

## Social Aspects of Urban Forestry

# THE ROLE OF ARBORICULTURE IN A HEALTHY SOCIAL ECOLOGY

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**Abstract.** In urban communities, arboriculture clearly contributes to the health of the biological ecosystem; does it contribute to the health of the social ecosystem as well? Evidence from studies in inner-city Chicago suggests so. In a series of studies involving over 1,300 person-space observations, 400 interviews, housing authority records, and 2 years of police crime reports, tree and grass cover were systematically linked to a wide range of social ecosystem indicators. These indicators included stronger ties among neighbors, greater sense of safety and adjustment, more supervision of children in outdoor spaces, healthier patterns of children's play, more use of neighborhood common spaces, fewer incivilities, fewer property crimes, and fewer violent crimes. The link between arboriculture and a healthier social ecosystem turns out to be surprisingly simple to explain. In residential areas, barren, treeless spaces often become "no man's lands," which discourage resident interaction and invite crime. The presence of trees and well-maintained grass can transform these no man's lands into pleasant, welcoming, well-used spaces. Vital, well-used neighborhood common spaces serve to both strengthen ties among residents and deter crime, thereby creating healthier, safer neighborhoods.

**Key Words.** Social ecology; strength of community; crime; social benefits; residential.

In urban communities, arboriculture plays an important role in the health of the biological ecosystem. It provides habitat for wildlife and creates a more hospitable setting for many species (for a review of environmental impacts of urban forestry, see Dwyer et al. 1992). Does arboriculture contribute to the health of the social ecosystem as well?

Before examining *whether* trees contribute to a healthy social ecology, it might be reasonable to ask *how* they might do so. One possible answer comes from a body of work that has traditionally had nothing to do with trees: the literature on "defensible space." Defensible space (DS) theory suggests that the physical features of a residential neighborhood can have important impacts on strength of community and rates of crime in that neighborhood (Newman 1972). Defensible space theory posits, among other things, that the architectural features and physical layout of residential buildings

substantially influence patterns of informal contact among neighbors and informal surveillance. Contact among neighbors and informal surveillance are, in turn, known to be linked to strength of community and levels of crime (see Taylor 1988 for review). Although not all interventions based on DS theory have been successful (Cisneros 1995), the promise embodied in its sometimes spectacular successes has led the U.S. Department of Housing and Urban Development (HUD) and others to invest millions of dollars in rehabilitating public housing and other neighborhoods in line with DS guidelines (U.S. HUD 1998; Newman 1996).

If defensible space theory is correct, then vital, well-used residential outdoor spaces should play a crucial role in strengthening community and deterring crime. Although defensible space theory says very little about vegetation per se, the theory clearly has implications for natural, as well as built, features of residential outdoor spaces. If the presence of trees and grass in these spaces encourages residents' use of these spaces, perhaps these features too can play a role in strengthening community and deterring crime.

Does arboriculture, in fact, contribute to the health of the social ecosystem? In an urban neighborhood, we might approach this question in a variety of ways. We might ask whether trees play a role in the patterns of interrelation among different resident subpopulations. We might ask whether trees affect patterns of territory within the neighborhood or patterns of resource exchange. And we might ask whether trees enhance resident populations' capacity to resist incursion or outside threats. To the extent that arboriculture contributes to a healthy social ecosystem, we would expect otherwise similar urban areas with and without trees to differ in some or all of these respects.

This article reviews findings from a line of investigation addressing precisely these questions. A series of large-scale studies conducted in inner-city Chicago, Illinois, U.S., systematically compared buildings and spaces with varying levels of tree and grass cover while controlling for numerous social and environmental factors. "Greener" settings were compared to architecturally comparable or identical counterparts in terms of their performance on a wide range of ecosystem indicators.

