URBAN FORESTS IN THE DESERT?

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Abstract. The first concerted efforts to establish urban forests in Tucson and Phoenix, Arizona occurred around the turn of the century. Both cities developed and projected images of oases. During the 1950s Tucson began to abandon the oasis image. Phoenix, however, has maintained that image to date. Differences in life-style and in the availability of water, and the environmental movement of the 1970s have been suggested as factors that influenced the changing image of Tucson. This paper reports on a mail survey that was conducted to explore Tucsonans' attitudes towards urban trees. While respondents believe trees are important for the city and for residential streets, they place greatest emphasis on trees in their own yards and indicate an unwillingness to pay more property taxes for a municipal street tree program.

Résumé. Les premiers efforts concertés pour établir des forêts urbaines à Tucson et Phoenix en Arizona se sont produits vers le tournant du siècle. Les deux villes ont développé et projeté des images d'oasis. Durant les années 1950, Tucson a commencé à abandonner son image d'oasis. Phoenix, cependant, a maintenu cette image. Des différences dans le style de vie et dans la disponibilité en eau et le mouvement environnemental des années 1970 ont été avancées comme facteurs ayant influencé le changement d'image de Tucson. Cet article rend compte d'un sondage postal qui a été réalisé pour explorer les attitudes des habitants de Tucson face aux arbres urbains. Même si les répondants croient que les arbres sont importants pour la ville et pour les rues résidentielles, ils mettent plus d'emphase sur les arbres dans leurs propres cours et marquent une hésitation pour payer plus de taxes foncières pour un programme municipal d'arbres de rue.

The concept of urban forests in Sonoran Desert cities may sound incongruous, if not improbable. Nevertheless, it is worthy of consideration. The purpose of this paper is to address that concept through a brief review of the history of attempts to develop an urban forest in Tucson, Arizona; a report on a mail survey of city residents perceptions of the values of trees and their attitudes towards street trees in particular; and discussion of the implications of the survey data for the realization of an urban forest in the city.

Shade has traditionally been an important element in the design and construction of desert cities around the world. The Laws of the Indies, issued in 1573 by the king of Spain, governed the building of communities in the New World and clearly recognized the value of shade in arid lands communities. The Laws called for a central square to be surrounded by portales or a covered arcade.

The plaza should be square or rectangular . . . Around the plaza as well as along the four principal streets which begin there, there shall be portales, for these are of considerable convenience to the merchants who generally gather there (2, p. 13-14).

While Tucson was not planned according to the Laws of the Indies, the need for shade and beautification was recognized in the late nineteenth century. This recognition led to tree planting campaigns at the turn of the century when the city provided free water to encourage the planting of street trees (8). In 1894 and again in 1907 substantial and successful efforts were made to develop an urban forest and convert the desert city to an oasis. McPherson and Haip note that 1,200 trees were planted in 1894 and 10,000 in 1907. They suggest that "The primary purposes for planting were beautification, shading, dust reduction, and horticultural experimentation" (8, p. 88). A similar transformation from desert to oasis was also undertaken in the neighboring city of Phoenix.

The creation of an oasis image was of more than local value. The sparsely settled Arizona Territory was actively recruiting immigrants to increase population, capital and prospects for statehood. Promotional literature prepared by cities and counties was distributed throughout the midwest and northeast. Pamphlets frequently depicted tree-lined streets with victorian houses and grass lawns in the cities of Tucson and Phoenix, and lush irrigated agricultural fields or extensive orchards in the surrounding countryside. Clearly the image portrayed was not of a desert. One brochure opened with the declaration, "Phoenix is not in the desert." Strong efforts were made to present Phoenix and Tucson as being similar to cities in the midwest and northeast, but with a healthy and salubrious climate and with excellent opportunities for economic advancement (11).

