

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 disturbance.

Research Questions

- What is the pathway by which economic disturbance, social, and environmental processes influence the arthropod community?
- How did the arthropod community change pre- and post recession (from 2005 to 2010)?
- 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

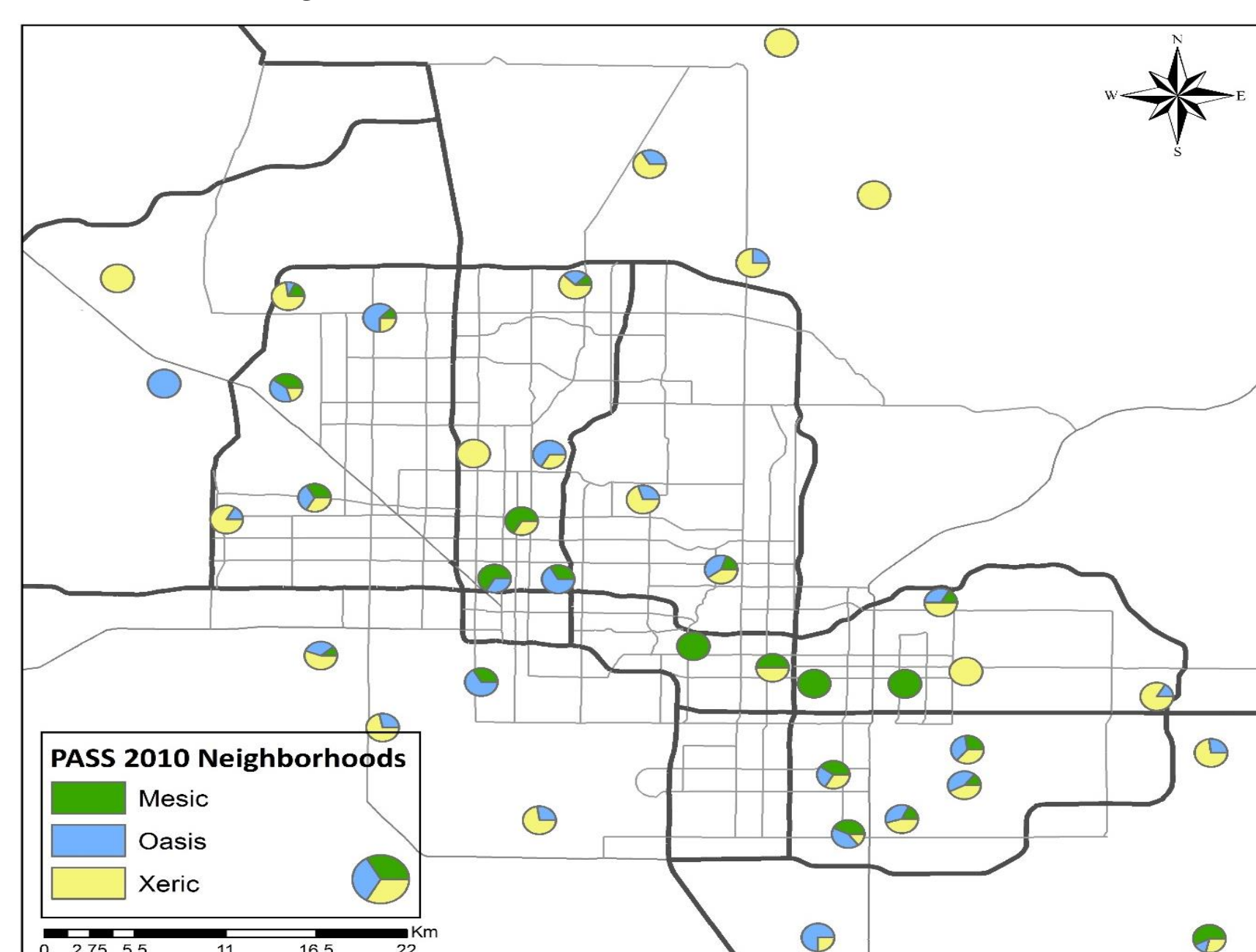


Figure 1. The distribution of long-term ecological monitoring plots that overlap with PASS neighborhoods between 2006 and 2011, 29 of which collected arthropod sweep-net samples used in analysis.

