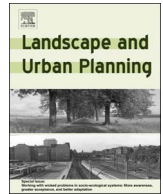




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Research Paper

## Legacy effects and landscape choices in a desert city

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## ABSTRACT

Lawns are a traditional landscape choice in urban neighborhoods, and their pervasiveness results in extensive irrigation around the world. Focusing on the semi-arid metropolis of Phoenix, Arizona, this paper examines residents' actual and preferred landscapes for both front and back yards; specifically considering grass (mesic) yards, gravel-based (xeric) yards, and mixed (oasis) yards that include some grass and some gravel. Since xeric yards can conserve water, practitioners have promoted them as a drought-tolerant alternative to traditional lawns. Understanding the factors that motivate or constrain landscaping choices can facilitate the transition from lawns toward more naturalistic alternatives. This paper provides an original analysis of how legacies in the Phoenix region—including local landscape traditions and development history—affect yard choices. Using survey data and inferential statistics, we found that longer-term residents—as measured by the proportion of a resident's lifetime spent in the Phoenix region—more often chose grassy landscapes compared to newcomers. This is counter to the common assumption that newcomers to the desert prefer lawns; instead, long-time residents seem to be accustomed to the long-established luxuriant landscapes of 'the Phoenix Oasis.' Residents of older neighborhoods also chose grassier landscaping compared to residents in newer areas, who tended to choose xeric yards. Altogether, these findings reflect the lasting legacies that previous landscaping choices have in urban environments, where changes in preferences and practices take time. Ultimately, the legacy effects of past choices often persist, thereby impeding efforts to promote drought-tolerant and naturalistic landscapes.

## 1. Introduction

Lawns are highly desired landscapes across the United States, with over 10–16 million hectares of land covered by turfgrass (Milesi et al., 2005). This estimate includes (but is not limited to) residential neighborhoods, where grass tends to be the traditional landscape type in yards. In desert cities such as Phoenix, Arizona, irrigating lawns contribute significantly to water consumption (Wentz & Gober, 2007). Due to the high water requirements of grass, coupled with reoccurring droughts and potential water scarcity, scholars, practitioners, and conservation advocates have pushed for replacing the traditional lawn with alternative land-cover types or otherwise reducing the amount of grass in residential neighborhoods (Larson, Casagrande, Harlan, & Yabiku, 2009; Robbins & Birkenholtz, 2003). In order to shift urban landscaping toward low water-use and climate-adapted yards, knowledge about what motivates and constrains landscape choices is imperative.

The desire for lawns has been driven by several factors including their appearance, familiarity, and feelings of social obligation that are

largely driven by social norms (Larson & Brumand, 2014; Larson et al., 2009; Robbins, 2007). In the arid western U.S., a common expectation regarding lawns is that people migrating from relatively humid regions such as the Midwest have created and reinforced the demand for traditional grass landscapes (McPherson & Haip, 1989). However, several studies conducted in the metropolitan Phoenix area have found the opposite trend—that is, longer-term residents tend to prefer lawns more so than residents who are relatively new to the desert region. Although three different studies have supported this tendency (Larson et al., 2009; Martin, Peterson, & Stabler, 2003; Yabiku, Casagrande, & Farley-Metzger, 2008), thereby strengthening its reliability and generalizability in Phoenix, the variables and samples examined were limited in each of these studies. We therefore build upon this work by analyzing a more robust array of landscape choices (i.e., preferred and actual landscape types for front and back yards) in relation to tenure of residency as well as the age of housing, both of which capture legacy effects in terms of the yard choices made by long-term residents who are accustomed to local norms as well as the landscaping decisions embedded in neighborhoods built during different times periods.

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Researchers have studied the legacies of past decision-making, for example, demonstrating the effects of historic land uses (e.g., agriculture) on present-day ecological conditions such as biogeochemistry (Grimm et al., 2008). Although several urban ecological studies have examined legacy effects (e.g., Clarke, Jenerette, & Davila, 2013; Hall et al., 2013; Hope et al., 2003; Lewis, Kaye, Gries, Kinzig, & Redman, 2006; Lubbe, Siebert, & Cilliers, 2010), less social science research has been conducted on the legacy effects in cities. A review of literature on the urban ecology of residential landscapes found relatively few studies on legacy effects, emphasizing a need for more research in this area (Cook, Hall, & Larson, 2012). We address this gap by examining how the history of development (as indicated by age of housing) and residency in the region (specifically as measured by the portion of one's life spent in the study region) affect actual and preferred landscape types in people's front and back yards. Employing inferential statistics with quantitative data from a questionnaire, we also examine the relationship between landscape choices and both age and years of residency in metropolitan Phoenix, which together were used to calculate the portion of a resident's life spent in the area.

To clarify the terminology in this paper, a *yard* encompasses the outdoor areas of homes in single-family residential parcels, which are often split into public front yards and relatively private back yards (Larsen & Harlan, 2006). Residential yards can encompass a variety of landscape components inclusive of living (e.g., trees, plants) and non-living (e.g., gravel, mulch, or cement) elements. Traditionally, single-family residential yards in the US and beyond have been dominated by grass cover, also known as lawn. In diverse regions of the world, people have called for yards that are more water-tolerant, biodiverse, and otherwise lessen the negative impacts of landscaping choices on the environment (Cook et al., 2012; Goddard, Dougill, & Benton, 2010; Lubbe et al., 2010).

