The Social Ecology of Residential Land Management

Complex Effects, Tradeoffs & Legacies in the Sonoran Desert of Phoenix, AZ

Kelli Larson, Elizabeth Cook, Jaleila Brumand, Sharon Hall & Kimberly Feldbauer

Research Overview

Although the monocultural lawn has been heralded for its hyper-green, weed-free aesthetic, concerns about the impacts of landscape management on urban ecology & sustainability have risen in recent years. Water demands, chemical inputs, & changes in biodiversity are among the potential implications of residential yard management. Focusing on the social-ecological causes, consequences & feedbacks of landscaping decisions, this poster presents an in-depth, interdisciplinary case study from Phoenix, Arizona. In particular, *the following themes have emerged across our research*:

1. **Critical tradeoffs** among landscape choices such as 'mesic' lawns versus 'xeric' drought-tolerant alternatives;
2. **Complex dynamics** including counterintuitive & contradictory relationships between environmental values & yard-management practices; &
3. **Legacy effects** in the social norms & structural constraints involved with residential landscaping decisions.

This project combines quantitative & qualitative datasets from social surveys, field observations, personal interviews & other sources (see publications for detailed methods from particular analyses). Employing **mixed methods**, we provide insights from both statistical patterns & 'thick descriptions' across **3 case study neighborhoods** (below) in Phoenix, AZ. Co-located with CAP LTER's Phoenix Area Social Survey, the neighborhoods represent diverse landscape types (xeric, oasis & mesic) across middle to high-income areas (a 4th lower income area was originally included but dropped from some analyses due to a low response rate). Overall, the place-based approach sheds light on how the social-ecological context of decision-making affects' landscaping practices.

Mesic Historic District
Mostly Lawn

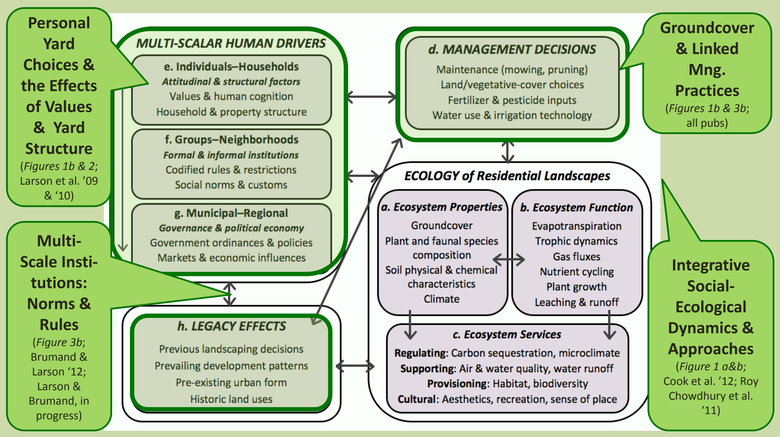
Oasis Mountain Cul-de-sacs
Mix of Lawn & Rock

Xeric New Tracts
Mostly Rock

1. Multiple Decisions & Tradeoffs

Residential land management involves a number of decisions made at various scales, which in turn have a multitude of potential outcomes & tradeoffs. Below is our conceptual framework (Cook et al. '12) for various landscaping practices, their effects & feedbacks. The **green callouts** pinpoint areas of empirical research reported herein.

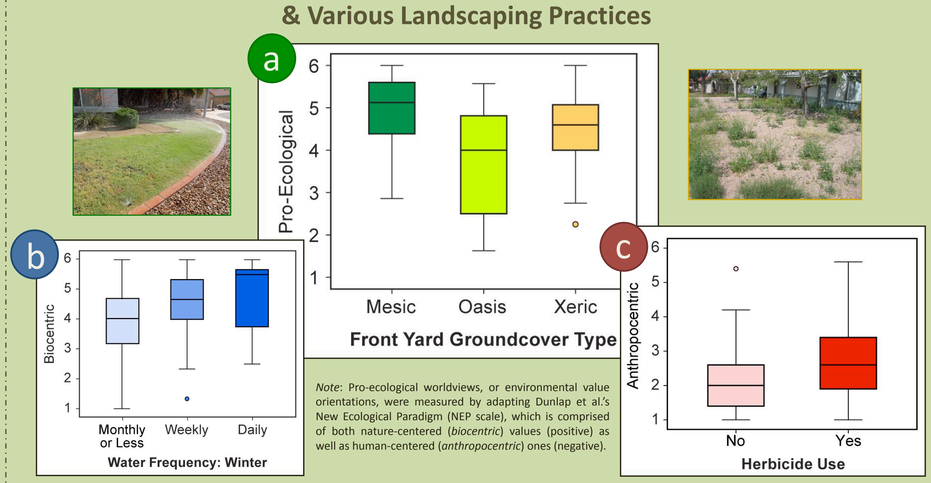
Figure 1a. The Social-Ecological Approach & Analyses