## GENERAL METHOD

A variety of measures, research designs, and statistical tools were used in this line of work; the particulars of different

studies within this line of investigation differed considerably. For the purpose of this review, only a brief overview of methodology is provided here. Detailed descriptions of the methodology for the constituent studies may be found in the original journal articles. Similarly, the specific statistical evidence underlying each link reported here can be found in the original journal articles. In many cases, a link between tree cover and an outcome is documented not only by statistical evidence of a relationship but also by mediation tests examining the proposed mechanism and by numerous, sometimes dozens of, statistical tests for potential confounding factors. While all findings reported here were statistically significant, it should be noted that both effect sizes and certainty levels varied across different analyses and different studies. The purpose of this review is to introduce the commonalities of the work as a whole and to address a larger theme not fully treated in any of the constituent studies—the relationship between trees and a healthy social ecology.

### Setting and Overall Research Design

In examining the potential effects of trees on a healthy social ecology, the challenge was to find a setting in which the presence of trees was independent of other factors likely to affect the social ecology. Ideally, any neighborhoods we studied would meet four criteria. First, a potential research setting had to have variation in the amount of green cover immediately outside residences—from places that were full of plants to places that were barren of plants. Second, environmental features other than vegetation should be held constant across residences. Third, residents should be randomly assigned to residences or assigned irrespective of the amount of green cover. Finally, residents should have no influence over the maintenance of the vegetation near their home.

We found two public housing developments in Chicago that met these criteria: Robert Taylor Homes and the Ida B. Wells housing development. Each development has pockets of trees and grass as well as expanses of barren area (Figure 1). Each development is strikingly consistent in architecture. At the time of our studies, Robert Taylor Homes consisted of 28 identical 16-story apartment buildings laid out in single file along a 4.8-km corridor. Each building at Robert Taylor Homes was bordered on the west by an interstate highway and railroad tracks and on the east by a six-lane municipal thoroughfare and wide sidewalk. The Ida B. Wells development included 124 low-rise (2- to 4-story) apartment buildings laid out on a typical grid pattern. Chicago Housing Authority policies result in de facto random assignment of residents to apartment buildings for both developments,

and residents have no influence over the location or maintenance of trees or grass at either development. Thus, throughout this review, all comparisons between “greener” and “less green” settings refer to settings which are either roughly matched or identical in a host of architectural characteristics and resident characteristics.

It should be noted that, in the studies reported here, ratings of “greenness” and “green cover” may be regarded as roughly equivalent to ratings of “tree cover.” Although “greenness” and “green cover” were defined to include grass cover, the amount of tree cover in a scene is a very strong predictor of overall judgments of greenness; by contrast, the amount of grass cover appears to contribute little to ratings of greenness.



**Figure 1. Apartment buildings at Robert Taylor Homes (top) and Ida B. Wells (bottom), without trees (left) and with trees (right).**

## RESULTS

### Welcoming Residents Outdoors

A quarter-century of research (for review, see Kaplan and Kaplan 1989) has indicated that, in general, urban outdoor areas with trees are substantially more preferred than similar settings without trees. Some housing authority managers, however, have the belief that low-income African Americans don't value trees—that trees are a middle-class preference. Moreover, in poor inner-city neighborhoods there is the concern that trees reduce visibility. Housing authority managers and police suggest that trees make residents feel unsafe; if so, the presence of trees in this setting might actually make outdoor spaces less attractive and less usable. How do poor urban residents respond to trees? Would the presence of trees in outdoor areas have no effect or even make these areas less attractive to residents?

Our findings suggest that, in fact, residents' response to trees is extremely positive (Kuo et al. 1998). One hundred residents of a Chicago public housing development were asked to respond to images (photosimulations) depicting their courtyard with and without trees, with other factors (lighting, weather, people in the courtyard, etc.) held constant. Residents strongly preferred images with trees—and the more trees, the stronger their preference. Mean ratings for the high tree density images (54 trees per ha) were 6 standard deviations higher than the mean ratings for treeless images (Ms 3.1 versus 0.2 on a 0 to 4 scale, from “not at all” to “very much”). Further, approximately one-third of residents surveyed claimed that they would use their courtyard more if trees were planted.