Results: Conceptual Framework

Research Question 1

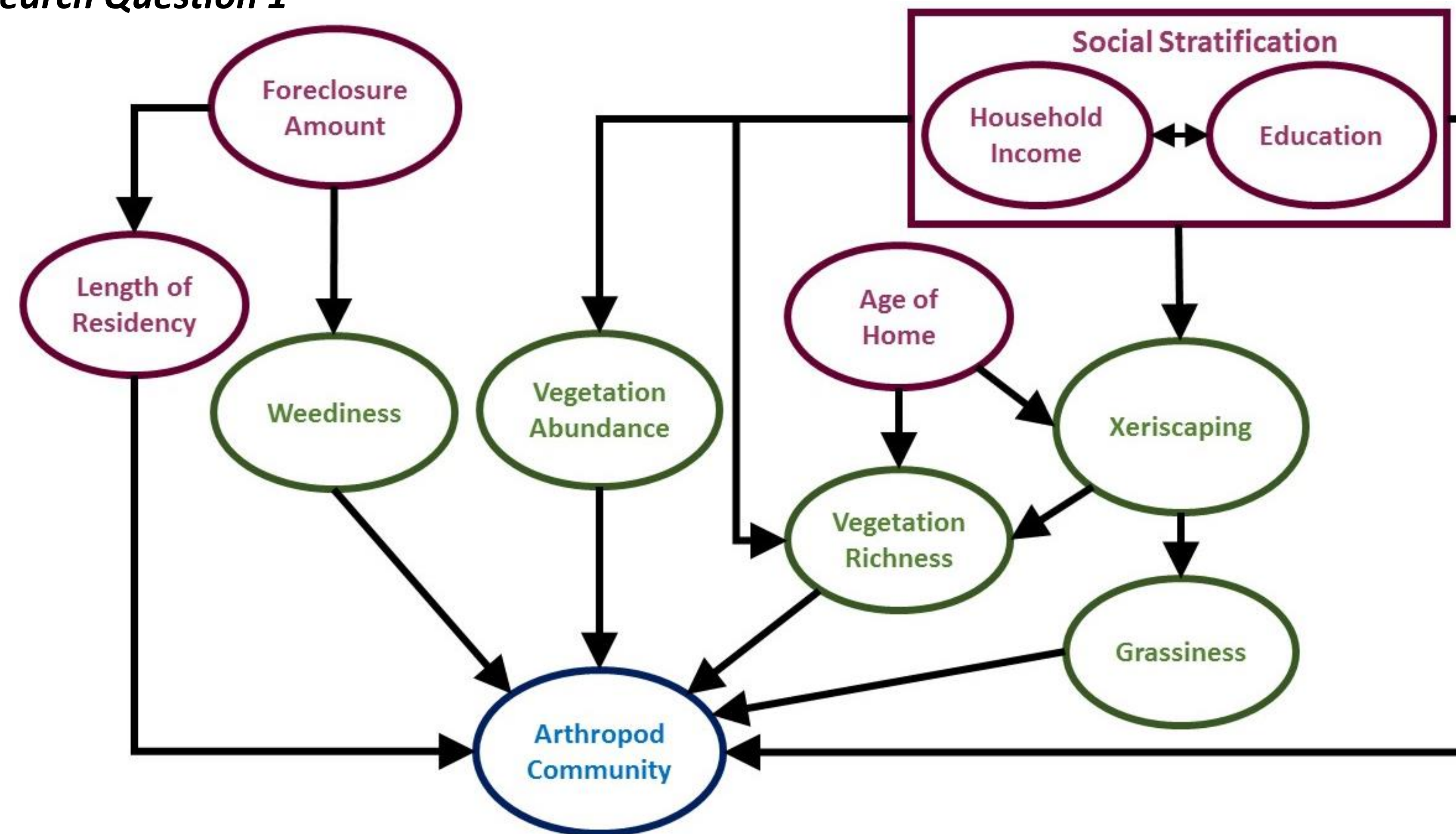


Figure 2. The conceptual model for the relationship between landscaping in residential yards and the arthropod community in urbanized landscapes during recessions. The links between social variables and landscaping practices and the links between vegetation and the arthropod community are well established. Less is known about how social and environmental variables interact or how pulse disturbance events (such as an increase in foreclosures) can influence the system.

