Does beauty still matter? Experiential and utilitarian values of urban trees

Abstract

A major focus of early research on the social aspects of urban forestry was on how people perceive and value the beauty of trees in cities and towns. Since then, researchers have found that besides aesthetic enjoyment, the presence of urban forest vegetation may provide additional benefits such as stress relief, recovery from mental fatigue, stronger social ties, improved health and longevity, and reduced crime. Research has also documented that the urban forest can generate economic returns in the form of higher property values, increased retail activity, and reduced costs of heating and cooling, as well as environmental benefits like improved air quality. In their enthusiasm for these research findings on utilitarian tree benefits, some urban forest advocates have tended to disparage and belittle the aesthetic values of urban trees, suggesting that the beauty of urban trees is of trivial significance compared to their environmental, social, economic, and health benefits. But there is ample research evidence to show that beauty still matters as a reason for planting trees. Aesthetic values and utilitarian values of urban trees are both important, and they are interrelated. In fact, many of the utilitarian benefits of trees are a direct consequence of their beauty. Therefore, future research on urban forest values needs to give equal attention to both kinds of value. Rather than promote one at the expense of the other, urban forest advocates should highlight how these two kinds of value reinforce and support each other in enhancing the quality of urban life.

Keywords:

aesthetics, benefits, social values, urban forestry

Introduction: research on urban tree values

Research on the social and aesthetic values of urban trees has been in progress for at least the last three decades. From its beginning, a major focus of this research has been on how people perceive and value the beauty of trees and forested environments in cities and towns. For example, early research on people's perceptions of urban environments in the USA found that trees and other vegetation are one of the most important positive features contributing to the visual aesthetic quality of residential streets, parks and neighbourhoods (Ulrich and Addoms, 1981; Anderson and Schroeder, 1983; Buhyoff *et al.*, 1984). Studies using tree inventory data to assess the impact of trees on the public's aesthetic preferences for streetscapes in Ohio towns found that big trees have a much greater impact on perceived beauty than do smaller trees (Schroeder and Cannon, 1983), and that yard trees away from the street also contribute significantly to visual quality (Schroeder and Cannon, 1987). In most of this research, it was taken for granted that aesthetic quality is a significant value provided by urban trees, and that enhancing visual aesthetics is an important way in which urban forest management can benefit urban residents.

More recently, research has revealed that there are a variety of other ways in which city and town residents benefit from trees in addition to aesthetic enjoyment of the urban forest. Vegetation and other natural features of the environment appear to have physiological and psychological effects on humans that contribute significantly to mental and physical health and wellbeing. Researchers have found evidence that trees and other vegetation may reduce stress (Ulrich *et al.*, 1991), speed recovery from surgery (Ulrich, 1984), and enhance cognitive functioning by promoting recovery from mental fatigue (Kaplan, 1995).

A series of studies on the social and psychological values of vegetation in Chicago public housing has shown that residents of buildings surrounded by trees benefit from increased social interaction with other residents (Kuo *et al.*, 1998), reduced levels of aggression (Kuo and Sullivan, 2001a), less crime and fear of crime (Kuo and Sullivan, 2001b), and improved ability

Herbert W. Schroeder

United States Department of Agriculture,
Forest Service,
Northern Research Station,
USA

to cope with stress (Kuo, 2001). Adolescent girls who spend time outdoors in settings with trees and vegetation exhibit higher levels of self-discipline (Taylor *et al*., 2002). Children with attention deficit disorder are better able to focus and learn after spending some time outdoors (Taylor *et al*., 2001).

Recent studies in Japan, the Netherlands, and England suggest that the restorative effects of experiencing nature and the opportunities that urban green spaces provide for physical activity may improve the public's general health (Maas *et al*., 2006), increase longevity (Takano *et al*., 2002), reduce morbidity (Maas *et al*., 2009), and mitigate inequalities in health due to disparities in income (Mitchell and Popham, 2007, 2008; Hartig, 2008).

