Human Imprints on Ecological Characteristics of Urban Parks

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Abstract

Humans actively construct biological communities in gardens, yards and neighborhood parks. Different human communities and societal institutions may construct or manipulate landscapes differently. There can be both intentional and unintentional consequences of these different constructions for ecosystem structure and function. Yet few studies have directly examined which sociocultural characteristics influence variation in ecological characteristics such as biodiversity. We studied bird species diversity and vegetation structure in 15 small neighborhood parks in the city of Phoenix, Arizona, classifying parks as high, medium, and low socioeconomic status using market cluster data, which provides a rank-ordered classification of human communities from the most urban-affluent to the most rural-impoverished. We conducted point count censuses for birds in and around each park and took a variety of measures of vegetation structure. Bird species diversity was higher in parks in higher income areas than in lower income areas. Neighborhood socioeconomic status was a better predictor of bird diversity than either tree species diversity or tree abundance, though tree abundance also varied with socioeconomic status. Thus, the human imprint on biodiversity in urban settings appears not to be monolithic, but influenced by social, economic, or cultural attributes of user groups.

Approach

Most ecological studies regard humans as a unified disturbing force: more humans = greater disturbance. The interactions of humans with ecological processes are likely far more varied and subtle than this simple equation (see Table 1). *We hypothesize that different ecological characteristics are influenced in different ways by different types of people, and therefore will exhibit different patterns of variation across the urban matrix.*

Methods

· Select parks in Phoenix that are similar in size and facilities.

·· Classify socioeconomic status of surrounding neighborhood as upper, middle or lower using market cluster data from PRIZM (e.g. below, a park in an upper income neighborhood).

Cluster code: 05
Park
● = Census point
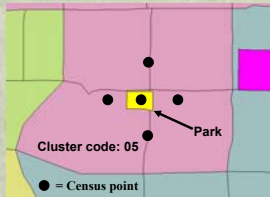
· Conduct censuses of bird species (15 minute point counts, 3 observers, 4 times per year)
· Count trees in park and identify to species.

|	Top-Down	Bottom-Up
Intentional	*e.g.* managers plant native species in parks	*e.g.* individual users kill and/or feed pigeons
Incidental	*e.g.* parks designed for recreation provide habitat for birds	*e.g.* high-use areas provide poor habitat for some bird species

Table 1. Mechanisms of human influence on ecological structure and function.

Why Parks?

A park is both a locus for daily interactions of people with nature and for social interactions among people. Thus, the design and use of parks varies with social, cultural and economic conditions. We can use this variation among parks to detect any imprint that humans might have on plant and animal communities.

Results

· Bird species diversity is positively correlated with socioeconomic status (Fig. 1).
· Tree species diversity does not vary significantly with socioeconomic status, but diversity tends to be highest in lower income parks (Fig. 1).
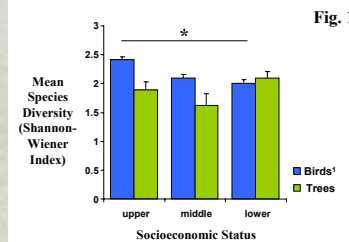
Notes: 1) Bird species diversity shown in Fig. 1 is from Dec. 2000, but a similar pattern occurs in Mar. 2001 as well.

· Birds and trees show different patterns of response to human influence (Figs 1&2).
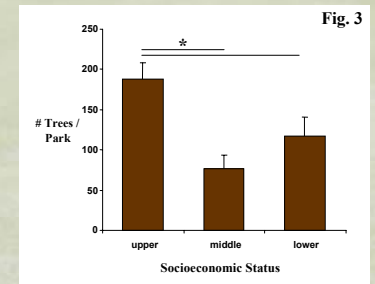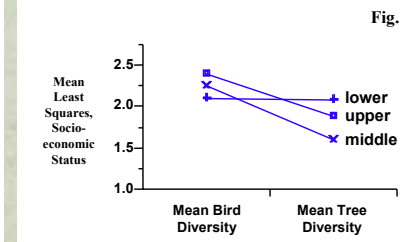
· Tree abundance is highest in upper income parks, but lowest in middle income parks (Fig. 3).

Conclusion and Future Work

Different ecological variables do indeed appear to vary differently with human social context. Both birds and trees in parks appear to be influenced by the socioeconomic characteristics of neighborhood residents, but in different ways. For example, bird diversity is lowest in parks in lower income areas while tree diversity appears to be highest in those same parks. Parks in middle income areas have moderately high bird diversity but have the lowest tree diversity and tree abundance. Incidental and bottom-up effects are most likely to be affecting bird diversity; while intentional, top-down effects from park managers are the most likely influences on tree abundance. Further work is required to elucidate the complex ways in which humans may be determining city-wide patterns of ecological processes.