

ATTITUDES TOWARDS VEGETATION IN A DESERT URBAN FOREST: CREATING A SENSE OF PLACE

by Christina B. Kennedy and Ervin H. Zube¹

Abstract. Attitudes towards vegetation are especially important in Tucson, located in the Sonoran Desert, where water availability is limited and where native vegetation can play an important role in the city's image and sense of place. This paper reports on interviews with long-term Tucson residents and a survey of students who are relatively new to Tucson. Vegetation was seen as contributing to Tucson's sense of place, however, preferences for native versus exotic vegetation appeared related to length of time in Tucson. Location and context were identified as important factors to be considered when choosing vegetation types or considering expanding the urban forest. Similarities between this study and ones from temperate regions, showing the importance of location and territoriality apparent in attitudes towards vegetation in the inner-city, are discussed.

Increasing concern about water availability, urban heat islands, and global warming, has brought renewed interest in urban forests and, simultaneously, in the type, amount, and location of vegetation planted in cities in arid climates. In an earlier article (1) we discussed the concept of urban forests in Sonoran Desert cities and reported on the results of a mail survey of Tucson residents' attitudes towards street trees. In this paper we draw upon an additional survey of University of Arizona students and in-depth interviews with longterm Tucson residents to investigate relationship of vegetation to place identity in Tucson, residents' and students' preferences for native or exotic species of vegetation, locations within the city that are deemed important as places for vegetation, and the reasons these locations are seen as important. Implications of the findings for the expansion of the urban forest in Tucson are discussed.

Tucson's current landscape. The type, amount, and location of a city's vegetation depend not only on fads, fashions, public policies and availability of plant species, but also on individuals who are trying to create their own personal comfortable landscapes. Some may achieve this by recreating a lost landscape from their youth or former home, and others by embracing the stark

contrasts in form and color offered by Sonoran desert vegetation. Yards as personal expressions of preferences, or the creation of personal niches, have a significant effect on the structure and form of the urban forest ecosystem.

In 1979 Fontana complained that because of Tucson's urban vegetation, if a person were blindfolded in a suburb of New York, brought to Tucson, and had the blindfold removed, she would be unable to tell she wasn't still in Schenectady, New York (2). A year earlier, Hect (3) had discussed the increased acceptance of desert vegetation which one would assume would clearly differentiate between Schenectady and Tucson. Today, according to McPherson and Haip (4), there is ample evidence of an "emerging desert landscape in Tucson". Still, as in 1979, if a person's blindfold were removed in Tucson, she might still be confused. The degree of her confusion would depend on where in Tucson the blindfold was removed.

McPherson and Haip (4) describe Tucson's transformation from desert into "sun drenched oases" and then back again into a "desert city". There remains some question of how pervasive this transformation has been. It is a convenient and frequently used heuristic device to divide Tucson's history into periods of different fashion regarding vegetation. We must not lose site of the fact, however, that there was, and remains, a great deal of variability during those periods and spatially throughout the city.

Different areas of Tucson have different vegetation compositions. Both Yoklic (5) and O'Rourke (6) point out that type and amount of neighborhood vegetation are associated with the age and location of the neighborhood. Giebner (7) notes the relationship of vegetation type with architectural forms within the neighborhood. Socio-economic status and mobility also affect vegeta-

1. Faculty member in the Department of Geography and Environmental Studies at California State University, Hayward, and faculty member in the School of Renewable Natural Resources at the University of Arizona in Tucson, respectively.

tion composition and maintenance in neighborhoods (5). Lower income neighborhoods tend to have far less phytomass than do higher income neighborhoods (8).

Currently over 650,000 people live in the Tucson metropolitan area (9). The form and structure of Tucson's urban forest has developed and will continue to be shaped by these residents', as well as by visitors', reactions to Sonoran Desert vegetation, by local needs and national attitudes, and by Tucson's physical setting where water availability is a major concern. Whether the urban forest is composed predominantly of native desert vegetation or mainly lush exotic vegetation, there is no question that Tucson's urban forest little resembles the presettlement vegetation which consisted mainly of a creosote flat with riparian woodland along the Santa Cruz and Rillito Rivers. Current emphasis on Global Releaf programs and attempts to increase urban forests make it mandatory to consider the type of forest that is appropriate to Tucson and to locations where additional trees and other vegetation are most wanted.