In addition to the social, psychological, and health-related benefits cited above, research into the economic benefits of urban trees has documented that the urban forest can generate real revenue in the form of higher sales prices for residential properties (Anderson and Cordell, 1988), increased retail activity in shopping districts (Wolf, 2005), and reduced costs of heating and cooling (McPherson and Simpson, 2003).

There are two primary purposes motivating this research on the values of urban trees. The first purpose is to provide community planners and urban foresters with information they can use to improve planting and maintenance programmes so as to maximize the benefits that urban trees provide to the populace. The second purpose is to convince local officials and decision makers of the importance of planting and maintaining trees and other green infrastructure, so that urban forestry will be given a higher priority in budgeting, planning, and decision-making. In combination with research on the physical environmental effects of trees and vegetation (e.g. air quality improvements, carbon sequestration, moderation of temperature extremes, and stormwater retention), information on the social, health, and economic benefits of urban trees provides strong support for planting and managing trees as an essential component of environments where humans live, work, and recreate.

Beauty belittled

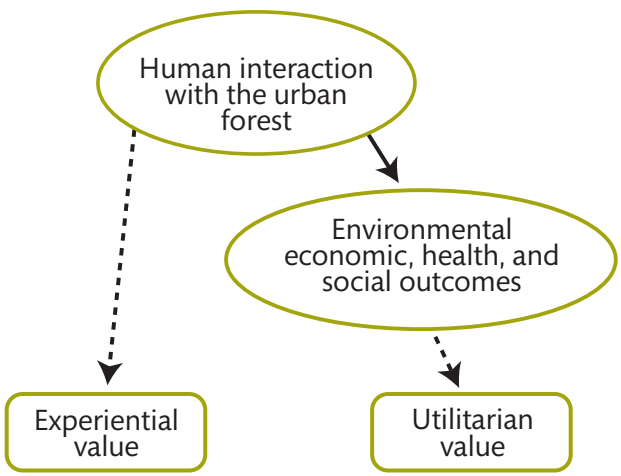
In their enthusiasm for these research findings on environmental, economic, social, and health-related benefits, however, some urban forest advocates have tended to disparage and belittle the more intangible and experiential values of urban trees such as aesthetics. Perhaps the most striking example of this is a speech given in the early 1990s by the chair of the National Urban Forest Council, Donald Willeke, in which he declared, 'Beautification be damned! Urban and community trees should be planted for economic, environmental and social reasons' (quoted by TreeLink, 2008). He went on to say that, because of the economic benefits of trees, he would urge their planting and maintenance in urban areas 'even if they were ugly and smelled bad' (quoted by Baxter, 2008, p. 9). Willeke's words have been echoed by other urban tree advocates and still appear on the websites and in newsletters of many urban forestry advocacy groups. In an article about economic benefits of urban trees, Provenzano (2008, p. 37) quotes Willeke and declares 'Ah, yes, trees are indeed beautiful, and the aesthetic appeal cannot be overstated, but we are talking about so much more than just a pretty face here.' Remarks like this seem to imply that the aesthetic value of urban trees is a superficial amenity and is of minor concern compared to their environmental, social, health, and economic benefits.

The beauty of trees has traditionally been a prime reason for planting them in cities, and aesthetic experience is perhaps the most immediate way in which most urban residents are aware of the value of the urban forest. But as our understanding of the economic, social, environmental, and health benefits of urban trees has increased, some urban forestry advocates seem to have decided that beauty does not really matter as a reason for planting trees.

Two kinds of value

To clarify the issue, it may be helpful to point out that there are two basically different ways in which value can arise from people's contact with the urban forest (see Figure 1). On the one hand there are the feelings of pleasure, enjoyment, and appreciation that arise directly from people's immediate experience of trees and other natural

Figure 1 Two ways in which value can arise from people's contact with the urban forest.



features in their environment. I call this *experiential value*, of which aesthetic value is probably the most well-known instance. Experiences of peacefulness and serenity, the feeling of being close to nature, a sense of place, and even (for some people) spiritual experiences could also be counted as experiential values of urban forests.

