Treenet Proceedings of the 4th National Street Tree Symposium: 4th and 5th September 2003
ISBN 0-9775084-3-9

SOCIAL PREFERENCES FOR STREET TREES

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Street trees provide a wide range of social benefits. Air quality, wildlife habitat, property values, shade and aesthetic appeal are some of the most widely recognized. Research also suggests urban plantings increase perceived quality of life in residential areas (Sheets and Manzer 1991) and may enhance feelings of safety (Kuo et al. 1998). Not all trees are considered attractive or beneficial however, and appropriate selection of trees is a critical aspect of urban forestry. Selection of trees tends to focus on biophysical considerations, but street tree managers are increasingly recognizing that social preferences place significant constraints on selection of appropriate species. This paper is concerned with residents' preferences for street trees, focusing on visual characteristics of trees.

While management issues such as invasive roots and debris are clearly important to resident evaluations (Sommer et al. 1989), visual characteristics also have a strong influence on the relative appeal of street trees. Research untaken largely in the north hemisphere reveals patterns of preference relating to tree size, form and, to a lesser extent, foliage. In general, large trees tend to be preferred over small trees (Kalmbach and Keilbaso 1979; Heerwagen and Orians 1992; Sommer et al. 1993; Sommer and Summit 1995). Several studies have been conducted regarding preferred tree forms, and these consistently point to a preference for spreading and globular forms over more columnar and conical forms (Legg and Hicks 1979 cited Summit and Sommer 1999; Sommer and Summit 1996; 1997). Similarly, Heerwagen and Orians (1992) found a non-significant preference for trees that are broader than they are tall. Characteristics of tree foliage may also be important, but relatively little is known about this issue. Exploratory research by Williams and Cary (2002; see also Cary and Williams, 2000) suggests tree foliage is important to landholder and urban residents' assessment of native vegetation. Woodlands comprised of non-eucalypt species such as trees from the *Allocasuarina* family (Buloke and Sheoke) were significantly less preferred than eucalypt woodlands. Interviews revealed that nearly one third of participants attributed their dislike of these species to the distinct foliage (cladodes), which was sometimes interpreted as characteristic of unhealthy tree.

Environmental researchers have drawn on evolutionary psychology to account for these patterns of preference. They propose that humans have an inherited predisposition to prefer environments that afford survival benefits such as shade, shelter and food (Appleton 1990). Accordingly, Sommer and Summit (1995) argue that trunk height and width, and canopy height and shape are important because these characteristics influence the potential for humans to see hazards or opportunities without being seen by predators (characteristics formally known as prospect and refuge). Orians (1998) predicts that the most preferred trees will be those sharing characteristics with trees typical of high quality East African savanna. His argument is predicated on the assumption that humans lived in this environment during the period when emotional structures within in the human brain were evolving. Based on this argument he predicts highest preference for Acacia trees with low bifurication of trunk, spreading canopies and small compound leaves. Several studies have reported support for these theories (Heerwagen and Orians 1992; Sommer and Summit 1995; 1996; Sommer 1997).

While such accounts provide insight to some trends in preference for trees, they fail to explain evidence that preference for streets trees varies with cultural and social factors. For example, studies conducted in northern America consistently suggest high levels of appreciation for trees in urban settings, yet research by Hitchmough and Bonugli (1997) conducted in a Scottish town found relatively low support for urban plantings. Similarly, a comparison of Canadian respondents from four ethnic backgrounds (Fraser and Kenney 2000) reveals considerable variation in attitudes towards urban trees, which the researchers attribute to the landscape histories of respondents' cultures of origin. Such research highlights the need for Australian and more local studies of tree preferences to support managers of urban landscapes in selecting appropriate species.

This paper outlines research undertaken in Melbourne to explore residents' preferences for street trees. A more detailed account can be found in Williams (2002). The study utilized a photoquestionnaire to survey a cross-section of Melbourne residents regarding their preference for a range of street trees.

Method

A photograph questionnaire was developed. The questionnaire presented black-white photographs of 36 street trees. All photographs were taken in Melbourne and trees varied in form, foliage and origin. Questionnaires were posted to individuals selected randomly from Melbourne's telephone directory. Correctly completed surveys were returned by 192 participants (35% response rate). Each participant indicated their preferences for the trees by rating each tree on a 5-point scale (5 = like very much, 1 = do not like at all). They also provided simple demographic information about themselves and were given an opportunity to make a general comment on street trees in their locality.