These findings suggest that, in urban neighborhoods, trees might play a pivotal role in drawing residents outside. They further suggest a way in which arboriculture might contribute to a healthy social ecosystem—by enhancing residents' use of the spaces just outside their buildings, thereby promoting informal contact among neighbors and introducing informal surveillance.

### **Adults' Use of Outdoor Spaces**

Photosimulations, however, are approximations of reality, and predictions of use are merely predictions. To what extent were inner-city residents accurate in predicting that they would use “greener” outdoor spaces more often?

Quite accurate, it would appear. Findings from three different studies indicate that greener residential outdoor spaces receive more use from adult residents than their barren counterparts. In one study, residents living in greener high-rise apartment buildings reported significantly more use of the area just outside their building than did residents living in buildings with less vegetation (Kuo et al. 1998). In two other studies, adult use of residential spaces was found to be disproportionately concentrated in greener versus more barren spaces (Coley et al. 1997; Sullivan et al., in press). In the Coley et al. study, the greater the number of trees found in a space, the greater the number of people who used the space simultaneously. Moreover, the closer trees were to apartment buildings, and thus the more visually and physically accessible they were, the more people spent time outside near them. In the low-rise development studied, no adults at all were observed in areas devoid of trees.

### **Children's Use of Outdoor Spaces**

We also found differences in children's use of outdoor spaces as a function of tree cover. Children's use of residential outdoor spaces was disproportionately concentrated in greener versus less green spaces—a statistically significant finding in one study (Coley et al. 1997) and a marginally significant one in another ( $p = .07$ , Sullivan et al., in press). In addition, more detailed observations revealed differences

in children's behaviors in greener versus less green spaces. Children in green spaces were more likely to be found engaged in play activities than other kinds of activities, and there was also increased creative play in green spaces (Faber Taylor et al. 1998).

In these studies, both adults' and children's territorial patterns were found to be systematically related to the extent of green cover. Presumably healthier patterns of territoriality—greater use of outdoor spaces by adults, greater use of outdoor spaces by children, and increased play in children—were associated with greener neighborhood spaces. In drawing residents outside, might trees also increase the time residents spend in proximity to one another, thereby promoting social interaction among neighbors?

### **Resident Interaction Outdoors**

Our findings suggest that green cover is indeed related to the amount of social interaction in residential outdoor spaces. Green cover was reliably linked to the number of individuals simultaneously present in areas just outside apartment buildings (Coley et al. 1997). More detailed observations further suggest that the number of explicitly social activities (e.g., talking, playing cards together, working on a car repair together) occurring in residential outdoor spaces is linked to green cover (Sullivan et al., in press). We found 73% more individuals involved in social activities in spaces with high levels of green cover than in spaces with low levels of green cover (Sullivan et al., in press). The pattern was strongest for adults: Compared to more barren spaces, there were 100% more adults engaged in social activities in green spaces.

### **Children's Access to Adults Outdoors**

The more social nature of residents' activities outside their buildings appears to extend not only to adult–adult interactions but to adult–child interactions as well. In one study, the presence of trees consistently predicted greater use of residential spaces by mixed-age groups of youth and adults (Coley et al. 1997). In another, we found systematically higher levels of access to adults for children in greener versus less green spaces (Faber Taylor et al. 1998).

Thus far, we have seen that trees and grass attract people to use inner-city neighborhood spaces and that in greener spaces there is more social contact among neighbors than in comparable barren spaces. We've also seen that the proximity of the trees to apartment buildings matters—when trees are closer to buildings, people use the outdoor spaces more. It appears that trees contribute to systematically healthier patterns of interrelation among adults and children outdoors.