On the other hand, human contact with urban forests may lead to additional outcomes, which also have value for people. I call this the *utilitarian value* of the urban forest. The outcomes that have utilitarian value may be grouped into the four broad categories shown in Table 1. In the case of utilitarian value, the urban forest itself is not immediately a source of value to people; rather the various outcomes and benefits that arise from human contact and interaction with the urban forest are what is valued. A person or community might enjoy these outcomes and benefits without even knowing that they are due to the presence of trees and other natural features in the environment.

Table 1 Utilitarian outcomes of human interaction with urban forests.

Category	Examples
Environmental	• Improved air quality • Reduced flooding • Carbon sequestration
Health Physical Mental	• Increased cardiovascular fitness from outdoors exercise • Reduced stress • Improved cognitive function
Economic New revenue Cost savings	• Higher residential property values • Increased retail activity • Reduced heating and cooling costs
Social	• Stronger community ties • Reduced violence and crime

The basic question then is this: with all that we have learned and are continuing to learn about the many utilitarian values that urban trees provide, should we now conclude that the aesthetic and other experiential values of the urban forest are not important as a reason for planting and maintaining trees? Does the beauty of the urban forest still matter?

Research supporting the importance of beauty

I believe there is ample evidence from research to show that beauty and other experiential values of the urban forest do indeed still matter. Studies in the USA and England have asked homeowners to rate the importance of various benefits and annoyances that they experience from the trees in the vicinity of their houses. These studies found that visual beauty is considered by homeowners to be the most important benefit provided by street trees. The pleasing appearance of street trees is consistently rated by homeowners as more important than utilitarian benefits such as improved air quality, cooling of the home, reduced wind speed, and increased property value (Sommer *et al.*, 1990; Schroeder and Ruffolo, 1996; Flannigan, 2005, 2010; Schroeder *et al.*, 2006;). These studies show that people generally have very high levels of satisfaction with the trees by their homes, and that the importance of the trees' benefits outweighs any annoyances they create. Most recently, Flannigan (2010) expanded on these findings by means of qualitative data, revealing that aesthetics and other experiential values of neighbourhood trees are very important to householders in the southwest of England. In addition to visual beauty, the sounds and smells associated with street trees give people a sense of connection with nature, bringing a feeling of the rural countryside into their urban environment.

Research on aesthetic experience of the environment and sense of place shows that experiences of beauty involving natural features of the landscape have an immediate and significant impact on people's quality of life. For example, in studies in which people kept diaries of aesthetic experiences in outdoor settings (Chenoweth and Gobster, 1990; Gobster and Chenoweth, 1990), aesthetic experiences – many of which involved natural features of the landscape – were among the most highly valued experiences that the participants had during the course of their week. Interviews with older park users (Tinsley *et al.*, 2002) revealed that the most important perceived benefit from using city parks was 'an immediate sense of pleasure or gratification.' A total of 82% of participants rated this as a 'very important' or 'extremely important' benefit of their park use (Tinsley and Tinsley, 2001).

Open-ended surveys about people's special outdoor places (Schroeder, 2002, 2007) found that beauty is one of the most frequently mentioned qualities of places that people consider to be memorable or important to them personally. As illustrated by the following quotes, aesthetic and other kinds of positive experiences in these places are not merely a superficial amenity. They serve as significant sources of meaning and happiness in people's lives, leading people to form strong emotional attachments to the places where they occur.

There are so many beautiful nature preserves and lands to explore, and I have. They all have natural beauty that fills me with joy, just to behold it.

What an uplifting experience it is to come here in early spring when the old oaks are outlined against the sky.

This beautiful spot restores my soul and makes me glad to be alive.