2. Complex Causes & Effects in Landscaping Practices

*The **relationships between values & landscaping decisions** are more complex than simply pro-environmental orientations leading to low water-use yards & alternatives to lawns*. Although their influence is limited overall (Larson et al. '10), some values do explain landscaping decisions. Statistically significant relationships (below) demonstrate the complex & counterintuitive linkages between human-ecological worldviews (i.e., environmental values) & assorted landscaping practices.

Figure 2a-c. Relationships among Environmental Values & Various Landscaping Practices



Note: Pro-ecological worldviews, or environmental value orientations, were measured by adapting Dunlap et al.'s New Ecological Paradigm (NEP scale), which is comprised of both nature-centered (*biocentric*) values (positive) as well as human-centered (*anthropocentric*) ones (negative).

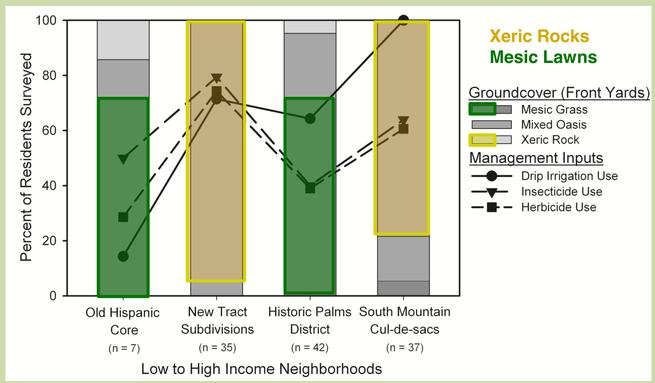
a. ***Non-linear & unexpected relationship between environmental values & grass cover***. Ecological worldviews (more biocentric, less anthropocentric) were positively associated with mesic lawns & xeric yards—that is, compared to mixed 'oasis' yards. Interviews (Larson et al. '09) further demonstrate how people associate environmental values with diverse yard types, with some viewing the management of non-native lawns & gardens as stewarding & connecting with 'nature.'

b. ***Counterintuitive link between environmental values & watering***. In cooler months, residents with relatively biocentric worldviews (e.g., resources are limited, wildlife have rights) irrigate their yards *more* frequently than others. This may be explained by the social construction of 'nature' in which people 'take care of' grass & other plants in comparatively intensive ways (Larson et al. '09; '10).

c. ***Expected association between environmental values & pesticide use***. Contrary to the above findings, & consistent with what people tend to expect, residents with stronger anthropocentric worldviews (e.g., humans have right to use environment, nature can handle impacts) use more herbicides than those with relatively biocentric worldviews (Larson et al. '10).

These multifarious results indicate the complexity of promoting landscapes with environmental benefits, particularly by appealing to peoples' values. Further complicating matters are decision tradeoffs & the fact that yard structure (e.g., cover) can dictate management inputs (see Figure 1b).

Figure 1b. Yard Cover, Inputs & Tradeoffs by Neighborhood



While drip irrigation increases with income across neighborhoods (left to right above), pesticides use is greater with xeric groundcover. Thus, lawns are not necessarily the most environmentally detrimental option, as typically assumed. Although xeric yards potentially reduce water use, they also result in more frequent chemical applications (e.g., to kills weeds) while exacerbating urban heat (Larson et al. '10). *As a whole, **yard management involves balancing tradeoffs** & pre-existing features (e.g., groundcover) determine inputs.*

3. Legacy Effects & Decision Feedbacks

Certain landscaping decisions, especially groundcover, have **lasting effects** on management (Figure 2b). The Phoenix tradition of 'doing away with the desert' is engrained in the preferences of long-time residents (Figure 3a; Larson et al. '09) & the traditions of historic (mostly mesic) neighborhoods (Figure 3b; Larson & Brumand '12). The 'oasis' mentality therefore remains a cultural legacy that perpetuates high water demands in Phoenix.