Results: Community Shifts

Research Question 2

- Overall abundance ($F(1,54)=4.68, P<0.03, \eta^2=0.07, CI=[0.00, 0.23]$) and herbivore abundance decreased ($F(1,54)=3.78, P<0.06, \eta^2=0.06, CI=[0.00, 0.21]$) between 2005 and 2010 (Repeated Measures ANOVA).
- Fisher's alpha diversity ($F(1,54)=3.50, P<0.06, \eta^2=0.06, CI=[0.00, 0.20]$) 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).

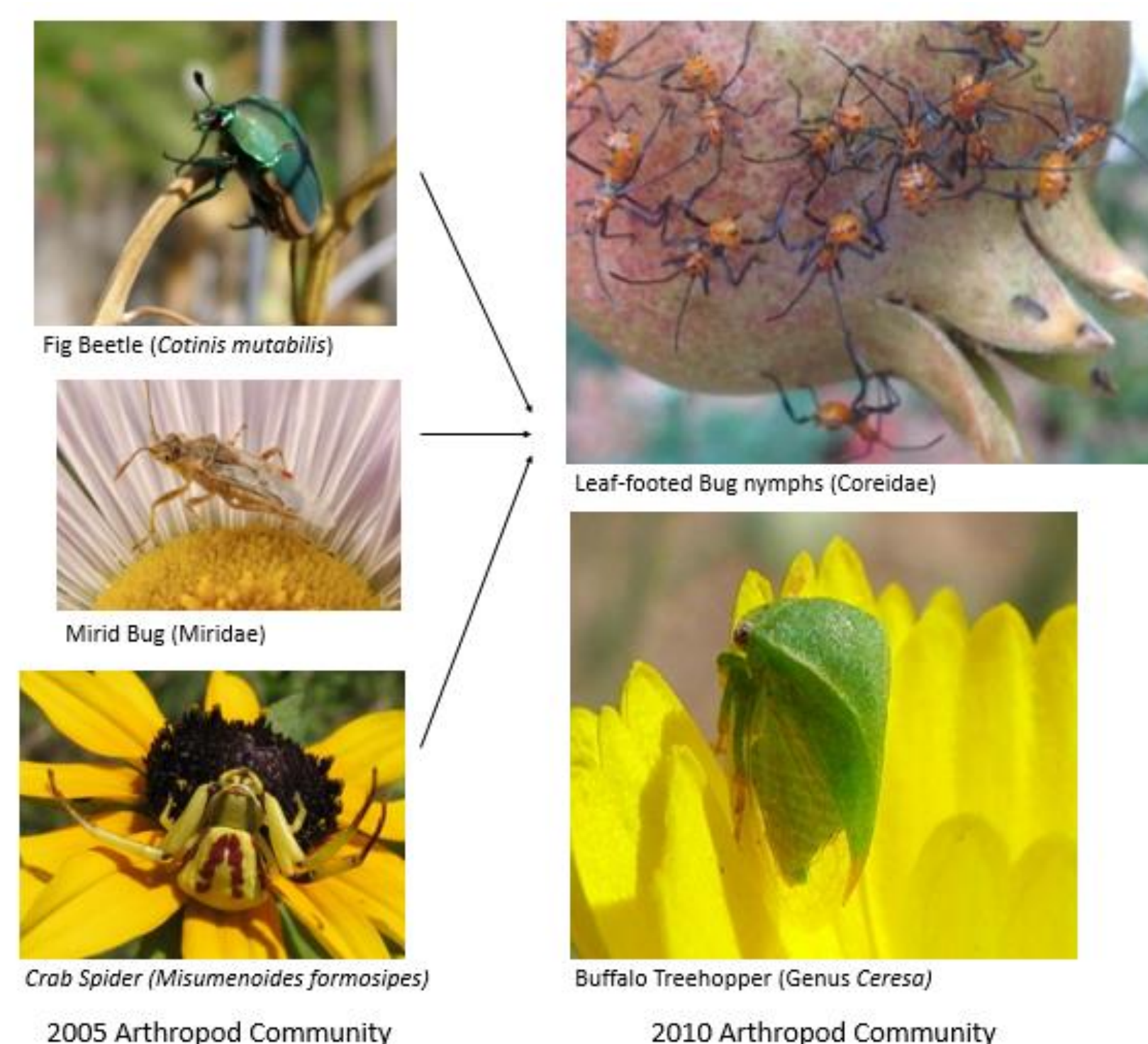


Figure 3. Illustration of shifts in the arthropod community between 2005 and 2010 to communities dominated by more herbivorous species.