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The oasis image began to fade in Tucson in the 1950s, however, such was not the case in Phoenix. Hecht attributes this phenomenon in Tuscon to, "a change in the value of leisure time and an increasing appreciation of the region's natural environment" (4, p. 935). Other factors, however, are involved. Predominant among them is the availability of water. During the 1970s the problems of a dropping water table and the increased cost of water in Tucson contributed to the adoption of desert landscape treatments in residential yards and public areas such as roadway median strips. Tucson is totally dependent upon ground-water, whereas Phoenix, in addition to ground-water, is serviced by a series of reservoirs impounding run-off and snowmelt from the nearby White Mountain. While neither city can be considered water-rich, on a comparative basis Phoenix is better watered. This is evident in the respective urban landscapes and in differences in a single family residential water use. The lush green of the Phoenix urban forest is suggestive of a more temperate climate city. And, at the scale of the single family residential unit there is an impressive difference in the per capita daily consumption of water. The consumption in Phoenix is 180 gallons per capita per day and in Tucson it is 113 gallons (6).

Jackovics and Saarinen (7) confirmed this divergence of images between Phoenix and Tucson in their study of university students' perceptions of both cities. Tucson was perceived as reflecting more of the desert while Phoenix was perceived as being similar to Los Angeles. The authors noted, "Phoenix is seen as having oasis-like qualities while Tucson has desert and mountain atmosphere. Phoenix residents notice the lack of oasis qualities when in Tucson" (p. 8). Further evidence of the difference between the two cities is found in residents' preferences for urban and metropolitan park landscapes. In a 1986 study, Tucsonans expressed signficantly greater preferences for desert park landscapes than did Phoenicians (12). Saarinen (10) adds another perspective on the changing image and suggests that Tucson was influenced by the growing awareness of environmental conditions that emerged nationally during the 1970s.

On May 21, 1989 an editorial was published in the *Arizona Daily Star* with the headline "Trees, trees they clean the air and lower electric bills." A variation on a message that first appeared around the turn-of-the-century was being issued, and it included a call for a return to an earlier green image of the city—with some important differences in supporting arguments. The editorial made note of the ability of trees to "absorb carbon dioxide and produce oxygen" . . . reduce hot-weather cooling bills "by 10 percent to 50 percent" . . . and create "a green glow under their canopy." It also made clear that, "The trick to planting trees here is to pick water-efficient varieties. Nature figured out long ago how to structure trees like mesquite, ironwood, desert willows and paloverdes to conserve little rainfall to best advantage" (1). After nearly one century the message was reissued, but with the admonition to plant trees, trees that are "water-efficient" and with the promise of lower electric bills.

The Survey

A mail survey was designed and distributed in 1987 to assess Tucson residents' perceptions of and attitudes about trees in the city. Using census data, aerial photography and ground reconnaissance, single-family residential study areas were identified that presented variability in tree density, but which were relatively homogeneous in home ownership and in socio-economic characteristics. Available resources were not adequate to sample across a range of residential neighborhood types and/or socio-economic characteristics. A sample of 300 households was drawn in the distinctly middle-class study area. The survey was administered following principles and procedures suggested by Dillon (2). Forty-eight questionnaires were undeliverable because of addressees moving, deaths, or individuals otherwise being unavailable. A response rate of 76.0 percent was obtained from the deliverable questionnaires.

The survey encompassed several issues related to urban vegetation as well as varying geographic scales ranging from the individual residential yard to the city. Issues included perceptions of elements that contribute to the quality of cities, attributes of good city streets, and attitudes about trees. In this paper, we focus

on the quality of cities and city streets.

Findings

The conventional or folk wisdom about responses to hot desert cities suggests that newcomers either love them or hate them, that few, if any, individuals are ambivalent about their new landscapes. Intense heat, strange vegetation and the inevitable dust are facts of life, as are opportunities for new landscape experiences and magnificent sunsets. Respondents to the mail survey were asked to indicate their feelings about living in Tucson. Nearly 90 percent stated that they loved/liked it; slightly more than three percent disliked it; and about eight percent were neutral in their feelings about it. But, only seven percent of the respondents had lived in Tucson for less than five years.

