The influence of environmental values & neighborhood context on household-level biodiversity

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Introduction
Urbanization & land use changes often alter plant biodiversity. Residential landscapes—as highly managed ecosystems that cover a considerable proportion of cities—may significantly impact urban biodiversity. Both homeowners’ decisions & property characteristics influence the structure of these landscapes & sub/urban environments. To-date, most urban biodiversity studies focus on regional scale analyses, with few addressing household-level decisions & associated social-ecological outcomes. We therefore examine plant biodiversity & groundcover at the household scale in Phoenix, AZ by exploring both agency-based drivers (residents’ values) & structural factors (property characteristics) as possible explanations for urban biodiversity patterns across diverse neighborhoods.

Research Questions
1) How does biodiversity differ across diverse neighborhoods & in relation to common groundcover types (grass vs. rock)?
2) How do residents’ values & property characteristics explain biodiversity at the household & neighborhood scales?

Landscape Gradient ➔ Common Phoenix, AZ Yard Structures
Mesic: Grass Lawn
Oasis: Mixed Grass & Rock
Xeric: Rock Yard

Integrative Methods
• Combining a social survey (n = 121) & observational field survey (n = 428) in 4 Phoenix neighborhoods (Fig. 1) we examined residents’ values & front-yard plant composition & groundcover, respectively.

Biodiversity: Plant taxa were identified to species or genus. Richness (# of plant species) & evenness (no single species dominates) were calculated using PAST 2.04 (Hammer et al. 2001). Turfgrass species were excluded from measures.

• Structural Property Characteristics: Property age & value were obtained from 2008 county tax assessor data. Yard area was manually digitized from high resolution satellite imagery in ArcGIS.
• Resident Values: Values are core beliefs that are important to a person. Social survey variables were averaged into composite indices & tested for reliability (Cronbach’s alpha) to create 2 value measures that influence groundcover choices & yard inputs (Larson et al. 2010): Environmental Practicability, reflecting easy-to-maintain yards with low environmental impact as a specific landscaping priority, & Ecological Orientation, reflecting a biocentric worldview broadly.

Conclusions & Next Steps
• Weak correlations between diversity and values imply that conservation programs should consider urban structure, rather than residents’ values, in encouraging landscaping practices.
• Biodiversity is quite different across similar yard types (e.g. mesic & xeric) (Fig. 2, 3 & 4). Thus, we need to know more about what constitutes these yard types & derive better classification schemes for them. See next steps below.
• Further studies should assess if biodiversity drivers, like area, exhibit different relationships among neighborhoods as we have anecdotally seen here. Biodiversity drivers may thus, be context dependent.
• Our next steps involve 1) regression analysis to further understand the possible drivers of yard biodiversity in multivariate models, and 2) cluster techniques to create a yard typology based on realistic depictions of mesic, oasis, & xeric yards. In developing a landscape typology considering groundcover, biodiversity, and other factors, we will link ecosystem services to common plant assemblages in varying types of yards allowing us to better understand our urban environment.

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