Methodology

A mail survey of 300 middle-class single family households was conducted in 1987 to assess Tucson residents' perceptions and attitudes about trees in the city (1). Follow-up interviews were conducted with a random subset of 34 of the mail survey respondents. For comparison purposes, a survey of fifty-four students from an introductory geography class was also completed. The students both filled an age gap in the general sample and provided a group of individuals who had fairly recently become residents of Tucson; a third had been in Tucson less than one year and another third between one and five years. These students provided an opportunity to compare the perceptions of short-term and long-term residents. The assumption was that their attitudes towards vegetation and preferences for types of urban landscapes would reflect those of their home regions more than those of the long-term Tucsonans in our sample, 88 percent of whom had been in Tucson for over 6 years.

The interviews and student survey encompassed many of the same urban forest issues included in the mail survey but also dealt with vegetation

other than trees; the question of place identity; the relationship among vegetation, place, and personal identity; preferences for desert versus non-desert plant species; and desired locations for vegetation. This paper focuses on these concerns.

Results

Tucson's Identity. Studies by Jackovics and Saarinen (10) and Shaw et al. (11) suggest that Tucson has a definite identity, personality, or "sense of place." Relph (12) argues that places are a synthesis of nature and culture. As such, vegetation, as a representation of nature, could be a significant factor in a places' image or personality. Research by Schmid (13), Barenstein (14), and McBride (15) in other cities supports the concept that vegetation contributes to "sense of place" by increasing a city's or neighborhood's unique character or identity.

In answer to the question, "Are there things (including sights, smells, and sounds) or places that identify Tucson to you, that make it different from other cities?", nearly ninety percent (88%) of the residents who were interviewed and the students said that there were. They were then asked what things or places made Tucson different from other cities. Multiple responses were possible and offered a rich variety of descriptors to draw from. Content analysis showed that vegetation or attributes of vegetation contributed to Tucson's identity for half (49%) of the respondents. Mountains were also named by half (49%). A quarter (27%) listed weather, and a fifth (20%) noted some aspect of the desert.

Residents' responses to vegetation were strongly positive. For example, residents noted ". . . the desert growth around here . . . the growth on the desert here has its own atmosphere, everything blooms.", ". . . palm trees, the desert plantings you see a lot of places, and the palo verdes in spring.", and "The cactus at the airport" as contributing to Tucson's identity. Cacti in general and the uniqueness of saguaros were commented on by several other residents.

Students also frequently mentioned cactus as being something that makes Tucson different. However, there was also a fairly strong negative awareness of "dirt," "sand," "sand and gravel,"

and "lack of vegetation." Some students appreciated the "variety of vegetation," "flowers in winter," and the smells of certain plants. Regardless of whether it was in a positive or negative manner, desert vegetation, and for some, a lack of vegetation, were seen as characteristics which made Tucson different from other places.

Whereas desert vegetation contributes to Tucson's uniqueness, the history of settlement in Tucson and the types of vegetation planted suggest that exotic vegetation was often preferred to Sonoran Desert vegetation. Responses to the question "Do you feel that the plants in the city of Tucson should contrast with, or be a continuation of, the surrounding Sonoran Desert vegetation" suggest that similar preferences exist among a substantial percent of the population today. While there was not a statistically significant difference between students and residents, over half of the students, compared with less than one third of the residents, felt that Tucson vegetation should contrast with the surrounding desert vegetation. However, the majority of residents felt that vegetation should be a continuation of Sonoran Desert vegetation, and another 15 percent felt there was a need for both native and exotic vegetation in Tucson even though this was not given as an option on either the student questionnaire or in the interviews.

Continuing the desert image in Tucson was the most frequently given reason for feeling that plants in Tucson should be a continuation of the surrounding Sonoran Desert vegetation followed closely by a concern for water issues, the fact that desert plants are natural to the area, and that people should adapt to their natural surroundings, as well as a belief that desert plants are easier to grow and maintain than are exotics (see Table 1). The attractiveness of desert plants and desert landscaping was recognized as well, and examples of a destination resort and local neighborhood which are characterized by the use of native plants were given. The aesthetic contribution of colorful native plants was also mentioned.