The aesthetic quality of trees is an important part of the character of many urban places, and people may feel intense emotional distress and grief when faced with the loss of trees that have been a part of their community for most of their lives. In interviews with Charleston, South Carolina, residents about the losses they suffered during a major hurricane (Hull, 1992), the city's trees were among the most frequently described significant features that had been damaged by the storm. People expressed strong positive emotions for the trees that were lost. The trees' aesthetic value and their contribution to community image were the most commonly mentioned reasons why residents valued them. Some of the interviewees were almost in tears as they described the trees that had been lost.

Riddell and Pollock (1999) interviewed residents of a Chicago neighbourhood in which most of the mature trees were removed over a few days' time due to an invasion of Asian longhorned beetle. The residents spoke of the trees in much the same way as they would old friends and family members. The aesthetic and experiential value of the trees was an important part of their life in the neighbourhood, and the loss of that value was traumatic to many. At the urging of local residents, the City went to considerable expense to plant larger-diameter replacement trees so that the neighbourhood streetscape could regain its former character more quickly.

Relationship between utilitarian and aesthetic values

Both aesthetic values and utilitarian values of urban trees are important, and they are intertwined with each other. In fact, many of the utilitarian values of urban trees extolled by Willeke and others are a direct consequence of their aesthetic value – although this is often not acknowledged. For example, a newsletter feature about economic benefits of urban trees (Nashville Tree Foundation, 2007) quotes Willeke on 'beautification be damned', and then lists increased shopping revenues, higher office occupancy rates, and increased home prices as examples of how trees add to the economic value of urban property. But these economic values exist in large part because the trees are beautiful. Trees increase property values and attract people to shopping districts and offices largely by virtue of their beauty. Furthermore, if trees were ugly and smelled bad, the potential of trees for reducing the consumption of fossil fuels for heating and cooling would likely not be realised, since people would not want to plant them near their homes. The beauty of trees and other natural things is part of what attracts people to go outdoors and engage in activities like walking and bicycling, which can improve cardiovascular health and reduce obesity. Similarly, in urban housing projects where aesthetically attractive outdoor spaces with trees and grass are available, residents are more likely to spend time outdoors where they can meet their neighbours, form social ties, and deter crime (Kuo 2003). If trees were not beautiful, most of these utilitarian benefits would be eliminated or greatly reduced.

However, even if beauty did not give rise to utilitarian benefits, it would still matter. Experiencing beautiful places and things has an immediate positive impact on a person's quality of life. The mere fact that people historically have chosen to plant trees in cities testifies to the experiential appeal that they have for urban residents. Why, then, would advocates for planting urban trees wish to belittle their aesthetic value? Perhaps it is because aesthetic values are inherently subjective, and our modern culture has an ingrained bias toward things that are tangible, objective, and measurable. Perhaps it is because experiences of beauty can be very difficult to capture in words. We know from our immediate experience that beauty matters, but when someone asks why, we may be at a loss to give a rational explanation or justification. Maybe it is also because aesthetic experiences can be very personal, making people reluctant to talk about them in a public forum where they can be criticised and judged by others. Therefore, people may feel a need to use more impersonal, objective information to argue for the things that they feel are important.

However, there is a potential risk in relying too heavily on research about utilitarian values to justify planting and management of urban trees. Many of the social, environmental, and health-related benefits being attributed to urban trees are in fact quite difficult to establish scientifically due to the multitude of complex factors that must be taken into account. Studies that do not adhere to very high standards of rigour in controlling for factors such as income, cultural differences, and self-reporting bias may be subjected to criticism that could ultimately weaken the argument for urban forestry (e.g. Adams and White, 2003). The exuberant claims now being made for tree benefits may

sound frankly incredible to many members of the public, and the fact that much of this research is being funded and carried out by outspoken advocates for urban nature might lead some people to be sceptical of the results.

