"). Urban landscape vegetation in the CAP area is normally irrigated because of this great disparity between potential evapotranspiration and rainfall.

Public awareness of increasing consumptive water use has caused a heightened awareness of the need to develop sound water conservation strategies with particular attention given to controlling the amount of water applied to outdoor amenity landscapes. Local area municipalities like have adopted landscape design and planting ordinances that recommend or regulate plant frequency and composition of new landscape installations. Some even offer rebate programs to residents who convert turf or mesic dominate yards into xeric or water conserving landscapes.

The intent of these ordinances is to balance water conservation with landscape amenity by giving residents a list of acceptable low water use, desert adapted or desert native plants for landscaping purposes. However, prior to 1998 the amounts of water used by homeowners to solely irrigate landscape vegetation including seasonal and yearly variation was unknown.

Methods

The structure and composition of residential vegetation, being intentionally constructed to enhance landscape aesthetics, may be defined by a system of three locally common landscape design typologies, mesic, oasis and xeric (Fig. 1).

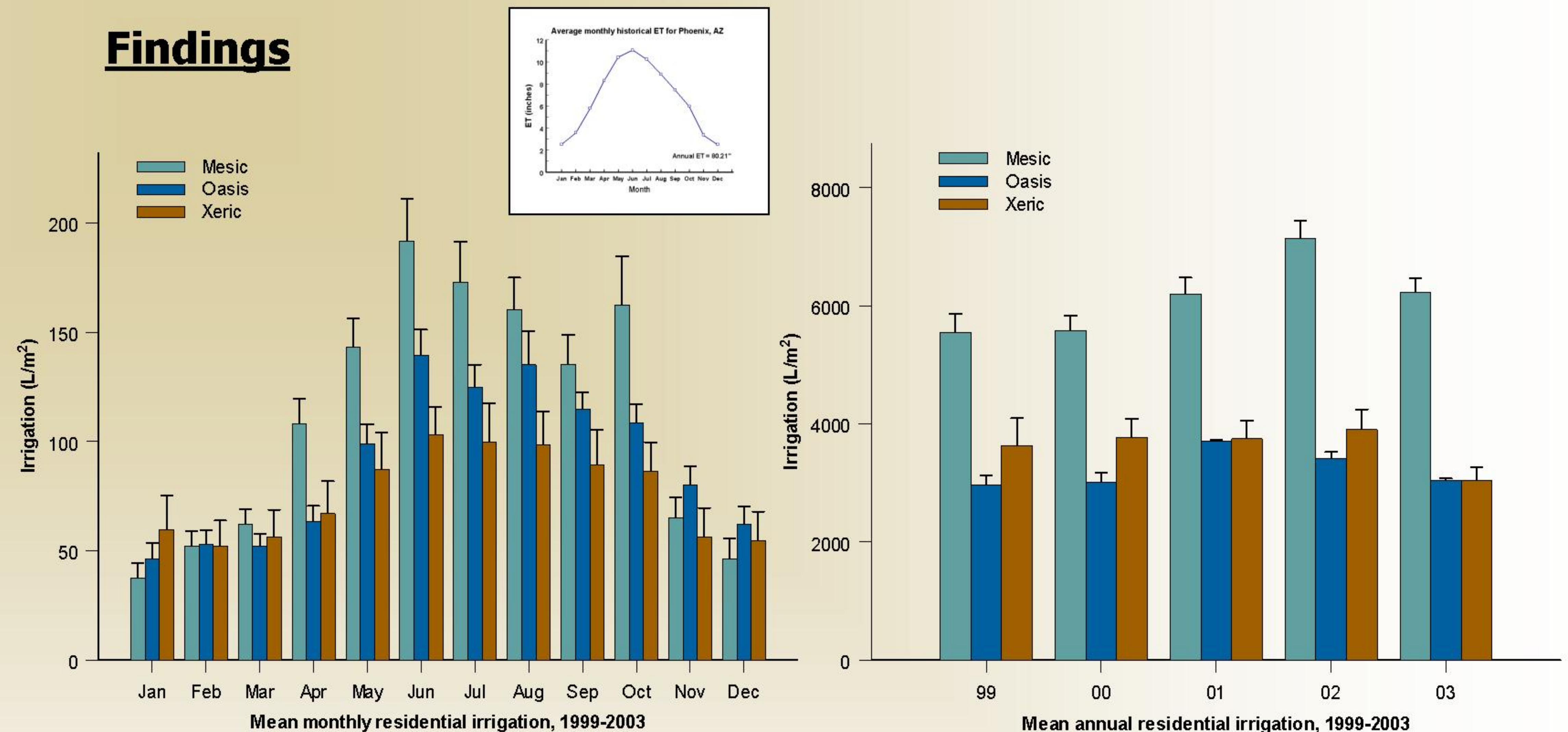
Extensive vegetative cover including grass lawns and broadleaf trees and shrubs dominates mesic landscapes. In contrast, desert adapted trees and shrubs, decomposing granite surface mulch and no grass lawns typify xeric landscapes. Oasis landscapes are an intermediate design type and generally have a mixture of elements found in both mesic and xeric design motifs.