The desire for vegetation that contrasts with the surrounding Sonoran Vegetation appeared to be mostly a desire for variety. It was, however also related to personal preferences for green grass or

trees and, for some, a dislike of the desert or desert vegetation. Aesthetics was also a consideration. One person commented, "I don't think they need to make a statement that Tucson is a desert area. They should do what makes it look better." The implication being that exotic vegetation is more attractive than native vegetation.

Respondents were then asked "If you were in charge of a program to select trees and other vegetation to be planted in Tucson, what are some of the kinds you would select?" The types of vegetation named by respondents were divided into water-use categories by Katherine L. Jacobs, Director of the Tucson Active Management Area of the State's Department of Water Resources. Tables 2 and 3 show that there were significant differences between the types of vegetation that the two groups would choose to be planted in Tucson.

The major differences were related to water use. Residents most often said they would plant trees, such as palo verde, mesquite, and eucalyptus, which were subsequently categorized as using little water. Conversely, few of the trees named by students were low water-use. Those most frequently mentioned were palms, pines, and oaks. Following in the same vein, more of the

Table 1. Reasons given for preferring contrast with or continuation of Sonoran Desert vegetation (percent mentioning).

<i>Reason</i>	<i>Residents (N=33)</i>	<i>Students (N=54)</i>
Continuation		
continue desert image	27.3	20.4
natural to area	24.2	18.5
concern for water issues	24.2	14.8
desert plants are easier to grow and maintain	21.2	3.7
Contrast		
like/need green grass or trees	15.2	18.5
need for variety	24.2	11.1
dislike desert or desert vegetation	8.8	16.7
Both		
aesthetics	14.7	11.1

Note: 1) Words included in dislike of desert or vegetation are dry, dirty, bring, poorly done, harsh. 2) Continue desert image includes a concern for preserving the desert. 3) The open-ended format of the question allowed multiple answers. One person may have responses in several categories.

students identified shrubs and ground cover which require larger amounts of water as something they would like to see planted. None of the residents did.

Location. Urban forestry studies such as those by Skylar and Ames (16), Getz et al. (17), Talbot and Kaplan (18), or Lein and Buhyoff (19) have tended to look selectively at the acceptance of street trees by city residents, the relative importance of vegetation in different areas of the city, the preferred density, or the form of vegetation. Seldom, however, have all these variables been considered in one study. Nevertheless, the context in which we find vegetation may determine whether we like a type of vegetation or whether we feel it is appropriate. Areas used for different activities can require different kinds of plantings.

Residents and students were given a list of eight generic locations to rank according to where they either expected to find, or thought there should be, trees and other vegetation. As indicated in Table 4, parks and yards topped the list. Yards are private spaces, parks are public, but both are places for relaxation and/or recreational activities. If one excludes parks, the perceived importance of trees at these locations decreases from the personal scale (yard) to the

neighborhood (street) and city scale.

The personal scale. As was found in the previous mail survey (1), the yard was deemed the most important place for trees. It was the most important primarily because it was identified as a personal space or territory, but also because the yard provides individuals with sanctuary and enjoyment, and, for some respondents, an enhanced sense of identity. Aesthetics, the shade and coolness trees provide, and simply liking or loving trees were also given as reasons. Residents and students saw front yards and back yards as having different functions or purposes, and many stated that different types of vegetation should be planted in each. Desert landscaping was seen as being more appropriate in front yards, while vegetation which provided an oasis was preferred for the back.

The neighborhood scale. Both yard and street trees were seen by respondent of the in-depth surveys as being equally important for creating pleasant streets and neighborhoods. However, students and residents differed. The majority of students (57%) considered street trees most important, while the majority of residents (59%) felt yard trees were more important.

The city scale. Parks were considered to be

Table 2. Vegetation chosen for Tucson, comparison of residents and students.