In research about the health benefits of foods and dietary supplements, it has often been the case that early, positive findings are not borne out by later, more extensive and rigorous studies. Early reports about vitamin E, for example, suggested that it could significantly reduce the risk of heart disease and cancer, and this prompted many people to start taking vitamin E supplements. Later, more rigorous research, however, was not able to confirm most of the beneficial effects that had been enthusiastically claimed for vitamin E, and the current state of knowledge about this nutrient remains unclear (National Institutes of Health, 2009). A similar fate may be in store for some of the health benefits of trees touted in recent studies. If the argument for planting trees is framed exclusively in terms of such benefits, then the argument may be undermined if later studies do not fully confirm the sweeping claims that are being made at present.

One advantage of beauty as an argument for planting urban trees is that aesthetic value is a matter of immediate, personal experience. One does not need a scientific study to know that trees are beautiful and that beauty contributes to one's quality of life. Unfortunately, people often do not fully appreciate this until after they have experienced a serious loss, such as in the spread of Dutch elm disease and the current widespread outbreaks of emerald ash borer in the USA.

Admittedly, not everyone is equally attuned to aesthetic experience, and some may indeed view aesthetics as a frivolous reason to plant trees. Local officials working with limited budgets may understandably be reluctant to spend money on trees without some evidence of a tangible, measurable return on their investment. A growing body of replicable scientific evidence about the utilitarian benefits of urban trees may be the most effective means of winning these people's support for urban forestry. But this in no way requires that the importance of aesthetic values be disregarded or belittled.

Future research

Research on the utilitarian environmental, health, economic, and social benefits of trees needs to proceed carefully and rigorously. The influences of the environment on individual people and communities are complex and far from completely understood. This is illustrated in a recent study by Mitchell and Popham (2007). Using census data for self-reported health of all residents of England, they found an overall positive correlation between health and the quantity of nearby greenspace, but the relation varied depending on the income and the urban, suburban, or rural character of an area. There was no relationship between health and greenspace within higher-income suburban and rural areas, and in lower-income suburban areas there was actually a negative correlation between greenspace and health. One possible explanation for this is that lower quality greenspace, which may be more prevalent in low-income districts, might actually be detrimental to health. This suggests that the relationship between greenspace and health is not simply a case of 'green is good'. Researchers and urban forest advocates should therefore be careful to critically evaluate the findings of new studies and avoid drawing sweeping or simplistic conclusions until early research results have been adequately tested and replicated.

As our knowledge of the utilitarian benefits of urban forests matures, the beauty of urban trees should continue to be celebrated as an important value. Research should be directed to learning more about what kinds and configurations of trees have the greatest aesthetic value for which groups of people. Here again the issue is complex, as there appear to be significant differences in preferences among people from different countries, regions, and cultures (Fraser and Kenney, 2000). In a comparison between householders in the Midwestern USA and the southwest of England, the aesthetic value of trees was important to both groups, but homeowners in that part of the USA tended to like very large and fast-growing trees in front of their homes while the residents of southwest England preferred smaller and slower growing street trees (Schroeder *et al.*, 2006). It appears that aesthetic preferences are conditioned by a variety of factors, including differences in climate and housing density as well as cultural norms. To broaden our understanding of experiential values of urban forests, more studies need to be conducted in countries other than the USA, which is where most such research has been done to date, and more qualitative research is needed to understand in depth how urban people experience both the benefits and the annoyances of trees near their homes (Flannigan, 2010).

Conclusion

Future research on urban forest values needs to give equal attention to both aesthetic and utilitarian values. Rather than promote one kind of value at the expense of the other, urban forest advocates should highlight how these two kinds of value can reinforce and support each other in enhancing the quality of life of urban people.

References

ADAMS, J. AND WHITE, M. (2003). Health benefits of green spaces not confirmed. [Letter to the editor] *Journal of Epidemiology and Community Health* **57**, 312.

ANDERSON, L.M. AND CORDELL, H.K. (1988). Influence of trees on residential property values in Athens, Georgia (U.S.A.): a survey based on actual sales prices. *Landscape and Urban Planning* **15**, 153–164.