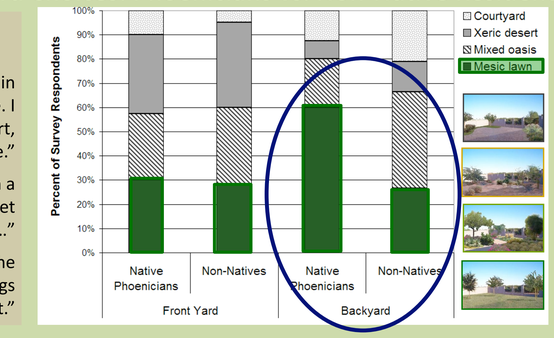
Figure 3a. Yard Choices: Phoenicians vs. Non-Native Residents

Illustrative Quotes

"I have lived in AZ all my life. I love the desert, in its place."

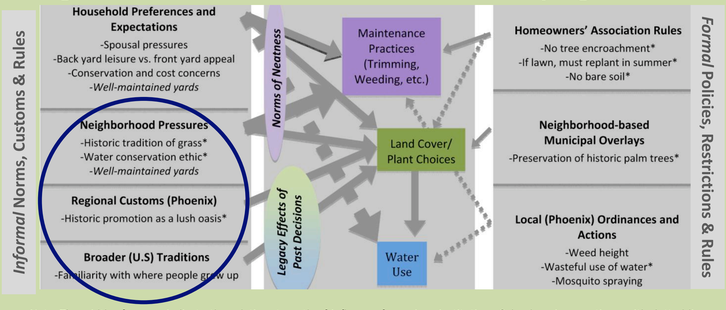
"We live in a desert & I get sick of it…"

"I think the desert belongs in the desert."



*Both **place-based & personal experiences** affect residents' yard decisions, particularly vegetation choices which indirectly affect water use* (Figure 3b). At various scales, informal norms affect land management more so than formal (codified) rules, with local customs varying somewhat across neighborhoods* (Larson & Brumand '12). Although residents largely accept diverse yard types overall, historic & existing landscapes often have persistent legacy effects.

Figure 3b. Institutions as Drivers of Landscaping Practices



Note: The width of arrows indicate the relative strength of influence for various institutions & landscaping practices, with dotted lines indicating tenuous relationships (e.g., for rules that are not known or enforced). *Asterisks denote neighborhood-specific dynamics.

Concluding Remarks

In sum, 3 insights arise from this research on residential land management:

1. Social-ecological dynamics are *far more **complex** than simple assumptions or hypotheses*—e.g., regarding environmental values leading to eco-friendly decisions. Further, in the faced of tradeoffs, the conventional lawn is not always the environmentally detrimental yard choice.
2. Resource management is *complicated by the complexity of human behavior & **tradeoffs***. Tailored approaches based on how decisions are made in specific contexts are therefore necessary, as is integrated planning to address multiple, potentially conflicting goals (e.g., water conservation vs. pollution & heat mitigation).
3. Past *decisions have long-lasting consequences, or **legacies***, especially seen in historic landscape traditions. Moreover, since yard structure (e.g., cover) determines inputs & maintenance, it is a critical antecedent for assorted practices.

Ongoing research is exploring these themes & others. A study (P.I. Groffman) across 6 metropolitan regions, in particular, is testing the homogeneity thesis: the ecology of diverse cities is more similar to each other than to native ecosystems. So far, evidence from various sources suggests both homogeneity & heterogeneity in the social-ecology of residential landscapes within & across cities.

References: Brumand & Larson. 2012. Nbhd. norms & restrictions as drivers of landscape mng. in Phoenix. *Triple Helix*. Spring:36-39. * Cook, Hall & Larson 2012. Residential landscapes in an urban socio-ecological context: Multi-scalar drivers & legacies of mng. practices, ecological structure & ecosystem services. *Urban Ecosyst.* * Harris, Polsky et al. 2012. Heterogeneity in residential landscape mng.: Evidence from suburban Boston, Miami & Phoenix. *Human Ecol.* * Larson & Brumand. 2012 (in progress). Paradoxes in landscape mng. & water conservation: examining neighborhood norms & institutional forces. * Larson, Cook, et al. 2010. The influence of diverse values, ecological structure, & geographic context on residents' multifaceted landscaping decisions. *Human Ecol.* * Larson, Casagrande et al. 2009. Residents' yard choices & rationales in a desert city: social priorities, ecological impacts & decision tradeoffs. *Env'tal Mng.* * Roy Chowdhury, Larson, et al. 2011. A multi-scalar approach to theorizing socio-ecological dynamics of urban residential landscapes. *Cities & Env't.*