How social and landscape characteristics affect the urban arthropod community during recessions

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Introduction

• Residential yard landscaping can affect ecological communities and biodiversity components of wildlife.
• Yard maintenance can be constrained by social and economic limitations such as house foreclosures.
• We examined how the arthropod community in Phoenix changed over time in response to economic disturbances.

Research Questions

1. What is the pathway by which economic disturbance, social, and environmental processes influence the arthropod community?
2. How did the arthropod community change pre- and post recession (from 2005 to 2010)?
3. How are human perceptions of foreclosures associated with social and ecological factors?

Methods

• We integrated data from arthropod sweep-net Survey 200 and PASS for two time periods (2005/06 and 2010/11) in 29 Phoenix neighborhoods.
• Survey 200, PASS, and census data were all spatially joined for the two time periods.
• PASS questions measuring resident perceptions:
  More homes in my neighborhood foreclosed or abandoned than elsewhere in the Valley
  Neighbors maintain their yards and landscaping not as well as before 2007

Results: Conceptual Framework

Research Question 1

- Foreclosure Amount
- Length of Residency
- Weediness
- Vegetable Richness
- Grassiness
- Age of Home
- Education
- Household Income
- Social Stratification

Results: Community Shifts

Research Question 2

- Overall abundance (f(1,54)= 4.68, P=0.03, r²=0.07, CI = [0.00, 0.23]) and herbivore abundance decreased (f(1,54)=3.78, P<0.06, r²=0.06, CI = [0.00, 0.21]) between 2005 and 2010 (Repeated Measures ANOVA).
- Fisher’s alpha diversity (f(1,54)=3.50, P=0.06, r²=0.06, CI = [0.00, 0.20]) decreased between 2005 and 2010 (Repeated Measures ANOVA).
- Annual plant species, vegetation richness and abundance, and median house age were all associated with structuring the arthropod community, which was shifting towards communities characterized by more weedy habitat 2010 (NMDS, Figure 4).

Results: Neighborhood Perceptions

Research Question 3

- Perceptions of foreclosures were positively correlated to perceptions of neglected yard maintenance (r=0.37, P<0.05).
- Foreclosures affected perceptions of neighborhood foreclosures (r²=0.45, F=24.3, P=0.0001, Figure 5a) and yard maintenance (r²=0.14, F=5.9, P=0.02, Figure 5b).
- Perceptions of yard maintenance were associated with vegetation richness and grassiness of a neighborhood.
- Perceptions of foreclosures were associated with length of residency and level of education (Table 1).

Conclusion

• Arthropod abundance and diversity decreased between 2005 and 2010.
• There was a shift in the arthropods from a more diverse community to one dominated by herbivore taxa in foreclosed neighborhoods with weedy yards.
• Resident perceptions of foreclosures and yard maintenance were related to the actual foreclosure disturbances caused by the recession.
• Ecological communities in urban ecosystems respond to complex interactions and disturbance regimes.

Table 1. Best fit models of variables predicting neighborhood yard maintenance and foreclosures perceptions of Phoenix residents collected in 2011 in response to foreclosures caused by the Great recession.

<table>
<thead>
<tr>
<th>Perception</th>
<th>Model Results</th>
<th>Variables</th>
<th>t</th>
<th>P</th>
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<td>Maintenance</td>
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<td>Veg Richness</td>
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<td>More Foreclosures in Neighborhood</td>
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Acknowledgements

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