To understand the relationship between homeowner irrigation practices and landscape design type, we installed totalizing water meters (Fig. 2) on the supply lines of 13 residential irrigation systems in 1998 and 1999 to measure the volume of water applied by homeowners to their landscape vegetation. Landscape surface areas were also measured for each the yards enabling us to express the amounts of irrigation water applied on a landscape surface areas basis, called the specific irrigation volume.



Figure. From left to right, representative examples of xeric, mesic, and oasis landscape design motifs.

Findings



Mean monthly residential irrigation, 1999-2003.

Specific irrigation application volumes for mesic and oasis yards fluctuated seasonally in a pattern that followed potential evapotranspiration. In contrast, specific irrigation rates for xeric yards showed little seasonal variation and were generally the greatest of the three landscape design types during the winter months.

Mean annual residential irrigation, 1999 to 2003.

Specific irrigation volumes (L/m²) applied to landscape vegetation by homeowners were greatest for yards landscaped with a mesic design motif and least for yards landscaped with an oasis design motif.

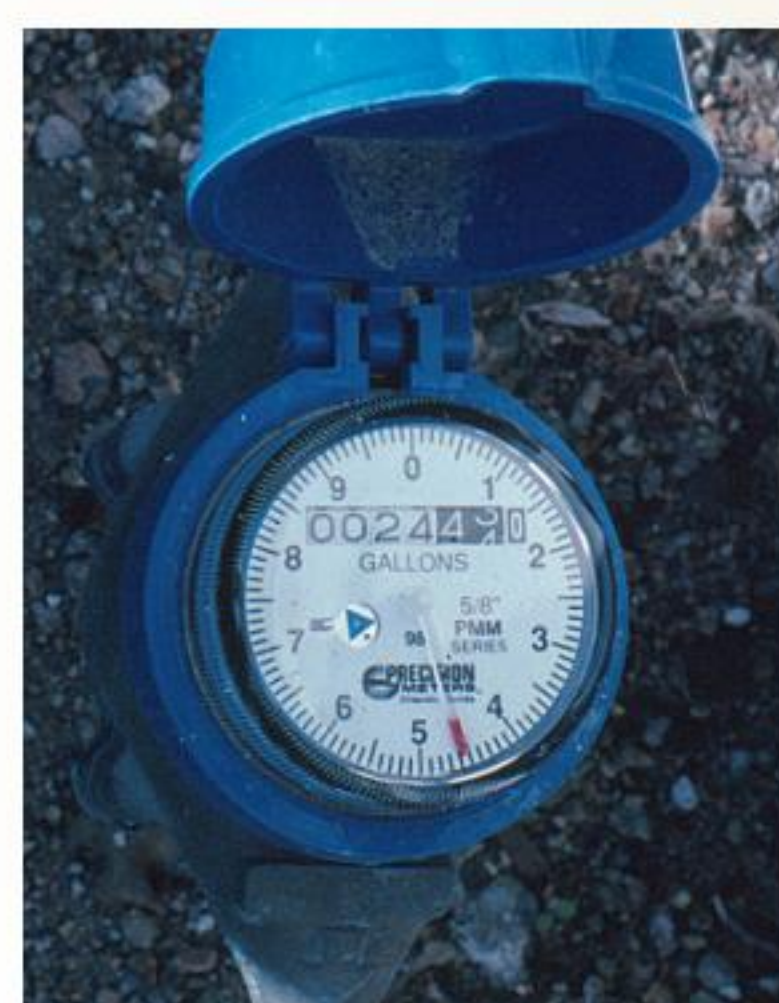


Figure 2. Precision totalizing water meter that has a magnetically driven register encapsulated in a copper and glass enclosure (<http://www.plumbingworld.com/wameters.html>).

Learn more about research in the Urban Horticultural Ecology Lab at <http://cactus.east.asu.edu/~cmartin/martinlab.html>

Acknowledgments

This research was funded, in part, by the NSF Central Arizona Phoenix LTER grant no. DEB-9714833.