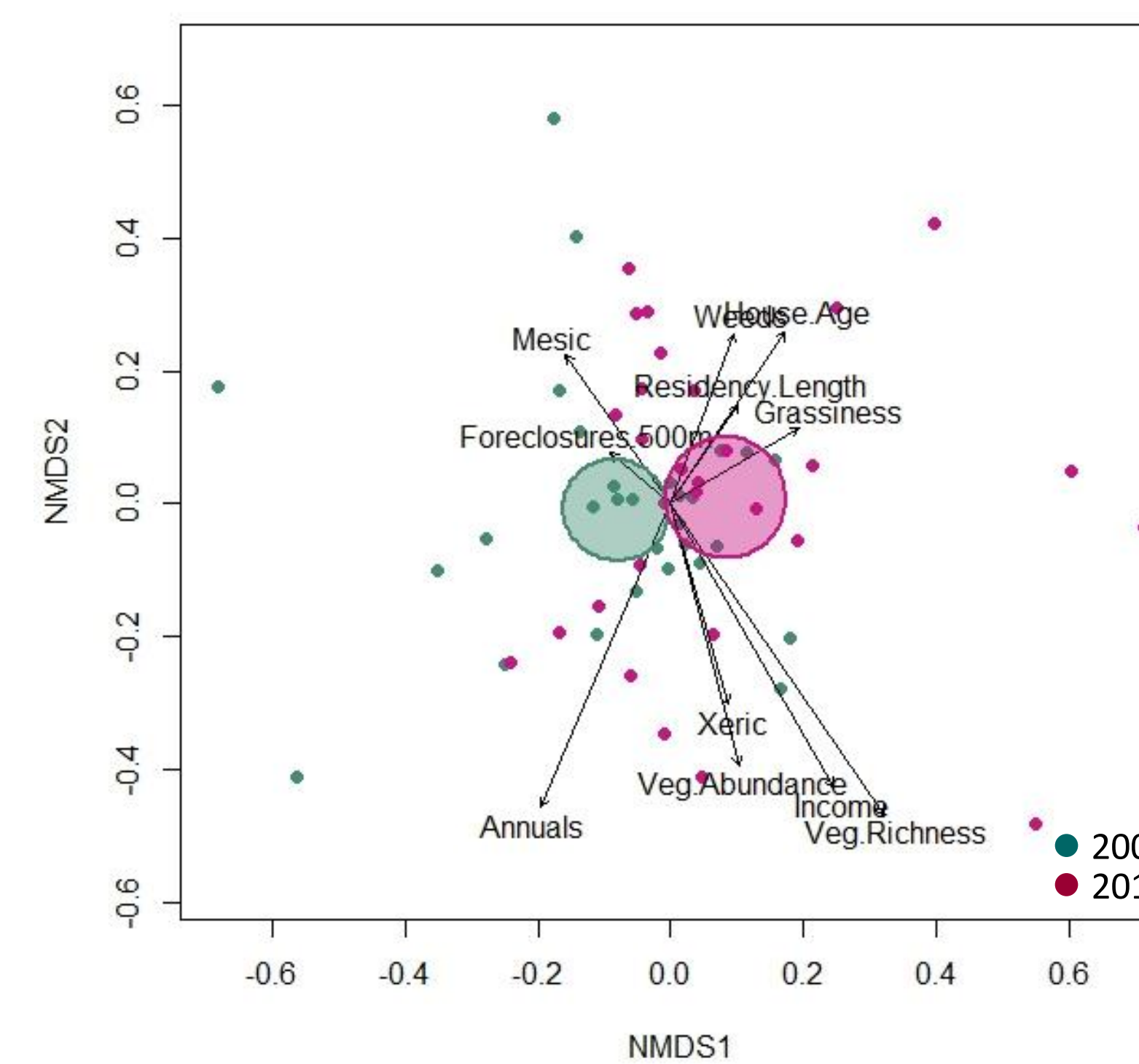


Figure 4. NMDS ordination plot of the relationship between the arthropod community, social, and biophysical variables between 2005/06 and 2010/11. Dots represent neighborhoods.