The trees shown in the photoquestionnaire were also assessed by four expert judges (arboriculturists and horticulturists). These assessors examined each of the 36 photographs and classified each tree on a number of criteria: tree size, balance, form, foliage texture and size, density of canopy.

Results and discussion

This analysis focuses on preferred tree characteristics. A more comprehensive analysis of the data can be found in Williams (2002). The first analysis compares preferences for trees with specific characteristics (as judged by horticultural experts): tree size, form, foliage and origin.

Trees of a medium size were significantly preferred over smaller and larger trees (Wilk's $\Lambda(4,188)=.43$, $p=.00$). This contrasts with previous research in this area, which has generally supported higher preference for large trees (Kalmbach and Kiebaso 1979; Schroeder and Cannon 1983; Sommer and Summit 1995). Tree form was also important: Trees with a globular or oval form were significantly preferred over trees with spreading, conical/columnar or upright/open form (Wilk's $\Lambda(3,189)=.38$, $p=.00$) The relatively low preference for conical columnar forms is consistent with previous research (Sommer and Summit 1996; 1997). In contrast, the significantly higher preference for globular forms over spreading forms is not consistent with research conducted elsewhere. It is possible that the findings reported here regarding preferred size and form reflect local sensitivities to the Melbourne

urban landscape, possibly related to predominance of small trees and shrubs in street plantings, or local landscape characteristics such as house sizes, placement of utilities such as power lines, width of streets and roadside paths. Alternatively, the finding may represent a temporal shift in attitudes as residents of developed countries in general become more aware of the management problems associated with large trees in urban landscapes (Schroeder and Cannon 1983; Barro et al. 1997).

Trees with a regular canopy were preferred over trees with an irregular canopy (Wilk's $\Lambda(1,191)=.54$, $p=.00$) and higher preferences were found for trees with more coarse foliage (generally broad leaf trees) over trees with fine foliage (generally conifers and some Australian native trees, many with needle-like foliage) (Wilk's $\Lambda(1,191)=.62$, $p=.00$). This is consistent with Williams and Cary (2002) and raises the possibility that some needle-leaved trees present a visual cue which some people may associate with relatively poor habitat – in this case environments of extreme cold or aridity, or may be considered to provide less shade than broad leaved trees. Both explanations are consistent with habitat or functional theories of environmental preferences. This speculation requires much further investigation. Native trees with very fine foliage (visually comparable to *Pinus* species) are relatively unusual in an Australian urban context, while conifers are not commonly chosen as street trees (Frank et al. 2001), and may be considered ecologically undesirable. Alternative patterns of preference may arise with northern hemisphere populations where fine or needle leaved trees may have more positive associations.

Street tree managers often debate the relative acceptability of native and introduced trees in urban streets. Comparisons revealed no significant difference in average preference for these two broad groups (Wilk's $\Lambda(1,191)=1.00$, $p>0.05$), suggesting that visual characteristics such as size, form and foliage are possibly more important predictors of average preference.

A second analysis was undertaken to further understand the combinations of tree characteristics that were valued by Melbourne residents. The statistical procedure Principal Components Analysis (PCA) was used to identify groups of tree photographs that participants tended to assess similarly. Since these categories are based on lay evaluations, they may seem quite different from the categories used by professionals. The process is helpful however in identifying tree characteristics that are important to residents, and also aids in simplifying data for interpretation and analysis. The six categories and mean preferences for these are summarized below:

Category A - introduced, deciduous trees, moderate to large with relatively large and coarse foliage: *Quercus*, *Ulmus* and *Fraxinus spp*. (mean preference = 3.93)

Category B - small to medium sized native trees with fine foliage and relatively dense, spreading or globular canopies: for example *Melaleuca*, *Acacia* and *Allocasuarina spp*. (mean preference = 2.99)

Category C - medium to large, Australian native trees with relatively large coarse foliage and sparse canopies: for example *Eucalyptus* and *Angophora spp*. (mean preference = 2.71)

Category D - small trees with a strongly irregular spreading form, and relatively coarse foliage and sparse canopies: included *Robinia, Melia, Prunus spp*. (mean preference = 2.52)

Category E - introduced conifers, relatively large trees with fine foliage: *Pinus* and *Cupressus spp*. (mean preference = 2.20)

Category F - mainly conical or columnar trees of relatively small size, some with relatively poor form: included *Callitris*, *Allocasuarina*, *Salix* and *Callistemon spp*. (mean preference = 2.08)

In considering this analysis, it is important to keep in mind that mean preferences refer to specific trees included in the photoquestionnaire rather than all trees within the species mentioned. Since individual trees will vary from ideal types, the characteristics described are more important than the species mentioned. By far the most preferred trees were relatively large, introduced, deciduous trees. This is consistent with predictions made to me by a number of street tree managers, who suggested to me that many Melbournians aspire to live in avenues of leafy green Pinoak. It is interesting to note that in this analysis, origin of trees (native/introduced) clearly does influence the judgements made by residents. While on average the two types are equally preferred, it is apparent that for many individuals this is an important consideration. This suggests the need to understand the relative balance of preference within specific communities when selecting street trees.

