Tree composition in small urban parks and surrounding neighborhoods of Phoenix, Arizona

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Introduction

Trees are the largest and most visibly dominate organisms in urban systems. Urban forests in arid zone cities like Phoenix are essentially created and sustained by a complex and often contradictory legacy of human activities that are variously geared toward enhancement of the local outdoor urban environment. The contemporary composition of the Phoenix urban forest is affected by this complex hysteresis of human interactions that are parameterized by local geography, climate, and water resources. This presentation highlights the influence of social economic rank (SER) and neighborhood and park age on the composition of trees in residential neighborhoods and embedded small urban parks in Phoenix with a special emphasis on urban tree place of origin.

Methods

The composition of trees were evaluated during 2000 and 2001 within an array of 16, small urban parks (1.7-5.5 Ha) and surrounding residential neighborhoods in Phoenix, Arizona that spanned a range of SER and age (Table 1). Parks were distributed within similarly dense residential neighborhoods of three SER, high, moderate, or low, and ranged in three age groups from approximately 1950 to 1997 (Table 1).

Counts of all trees in each park were made and neighborhood tree composition was approximated by tree counts along four transects distributed away from each park along streets in a northerly, easterly, southerly or westerly direction, respectively. Transect widths extended about the depth of a front yard residence on both sides of the street. Park and surrounding neighborhood tree composition was calculated as total frequency and taxa frequency per Ha of landscape surface area.

Table 1. Classification system for 16 residential neighborhoods and embedded small urban parks in Phoenix, AZ.

Socioeconomic rank (SER)		Neighborhood and Park Age	
Low	$ 6,700-35,000	Old	1949-1967
Medium	$36,000-58.000	Middle	1968-1980
High	$59,000-74,000	New	1981-1997

SER based on neighborhood median annual income identified using the 1999 Claritas PRIZM dataset .

Effect of neighborhood SER (low, medium, and high) and park age (old, middle, and new) on fractional distribution of place of origin of trees in 16 Phoenix parks.

Place of Origin	Low	Medium	High	Place of Origin	Old	Middle	New
Africa	0.042	0.007	0.025	Africa	0.007	0.063	0.002
Australia	0.144	0.049	0.089	Australia	0.094	0.105	0.097
Canary Island	0.002	0.000	0.0126	Canary Island	0.003	0.017	0.000
China	0.111	0.088	0.049	China	0.141	0.070	0.054
E USA	0.052	0.088	0.026	E USA	0.117	0.050	0.011
Europe	0.000	0.007	0.000	Europe	0.000	0.000	0.002
India	0.031	0.000	0.002	India	0.003	0.007	0.017
Latin America	0.007	0.007	0.003	Latin America	0.017	0.003	0.002
Mediterranean	0.076	0.000	0.026	Mediterranean	0.117	0.045	0.002
Mexico	0.108	0.168	0.099	Mexico	0.007	0.080	0.178
Pacific	0.000	0.000	0.000	Pacific	0.000	0.000	0.000
Russia	0.000	0.000	0.000	Russia	0.000	0.000	0.000
S America	0.040	0.088	0.089	S America	0.010	0.046	0.122
SE Asia	0.082	0.098	0.000	SE Asia	0.203	0.012	0.007
SW Asia	0.153	0.189	0.201	SW Asia	0.124	0.254	0.143
SW USA	0.153	0.211	0.089	SW USA	0.158	0.184	0.063
Sonoran	0.000	0.000	0.290	Sonoran	0.000	0.063	0.300
Total	1.000	1.000	1.000	Total	1.000	1.000	1.000

Data in red had a fractional distribution greater than 10% of total of total abundance by park category.

Effect of neighborhood SER (low, medium, and high) and neighborhood age (old, middle, and new) on fractional distribution of place of origin of trees in 16 Phoenix neighborhoods.

Place of Origin	Low	Medium	High	Place of Origin	Old	Middle	New
Africa	0.011	0.060	0.072	Africa	0.021	0.049	0.077
Australia	0.150	0.168	0.166	Australia	0.127	0.169	0.198
Canary Island	0.001	0.002	0.002	Canary Island	0.000	0.002	0.003
China	0.178	0.172	0.059	China	0.217	0.126	0.029
E USA	0.006	0.010	0.003	E USA	0.011	0.004	0.003
Europe	0.004	0.003	0.005	Europe	0.007	0.004	0.000
India	0.006	0.012	0.012	India	0.008	0.010	0.013
Latin America	0.076	0.078	0.028	Latin America	0.104	0.031	0.037
Mediterranean	0.076	0.054	0.080	Mediterranean	0.054	0.093	0.066
Mexico	0.072	0.016	0.063	Mexico	0.034	0.062	0.070
Pacific	0.001	0.000	0.000	Pacific	0.001	0.000	0.000
Russia	0.035	0.003	0.027	Russia	0.012	0.051	0.000
S America	0.088	0.084	0.132	S America	0.084	0.053	0.198
SE Asia	0.077	0.160	0.133	SE Asia	0.124	0.133	0.091
SW Asia	0.106	0.088	0.096	SW Asia	0.082	0.132	0.072
SW USA	0.085	0.057	0.026	SW USA	0.083	0.057	0.022
Sonoran	0.028	0.033	0.091	Sonoran	0.032	0.023	0.120
Total	1.000	1.000	1.000	Total	1.000	1.000	1.000

Data in red had a fractional distribution greater than 10% of total abundance by neighborhood category.

Results

1. Park tree abundance was highest when surrounded by neighborhoods of high SER (P=0.0005) . Park tree abundance was not related to park age (P=0.9512).

2. Neither park age (P=0.6062) or SER of surrounding neighborhoods (P=0.8030) had an impact on park tree diversity.

3. Neighborhoods of high SER had greater tree diversity than neighborhoods of low SER (P=0.0087), but neighborhood age had no effect on tree diversity (P=0.3405).

4. Neighborhood tree abundance was not affected by either neighborhood SER (P=0.2806) or age (P=0.7750).

5. Parks in neighborhoods with high SER ad the most trees from the Sonoran Desert and southwest Asia while parks in neighborhoods of low SER had more trees from more trees from Australia, China, Mexico, southwest Asia, and non-desert regions of the southwest US.

6. Older parks tended to have more trees from China, the eastern US, the Mediterranean region southeast and southwest Asia, and the SW USA; whereas newer parks had trees that were mostly from Mexico, the Sonoran Desert, and non-desert regions of the southwest US.

7. Neighborhoods of high SER tended to have more trees from Australia, South American, and SE Asia; whereas neighborhoods of low SER had trees that were mostly from Australia, China, and SW Asia.

8. Older neighborhoods tended to have more from Australia, China, Latin America, and SE Asia; whereas newer neighborhoods had trees that were mostly from Australia, South America, and the Sonoran Desert.

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"Trees........a value that spans generations." – Author unknown