ANDERSON, L.M. AND SCHROEDER, H.W. (1983). Application of wildland scenic assessment methods to the urban landscape. *Landscape Planning* **10**, 219–237.

BAXTER, B. (2008). *Chestnut memories: oral history transcript*. Interview transcript. University of Tennessee, Chattanooga, Tennessee, USA. [Online] Available at: http://www.cs.uky.edu/~tony/BNB_WEB/25th%20Annual%20Meeting/Don%20Willeke.pdf [Accessed January 2011].

BUHYOFF, G.J., GAUTHIER, L.J. AND WELLMAN, J.D. (1984). Predicting scenic quality for urban forests using vegetation measurements. *Forest Science* **30**, 71–82.

CHENOWETH, R.E. AND GOBSTER, P.H. (1990). The nature and ecology of aesthetic experiences in the landscape. *Landscape Journal* **9**(1), 1–8.

FLANNIGAN, J. (2005). An evaluation of residents' attitudes to street trees in southwest England. *Arboricultural Journal* **28**, 219–241.

FLANNIGAN, J. (2010). *An investigation of residents' relationships with street trees in southwest England*. PhD Thesis. Birmingham City University, Birmingham, UK.

FRASER, E.D.G. AND KENNEY, W.A. (2000). Cultural background and landscape history as factors affecting perceptions of the urban forest. *Journal of Arboriculture* **26**, 106–113.

GOBSTER, P.H. AND CHENOWETH, R.E. (1990). Peak aesthetic experiences and the natural landscape. *In: Proceedings of the Twenty-First Annual Conference of the Environmental Design Research Association (Champaign-Urbana, Illinois, USA, 1990)*. EDRA, Inc., Oklahoma City, Oklahoma, USA.

HARTIG, T. (2008). Green space, psychological restoration, and health inequality. *The Lancet* **372**, 1614–1615.

HULL, R.B. IV (1992). How the public values urban forests. *Journal of Arboriculture* **18**, 98–101.

KAPLAN, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology* **15**, 169–182.

KUO, F.E. (2001). Coping with poverty: Impacts of environment and attention in the inner city. *Environment & Behavior* **33**, 5–34.

KUO, F.E. (2003). The role of arboriculture in a healthy social ecology. *Journal of Arboriculture* **29**, 148–155.

KUO, F.E. AND SULLIVAN, W.C. (2001A). Aggression and violence in the inner city: Impacts of environment via mental fatigue. *Environment & Behavior* **33**, 543–571.

KUO, F.E. AND SULLIVAN, W.C. (2001B). Environment and crime in the inner city: Does vegetation reduce crime? *Environment & Behavior* **33**, 343–367.

KUO, F.E., SULLIVAN, W.C., COLEY, R.I. AND BRUNSON, L. (1998). Fertile ground for community: Inner-city neighborhood common spaces. *American Journal of Community Psychology* **26**, 823–851.

MCPHERSON, E.G. AND SIMPSON, J.R. (2003). Potential energy savings in buildings by an urban tree planting programme in California. *Urban Forestry and Urban Greening* **2**, 73–86.

MAAS, J., VERHEIJ, R.A., DE VRIES, S., SPREEUWENBERG, P., SCHELLEVIS, F.G. AND GROENEWEGEN P.P. (2009). Morbidity is related to a green living environment. *Journal of Epidemiology and Community Health* **63**, 967–973.

MAAS, J., VERHEIJ, R.A., GROENEWEGEN, P.P., DE VRIES, S. AND SPREEUWENBERG, P. (2006). Green space, urbanity, and health: how strong is the relation? *Journal of Epidemiology and Community Health* **60**, 587–592.

MITCHELL, R. AND POPHAM, F. (2007). Greenspace, urbanity and health: relationships in England. *Journal of Epidemiology and Community Health* **61**, 681–683.

MITCHELL, R. AND POPHAM, F. (2008). Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet* **372**, 1655–1660.