	Students (n=48)	Residents (n=34)
Trees		
* 1 native low water-use	12.5	55.9
native high water-use	4.2	2.9
* 2 non-native low water-use	2.1	47.1
non-native medium water-use	48.3	52.9
non-native high water-use	19.0	17.6
Cactus	12.1	5.9
Ground Cover		
low water-use	3.4	2.9
* 3 high water-use	13.8	0.0
Shrubs		
low water-use	5.2	5.9
* 4 high water-use	12.1	0.0
Other (i.e. flowers etc.)	15.5	5.9

*P=.05 Chi-Squares: 1) 15.67, 2) 21.84, 3) 4.53, and 4) 3.71 (1df). Multiple answers were possible.

Table 3. Comparison of frequency of naming low water-use versus high water-use plants.

Plants	Students		Residents	
	(N)	(%)	(N)	(%)
low water-use	19	40.4	40	85.1
high water-use	28	59.6	7	14.9
Total	47	100.0	47	100.0
Chi-square	18.2	1df	P=.005	

Table 4. Locations considered to be important places to have trees and other vegetation.

Location	Mean* (N=88)
parks	1.9
yards	2.8
residential areas	3.0
schools	4.4
lining street edges	5.0
near commercial establishments	6.3
medians of streets	6.3
along washes	6.6

*Mean value of ranking: 1=most important location, 8=least important location.

the most important place for trees and other vegetation. A major reason was because "parks are supposed to have trees." Trees were seen as contributing to relaxation as well as providing shade and coolness in parks. As public spaces, parks were seen as offering amenities to everyone, especially to people who might not have a place with grass and trees at home in which to recreate.

The decreasing emphasis placed on trees in public places other than parks suggests that the reasons given for choosing an area as the most important or least important location tended to be more anthropocentric than ecological. The reasons reflected the following: the perceived function of a location or the type of activity the respondent expected to engage in at that location; whether vegetation contributed to, was superfluous to, or possibly hindered carrying out a function or activity; and whether or not vegetation would even be noticed.

The three locations that were consistently considered least important as places for trees and other vegetation were in medians, near commercial establishments, and, in washes, even though these can be ideal place in which desert vegetation can contribute to the sense of place. A look at reasons why trees in these areas are considered unimportant, or at least less important, is instructive.

The reason given by half (50%) of the respondents who felt medians unsuitable places for trees was that of driver and pedestrian safety. Respondents were concerned that "drivers would run into them," "it would make drivers even worse," or "it's hard to see cars when crossing the street." Other reasons given for choosing medians as the least important place for vegetation were that trees "don't serve any purpose there," or that maintaining trees in medians is expensive and difficult.

In commercial areas there was not only a sense that trees serve little purpose, but there was also resentment that trees be used, or rather "wasted" on business enterprises or for strictly decorative purposes. As one respondent exclaimed "why waste good trees on useless business?" There was also a strong feeling that trees were unimportant in those areas because the respondent spent

little time there or went there with a specific purpose which did not include enjoying trees. "They are places you go to do something, and then come back. Not someplace you'd go, and lo! around, and enjoy the shade." Others were concerned with water use or lack of care. "Trees by commercial establishments are useful for decoration only, and that is the least justifiable use of water I can think of." There was no awareness of the contributions trees can make to energy conservation for air conditioning or to controlling the urban heat island phenomena.

Although washes, natural drainage areas, were considered least important of the eight locations, there was a difference between resident and student perceptions of the importance of wash vegetation. Nearly two-thirds (61%) of the student respondents, compared with one quarter (24%) of the resident respondents to this question, considered washes the least important place for trees or other vegetation. Yet, when undisturbed, washes are the most heavily vegetated areas in the Sonoran Desert. Vegetation along washes is important as wildlife habitat and for controlling lateral erosion during flooding. Reasons given by respondents who choose washes as a least important place to have trees and other vegetation were, as with responses to other urban non-private locations, strongly anthropocentric and showed a lack of awareness of ecological values associated with wash vegetation. To approximately one half of the respondents, (45%) washes were places where it is unimportant to have trees and other vegetation "because washes are not major areas of human congregation," "they are not recreation areas," and "nobody notices the washes". One third (33%) appeared oblivious to the fact that washes are areas where one might expect there to be trees and other vegetation and that this vegetation serves important ecological functions. Examples of these responses are: "what are washes?", and, "washes would look awkward with trees around them." Still others saw washes as "nothing but a means to carry water away." Some (15%) did recognize that washes have vegetation naturally, however, and felt "the natural environment" should be left alone.