Table 1 indicates the rank-order of selected indicators that are perceived as contributing to the quality of the cities and Table 2 presents the list of elements that respondents were asked to use to *describe* the streets on which they lived. Both lists were based on previous studies of environmental quality (7, 8) and on topics that received frequent mention in local newspapers. While none of the city quality indicators was viewed as unimportant, the existence of street trees is certainly not perceived as very important. As indicated in Table 2, overall, respondents perceive their streets as being in good neighborhoods and as being quiet with well maintained houses and yards. They are private, attractive, friendly and uncrowded. However, they are preceived, at best, as only moderately safe. The yards tend more towards grass lawns than the gravel of desert landscape designs and there are few trees.

Respondents attitudes about the importance of trees was addressed in several ways including for contributing to the quality of cities (Table 1), for creating pleasant streets, and for providing shade in the respondent's yard. Table 3 indicates the substantial differences in attitudes about where trees are important. Emphasis increases as the scale decreases from that of the city, to the street, and to the individual yard. Another attempt to explore the perceived value of street trees involved asking respondents if they would "be willing to pay additional property taxes to have street trees planted and maintained?" And, if so, how much would they be willing to pay? Slightly more than one-quarter (27 percent) of the respondents were willing to pay additional property taxes. Of

Table 1. Perceived indicators of the quality of an urban landscape

Indicator	x^1	*SD*
Air and water quality	1.22	.527
Traffic density	1.60	.755
Street conditions	1.66	.696
Climate	1.67	.727
Street lighting	1.90	1.022
Availability of parks	2.12	.830
Availability of cultural features	2.13	.942
Availability of recreation facilities	2.20	.883
Existence of sidewalks	2.36	1.085
Existence of street trees	2.51	1.089

1. Each issue was rated on a 5 point scale; 1 = very important, 5 = not at all important

Table 2. Respondents perceptions of elements that contribute to the quality of their streets

Element	x^1	*SD*
Good - bad neighborhood	1.83	.907
Quiet - noisy	2.11	1.153
Buildings well - poorly kept	2.21	1.056
Yard well - poorly kept	2.36	1.130
Lot of - no privacy	2.33	1.141
Attractive - unattractive	2.37	1.145
Friendly - unfriendly	1.41	1.076
Uncrowded - crowded	2.44	1.202
Safe - unsafe	2.55	1.253
Desert landscape - grass lawns	2.73	1.174
Many - few trees	2.78	1.272

1. Each element rated on a 5 point scale; 1 = word/phrase on the left, 5 = the right

Table 3. Importance of trees

Factor	+ *	±	−
For contributing to the quality of cities	*51.9%*	*32.1%*	*1.6.1%*
For creating pleasant streets	*60.2%*	*24.7%*	*15.0%*
For providing shade in respondents yards	*80.0%*	*13.5%*	*6.5%*

* + = *Important*, ± = *neutral*, − = *unimportant*

those who indicated a willingness to pay more taxes per year, 66 percent would pay five to ten dollars and the remainder would pay an additional twenty dollars or more.

Discussion

The data presented here suggest that, in our middle-class study area there is only moderate support for an urban forest of street trees in Tucson. When compared with other indicators of urban quality, the existence of street trees was not viewed as very important. A clear message comes through about where people want trees—in their yards. Shade is important adjacent to the house. If the energy savings mentioned in the newspaper editorial are to be realized by homeowners and renters, it will be through shading her/his house and not through shading cars parked along the street. Nevertheless, when asked in general, how important "street trees are in a desert city like Tucson," over three-quarters of the respondents thought street trees were important, but only one-fourth of those respondents indicated a willingness to pay more taxes for those trees.

We did not inquire about respondents attitudes about trees in governmental, commercial and business areas. Nevertheless, those areas with large ground surfaces covered by roads, parking lots and buildings, and which frequently have higher intensities of human use, may be most in need of the beneficial effects of trees. Possibilities for reducing the effects of the urban heat-island phenomenon and improving air quality may be greatest in those public and commercial areas where street trees and trees in parking lots would also provide benefits of improved human comfort for large numbers of users and of enhanced urban landscape aesthetics.

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