NASHVILLE TREE FOUNDATION (2007). *Tree talk*, April 2007 [newsletter], Nashville Tree Foundation, Nashville, Tennessee, USA. [Online] Available at: http://www.nashvilletreefoundation.org/pdfs/april07news.pdf [Accessed March 2011].

NATIONAL INSTITUTES OF HEALTH (2009). Dietary supplement fact sheet: vitamin E. National Institutes of Health, Office of Dietary Supplements, Bethesda, Maryland, USA. [Online] Available at: http://ods.od.nih.gov/factsheets/vitamine/ [Accessed February 2011].

PROVENZANO, P. (2008). Money does grow on trees. *Land Development Today* **4**(7), 36–37.

RIDDELL, J. AND POLLACK, N. (1999). *Views on the Asian longhorned beetle infestation in Chicago: an exploration of insights from neighbors and government*. Final report 23–99–10-RJVA. USDA Forest Service, North Central Forest Experiment Station, Evanston, Illinois, USA.

SCHROEDER, H.W. (2002). Experiencing nature in special places. *Journal of Forestry* **100**(5), 8–14.

SCHROEDER, H.W. (2007). Place experience, gestalt, and the human-nature relationship. *Journal of Environmental Psychology* **27**, 293–309.

SCHROEDER, H.W. AND CANNON, W.N. (1983). The esthetic contribution of trees to residential streets in Ohio towns. *Journal of Arboriculture* **9**, 237–243.
SCHROEDER, H.W. AND CANNON, W.N. (1987). Visual quality of residential streets: Both street and yard trees make a difference. *Journal of Arboriculture* **13**, 236–239.
SCHROEDER, H., FLANNIGAN, J. AND COLES, R. (2006). Residents' attitudes toward street trees in the UK and U.S. communities. *Arboriculture and Urban Forestry* **32**, 236–246.
SCHROEDER, H.W. AND RUFFOLO, S.R. (1996). Householder evaluations of street trees in a Chicago suburb. *Journal of Arboriculture* **22**, 35–43.
SOMMER, R., GUENTHER, H. AND BARKER, P.A. (1990). Surveying householder response to street trees. *Landscape Journal* **9**(2), 79–85.
TAKANO, T., NAKAMURA, K. AND WATANABE, M. (2002). Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *Journal of Epidemiology and Community Health* **56**, 913–918.
TAYLOR, A.F., KUO, F.E. AND SULLIVAN, W.C. (2001). Coping with ADD: The surprising connection to green play settings. *Environment & Behavior* **33**, 54–77.
TAYLOR, A.F., KUO, F.E. AND SULLIVAN, W.C. (2002). Views of nature and self-discipline: evidence from inner city children. *Journal of Environmental Psychology* **22**, 49–63.
TINSLEY, H.E.A. AND TINSLEY, D.J. (2001). *Older urban park users' and non-users' perceptions and preferences of Lincoln Park, Chicago*. Final report RJVA-23–98–18. USDA Forest Service, North Central Research Station, Evanston, Illinois.
TINSLEY, H.E.A., TINSLEY, D.J. AND CROSKEYS, C.E. (2002). Park usage, social milieu, and psychosocial benefits of park use reported by older urban park users from four ethnic groups. *Leisure Sciences* **24**, 199–218.
TREELINK (2008). *TreeLink's quote source*. TreeLink, Salt Lake City, Utah, USA. [Online] Available at: http://www.treelink.org/linx/Quotesearch.php [Accessed January 2011].
ULRICH, R.S. (1984). View through a window may influence recovery from surgery. *Science* **224**, 420–421.
ULRICH, R.S. AND ADDOMS, D.L. (1981). Psychological and recreational benefits of a residential park. *Journal of Leisure Research* **13**, 43–65.
ULRICH, R.S., SIMONS, R.F., LOSITO, B.D., FIORITO, E., MILES, M.A. AND ZELSON, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology* **11**, 201–230.
WOLF, K. (2005). Business district streetscapes, trees and consumer response. *Journal of Forestry* **103**, 396–400.