Discussion

Getz et al. (17), in their survey of Detroit black inner-city residents, found that neighborhood streets and parks were considered to be the most important places for trees; downtown areas, industrial areas, and parking lots the least. Sklar and Ames (16) attributed the high survival rate for trees planted in neighborhood parkways during block parties to a redefining of public trees and parkways as the territory and responsibility of individual inner-city residents in Oakland. The similarity between results from Tucson and Detroit (17) regarding preferred locations for trees, as well as the importance of territoriality/personal space in the Oakland study (16) suggests that the perceived relative importance of the presence or absence of vegetation is based on three factors: a sense of territoriality, hence responsibility for trees or other vegetation; what functions a location provides; and the expected personal use of an area. These factors appear to cross socioeconomic and ethnic lines and may be integral to person—urban forest interactions. They are strongly anthropocentric and appear to be independent of climate type. Despite the similarities with studies from temperate regions, however, because Tucson *is* a city in a desert, species selection and choice of planting sites appear to assume increased importance in establishing a sense of place while remaining sensitive to environmental constraints.

Vegetation does contribute to Tucson's identity and sense of place. But the message conveyed by participants in this study is clear. Personal preference is strong for both Sonoran Desert vegetation and exotics reminiscent of the east or more tropical areas. Although it is important to be sensitive to the needs of residents, there is an important question regarding whether the city should pander, particularly in public areas, to tastes developed in other regions or whether it should maintain some of the ecological integrity of the Sonoran Desert in Tucson. Apparently developers believe they can attract newcomers more easily with an abundance of exotic vegetation, including green grass lawns. Nevertheless, desert landscaping is becoming increasingly acceptable, is far more appropriate to environmental constraints in Tucson, and is being encouraged by the recent Tucson landscape ordinance. As peo-

ple live in Tucson and become more familiar with the area, our data suggest that their appreciation of the types of vegetation suitable to the desert increases. This is indicated in the contrast between residents and students in their preferred types of vegetation.

Grass is an important surface for play and recreational activities and apparently contributes to the emotional well-being of some residents. However, at the entrance to developments or in front of commercial establishments, it denies the desert setting and consumes substantial amounts of valuable water. Replacing grass as much as possible with native shrubs and ground covers can offer the color and variety noted as important by a large number of respondents.

The medians of major thoroughfares did not rate as highly as other public places as a location where vegetation was important to respondents. Nevertheless, desert vegetation was cited as being important to Tucson's identity. The continuation and increase of efforts to plant saguaro, mesquite, palo verde, acacia, smaller cacti and other attractive native trees and shrubs in medians, and in other public places such as the airport and major highway entrances to Tucson will continue to strengthen Tucson's image as a unique desert city.

Although washes were seen as being the least important place for vegetation, these are areas that, with intensive replanting, would contribute greatly to the image of the city. Planting along the two primary washes, the Santa Cruz and the Rillito Rivers, could help to identify them as important riparian areas and increase the attractiveness of the existing and proposed linear parks along them. Heavy planting with native species would not only make washes more attractive but would provide better corridors and habitat for native wildlife.

Finally, the apparent strong desire for oases indicated by some respondents suggests the need for diversity of vegetation within the city and for the distinction between private and public landscapes. It is important to choose vegetation based on context and location. Personal oases are important, but perhaps a reduction in size should be encouraged. Oases, such as parks, for those who cannot create their own oases, are vital in a desert environment. Previous research has shown that

Tucsonans believe that the city and metropolitan area should have a mix of parks ranging from green oases to native desert landscapes (20). A mixture of park types, some with predominantly exotic vegetation and others with native vegetation, offers areas for different types of activities and for different uses during the four seasons of the year. Desert parks offer examples of the attractiveness and shade production of different desert species and provide inviting places for winter walks. The advantages and disadvantages of different parks and vegetation types need to be weighed and the psychological, emotional, and ecological benefits derived from them considered, as well as the costs related to water-use and pollen production.