Conclusion

This study provides some insight to the way Melbourne residents' preferences for street trees. There is much further work required however. For example, only a limited range of street trees were included in this study, and the results presented here reflect only overall trends and do not explore the range of views that exist within urban communities. It is clear however that an understanding of social preferences for the urban landscape is critical to planning and management of street trees. This study highlights a range of tree characteristics that should be considered in tree selection. Some of the findings reported here differ from findings reported in studies conducted overseas. This highlights the need for local and regional research to support effective street tree selection.

References

Appleton, J. 1990. The Symbolism of Habitat University of Washington Press, Seattle. 113 pp.

Barro, S.C., P. Gobster, H.W. Schroeder, and S.M. Bartram. 1997. What makes a big tree special? Insights from the Chicagoland Treemendous Trees Program. J.Arboric. 23:239-249.

Cary, J.W., and K.J.H. Williams. 2000. The value of native vegetation: Urban and rural perspectives Research Report 3/00. Land and Water Research and Development Corporation, Canberra. 56 pp.

Frank, S., R. Beer, and G. Waters. 2001. Street tree populations in Melbourne at the turn of the 21st century. Horticultural Project Report. Burnley College, Richmond.

Fraser, E.D.G., and W.A. Kenney. 2000. Cultural background and landscape history as factors affecting perceptions of the urban forest. J. Arboric. 26:106-113.

Heerwagen, J., and G.H. Orians. 1992. Humans, habitats and aesthetics, *In* S. R. Kellert and E. O. Wilson, eds. The Biophilia Hypothesis. Island Press, Washington DC. 484 pp.

Hitchmough, J.D., and A.M. Bonugli. 1997. Attitudes of residents of a medium sized town in south west Scotland to street trees. Landscape Research 22:327-337.

Kalmbach, K.L., and J.J. Kielbaso. 1979. Resident attitudes toward selected characteristics of street tree plantings. J.Arboric. 5:124-129.

Kuo, F.E., M. Bacaicoa, and W.C. Sullivan. 1998. Transforming inner-city landscapes: trees, sense of safety, and preference. Environment and Behavior 30:28-59.

Orians, G.H. 1998. Human behavioral ecology: 140 years without Darwin is too long. Bulletin of the Ecological Society of America:15-28.

Schroeder, H.W., and W.N. Cannon. 1983. The esthetic contribution of trees to residential streets in Ohio towns. J. Arboric. 9:237-243.

Sheets, V.L., and C.D. Manzer. 1991. Affect, cognition and urban vegetation: Some effects of adding trees along city streets. Environment and Behavior 23:285-304.

Sommer, R. 1997. Further cross-national studies of tree form preference. Ecological Psychology 9:155-160.

Sommer, R., and J. Summit. 1995. An exploratory study of preferred tree form. Environment and Behavior 27:540-557.

Sommer, R., and J. Summit. 1996a. An evaluation of tree descriptions in a popular garden guide. J. Arboric. 22:155-159.

Sommer, R., and J. Summit. 1996b. Cross-national rankings of tree shape. Ecological Psychology 8:327-341.

Sommer, R., P.A. Barker, H. Guenther, and K. Kurani. 1989. Householder evaluation of two street tree species. J. Arboric. 15:99-103.

Sommer, R., H. Guenther, P.A. Barker, and J.P. Swenson. 1993. Comparison of four methods of street tree assessment. J. Arboric. 19:27-34.

Summit, J., and R. Sommer. 1999. Further studies of preferred tree shapes. Environment and Behavior 31:550-576.

Williams, K.J.H. (2002). Exploring resident preferences for street trees in Melbourne, Australia. J.Arboric. 28: 161-170.

Williams, K.J.H., and J.W. Cary. 2002. Landscape preference, ecological quality and biodiversity protection. Environment and Behavior 34: 258-275.