Effects of habitat type on arthropod community structure in a heterogeneous urban environment

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Research objectives

- describe composition and turnover of arthropod communities in 4 types of urban land use in the Phoenix, Arizona, metropolitan area
- determine which taxa are indicative of the area's dominant forms of urban land use
- explore how variation in physical habitat structure may explain variation in arthropod communities

Land use: Phoenix metropolitan area

Desert: 58.9%
Residential: 25.8%
Agriculture: 7.2%
Industrial: 5.7%

Overall results

- Arthropods from 88 taxa (21 orders, 65 families) were collected.
- Ants, mites, and springtails were ubiquitous and accounted for 93% of individuals captured.
- As many taxa were found in agricultural and residential lands as in native desert. The fewest taxa were found at industrial sites.
- Taxonomic richness tracked temperature more closely than it did precipitation.
- Differences in community composition among land-use types corresponded to differences in habitat structure with land use.

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Results: habitat structure and community composition

Canonical Correspondence Analysis

Arthropod collecting sites were chosen to represent the 4 most dominant forms of land use in Phoenix.

Results: arthropod richness

Tukey's test

Results: community composition

Results: seasonal richness with climate variables

Spearman correlation analysis

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Implications

- the presence of spatial heterogeneity within the Phoenix metro area boosts the overall arthropod diversity of the region
- although the number of taxa is similar among land-use types, the community composition differs, reflecting differences in the physical habitat structure with land use
- there are arthropod communities that are characteristic of different forms of urban land use, which may be very useful in detecting latent effects of future urban development

Data source: Maricopa Association of Governments, 1998

Percent ground cover of each of the following was measured in a 25-m-diameter circle, centered around each site:
- bare ground
- native grass
- native shrubs
- exotic grass
- exotic shrubs
- cactus
- bare soil
- gravel
- rock
- buildings, concrete
- native trees
- exotic trees
- bare ground
- gravel
- rock
- cactus
- native trees
- exotic trees
- bare ground
- gravel
- rock
- cactus
- native trees
- exotic trees