The expansion of Tucson's urban forest in an attempt to ameliorate certain environmental problems must be done with care and attention to appropriate vegetation types as well as to the attitudes of residents towards vegetation. What people plant in their yards, support as public landscapes, and promote for community tree planting efforts will shape Tucson's urban forest of tomorrow.

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Department of Geography
and Environmental Development
California State University
Hayward, California 94542

Résumé. Les attitudes à l'égard de la végétation sont spécialement importantes à Tucson, ville située au coeur du désert de la Sonora où la disponibilité en eau est limitée et où la végétation indigène peut jouer un rôle important vis-à-vis de l'image de la ville et de l'opinion de l'endroit. Cet article réfère à des interviews avec des résidents de longue date de Tucson et un tour d'horizon des étudiants qui sont relativement nouveaux à Tucson. La végétation était vue comme contribuant à l'opinion de l'endroit quoique les préférences pour la végétation indigène versus celle exotique semble reliées à la durée de résidence à Tucson. La localisation et le contexte étaient identifiés comme d'important facteurs à être considérés au moment de choisir les types de végétation ou d'envisager une expansion de la forêt urbaine. Des similarités entre cette étude et certaines de régions tempérées, montrant l'importance de la localisation et de la territorialité apparente dans les attitudes envers la végétation à l'intérieur de la ville, sont discutées.

Zusammenfassung: In Tucson, in der Sonoranwüste, wo Wasser-verfügbarkeit begrenzt ist und einheimische Vegetation eine wichtige Rolle im Stadtbild und Stadtgefühl spielen kann, sind Haltungen der Vegetation gegenüber besonders wichtig. Diese Arbeit berichtet über Interviews mit langfristigen

Tucson Einwohnern und eine Umfrage von Studenten, die in Tucson relativ neu angekommen sind. Die Vegetation wurde als ein Teil von Tucsons Stadtbild betrachtet, aber eine Vorliebe für einheimische oder für exotische Vegetation schien von der Dauer der Aufenthalt in Tucson abzuhängen. Der Ort und Zusammenhang wurden als wichtige Faktoren identifiziert,

wenn man Vegetationarten wählt oder daran denkt, den Stadtwald auszudehnen. Ähnlichkeiten zwischen dieser Untersuchung und Untersuchungen von gemäßigteren Gegenden, die die Wichtigkeit vom Ort und Territorialverhalten vorhanden in Haltungen über Stadtkernvegetation zeigen, werden diskutiert.

ABSTRACTS

LAWTON, B. P. 1990 . **Plant health: a vital link.** Am. Nurseryman 172(4): 76-78, 84.

Soil pH directly impacts nutrient availability, especially of micronutrients. Plants have specific pH requirements. Most commercial crops grow well in a pH range of 5.8 to 6.8. However, the USDA recommends keeping soil pH between 6.0 and 6.5. Depending on your state, the local extension agent may be able to test your soil for the basics of pH, nitrogen, phosphorus, and potassium. Adding agricultural lime is the safest long-term method of raising soil pH. Using finely ground sulfur, which has a long residual effect, is good long-range way to lower soil pH. Iron sulfate or aluminum sulfate take longer to lower pH and do not last as long. Once your soil is the right pH for your crop, you should retest it every five years.

BOORLAND, J. 1990. **Mulch.** Am. Nurseryman 172(4): 132-133, 135, 137-143.

Mulch can be composed of either inorganic or organic materials. It is most important to choose mulch that allows the exchange of gases between soil and air and the penetration of water. Because it eliminates unwanted plants from the landscape, mulch gives the remaining plants access to more moisture. Mulch reduces the need to artificially recharge the moisture supply. Little is known about the interaction of daily and seasonal soil temperature fluctuations and natural plant growth. Another unproven benefit attributed to mulch is that it helps soil maintain higher-than-normal temperatures longer into the fall and winter. Questions regarding warmer soil temperatures and plant phenology are still unanswered. Mulch is definitely useful in landscapes where alternate periods of freezing and thawing present problems. Mulch with fibrous or large-size particles impedes the gas-to-air exchange less than other mulches.