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 ($r^2=0.45, F=24.3, P<0.0001$, Figure 5a) and yard maintenance ($r^2=0.14, F=5.9, P<0.02$, 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).

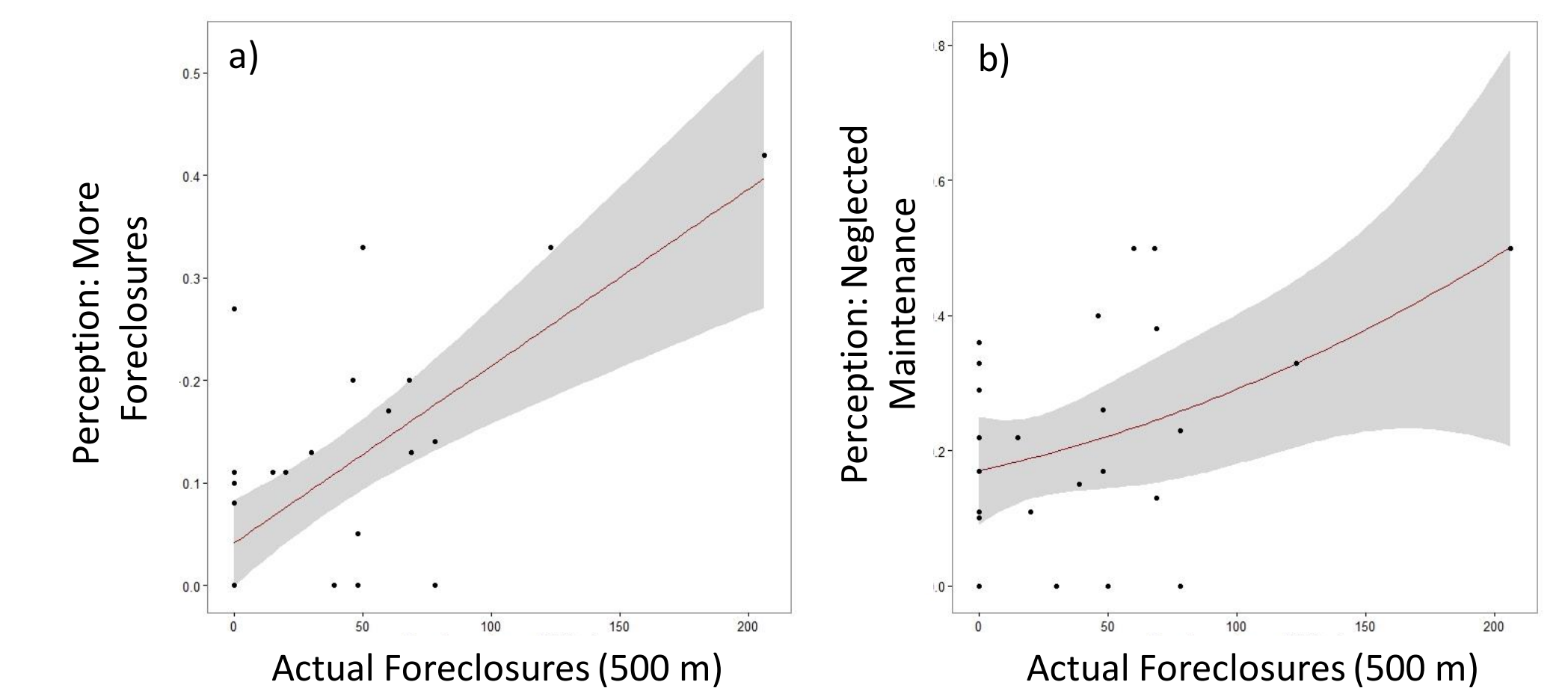


Figure 5. The actual amount of foreclosures and resident perceptions in PASS neighborhoods were correlated.

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

Perception	Model Results	Variables	t	P<
Neglected Yard Maintenance	$r^2=0.22, P<0.02$	Intercept	4.6	0.0001
		Veg Richness	-1.8	0.07
		Grassiness	-1.6	0.13
More Foreclosures in Neighborhood	$r^2=0.59, P<0.0001$	Foreclosures	1.9	0.06
		Intercept	3.8	0.0001
		Length of Residency	-1.6	0.11
		Bachelor's Degree	-2.3	0.03
		Foreclosures	4.5	0.0001

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.

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