Although residential landscapes can be described in a variety of ways, we adapted a commonly used typology for desert cities (e.g., by Larson et al., 2009; Martin et al., 2003; Yabiku et al., 2008). In particular, scholars have contrasted lawn-dominated yards (known as *mesic*, literally wet, because of their dependence on irrigation) with yards that have no or partial grass. Given the importance of water conservation in arid cities, *xeric* (dry) landscapes have been described as a drought-tolerant and desert-like alternatives to *mesic* lawns. In our typology, *xeric* yards entail landscapes that encompass rock or gravel groundcover with low water-use plants (Martin et al., 2003). Yet not all yards are comprised of all or no grass; some yards encompass some grass and some gravel groundcover, which are called *oasis* landscapes to reflect some verdant elements in the midst of an otherwise arid landscapes. At the regional scale, the Phoenix area—also known as the Valley of the Sun—has been described as an oasis since its landscapes provide a relatively lush refuge compared to the native Sonoran Desert ecosystem within which it is situated.

In the next sections, we present the research that informs this study while establishing the theoretical expectations between landscape choices and tenure of residency as well as age of development. We then discuss the methods of data collection and analyses before presenting and discussing our results.

## 1.1. Legacy effects

### 1.1.1. Tenure of residency

As noted in the introduction, a few studies seem to suggest that the 'oasis mentality' may be entrenched in the landscape norms and choices of established Phoenixians, since research has shown that long-time Phoenix residents tend to choose grass yards more so than relative newcomers (Larson et al., 2009; Martin et al., 2003; Yabiku et al., 2008). Before detailing the findings of this comparatively new research, it is important to note that earlier studies have indicated the opposite effect. For example, McPherson and Haip (1989) noted that throughout the late-1800s to mid-1900s, "people with their Eastern and Midwes-

tern landscape images and values" (440) were responsible for bringing exotic trees and turfgrass species (e.g., Bermuda and winter rye grass) to the southwestern U.S. Zube et al. (1986: 8) concurred: "The grass lawn tradition dates from the earliest period of Anglo settlement in both Tucson and Phoenix when immigrants from more temperate climates moved to these desert locations and created the greener landscape they had left behind in the Midwest and Southeast." Kennedy and Zube (1991) empirically demonstrated this expectation in a study of Tucson, Arizona, which found long-time residents of the city (which is located just 185 km, or 115 miles, to the south of Phoenix) preferred native desert plants and low water-use vegetation more so than newcomers.

Among the more recent Phoenix-based studies, the earliest one (Martin et al., 2003) showed that long-term residents of Phoenix tend to prefer grassy landscapes while those native to Arizona prefer mesic landscapes more than relatively xeric alternatives. More specifically, native Arizonans least preferred xeric landscapes (16%) compared to those from other regions, with xeric yard preferences ranging from a low of 21% for residents from the Southwest to a high of 43% among those from the Great Plains. Another study by Larson et al. (2009) found similar trends as Martin et al. (2003) in that native Phoenixians more often preferred and actually had mesic back yards compared to newer Phoenix residents. The trend for actual landscapes was similar but less pronounced for front yards; however, preferences for front yards were similar across native and non-native residents. Although informative, neither of these studies conducted analyses to show whether or not these differences were statistically significant.

Yabiku et al. (2008) hypothesized and found that years spent in the Phoenix region had a statistically significant, negative effect on preferences for desert-like xeric landscapes. These researchers purported that "socialization"—defined as "the process through which individuals learn how to live within society or within a specific group" (386)—affects landscape choices. While socialization is a complex process, Yabiku et al. showed how familiarity with local landscapes—as measured by longer residency in the region—results in disdain for xeric landscapes. This result was also reported by a qualitative study that found 'people get sick of the desert' (Larson et al., 2009).

Regardless, the sample in Yabiku et al.'s (2008) study was limited to a narrow demographic of mostly young adults—many with small children—who lived in a residential village of a university campus. This may be the reason why the majority of their sample preferred grass yards—that is, since these are safer environments for children compared to the rock-covered alternatives that often have spiny cactuses and plants (Larson et al., 2009). In contrast to Yabiku et al.'s narrow sample, another survey of a relatively diverse sample of residents from the Phoenix area exhibited more varied preferences, wherein approximately one-third preferred each mesic, oasis, and xeric (Larsen & Harlan, 2006).

Considering length of residency in a region, local customs must be considered. In the case of Phoenix, the region has historically been marketed as a luxuriant oasis, with promotional campaigns such as "the desert is a myth" (Larson et al., 2009). Thus, although the region has seen a rise in xeric, drought-tolerant landscapes, earlier research has shown that Phoenix residents prefer irrigated grass more so than Tucson residents, who instead held stronger preferences for native desert landscapes (Zube, Simcox, & Law, 1986). Whether this distinction still exists is beyond the scope of this paper (since we focus solely on trends in metropolitan Phoenix); however, we will return to this point later on in the discussion, as the history and geography of particular regions are important considerations when examining social legacies in landscaping choices and urban ecology.

### 1.1.2. History of development

Research on legacy effects has shown that previous land-use and land-cover decisions have the potential to significantly impact social and ecological conditions and dynamics into the future (Cook et al., 2012). Past decisions continue to affect current ecological conditions

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