These findings are exciting because access to adults plays such an important role in healthy child development. Children are socialized into the mores and standards of a culture through imitation of adults, explanations from

adults, and, last but not least, corrective feedback from adults (e.g., Miller and Sperry 1987; Ochs and Schieffelin 1984). Further, adult supervision is pivotal in preventing misbehavior; indeed, "lack of parental supervision is one of the strongest predictors of the development of conduct problems and delinquency" (APA Commission on Violence and Youth 1983, p. 19). To the extent that greener residential spaces promote adult supervision, then, we might expect fewer delinquent behaviors in these spaces.

### **Neighborhood Social Ties, Resource Flows**

Thus far in this review, we have focused on outcomes specifically related to residential outdoor spaces—residents' use of these spaces, their activities in these spaces, the amount of socializing in these spaces, children's play in these spaces, etc. Do trees go beyond simply enhancing the vitality of residential outdoor spaces? Here, we turn toward social ecosystem variables that do not pertain specifically to residential outdoor space. The question here is whether, by making residential outdoor spaces more vital, trees contribute to the healthy functioning of a community in general.

There is substantial evidence to suggest that opportunities for casual social interaction provide a rich matrix from which social ties among neighbors develop (e.g., Ebbesen et al. 1976; Perkins et al. 1990). Opportunities for casual social contact, in turn, are greater when neighborhood residents spend more time in the outdoor spaces around their homes (Cooper 1975; Gans 1967; Talbot et al. 1987). If informal social contact among neighbors is a key factor in the development of social ties among neighbors, and trees are a key factor in informal social contact, perhaps trees can ultimately affect the development of neighborhood social ties.

A number of findings suggest that trees do in fact help strengthen neighborhood social ties. In a study of 145 public housing residents randomly assigned to architecturally identical buildings with varying levels of vegetation, the greener the building, the stronger the neighborhood social ties (Kuo et al. 1998). Compared to residents living in relatively barren buildings, individuals living in greener buildings reported more social activities and more visitors, knew more of their neighbors, reported their neighbors were more concerned with helping and supporting one another, and had stronger feelings of belonging. Further, statistical mediation tests indicated that the link between vegetation and neighborhood social ties is explained by residents' greater use of outdoor spaces (Kuo et al. 1998). Together, these findings suggest that by increasing the opportunities for residents to meet and interact, greener common spaces facilitated the development and maintenance of neighborhood social ties. This general pattern of findings has been replicated in a study of senior citizens (Kweon et al. 1998).

It is important to note that in another study comparing neighborhood social ties for residents of greener versus less

green buildings (Brunson 1999), no significant differences were found in the number of neighbors with whom residents reported having strong ties. It may be that shared use of common spaces contributes only to the development of strong ties with one or two neighbors, as opposed to fostering a strong network of ties as in a village or small town.

It is also important to note that one component of neighborhood social ties in this work was the sharing of resources between neighbors. For individuals who live in intense poverty, neighborhood social ties are more than a pleasant feature—they are the foundation of an important survival strategy. Social ties among neighbors provide a conduit through which individuals share resources (Belle 1982; Stack 1974). In poor communities, social ties among neighbors are the first line of defense against the ravages of poverty. By contributing to stronger ties among neighbors, trees may enhance residents' resilience in the face of sudden financial setbacks and emergencies.

To summarize thus far, our findings suggest that in poor inner-city neighborhoods, trees not only enhance patterns of resident territoriality but also contribute to healthier, more supportive patterns of interrelations among residents, including greater sharing of resources.

### **Sense of Safety**

At the beginning of this review, we addressed the concern that trees might decrease visibility and thereby reduce either actual safety or residents' sense of safety. Here, we come full circle and address the link between trees and safety directly.

Previous research indicates that neighbors who have strong social ties form more effective social groups (e.g., Greenbaum 1982; Warren 1981). For instance, compared to communities in which neighbors had weaker social ties, those with stronger social ties were more capable of building consensus on values and norms (Dubow and Emmons 1981), monitoring behavior, intervening if problem behaviors occur (Taylor 1988), and defending their neighborhoods against crime (e.g., Perkins et al. 1990). If stronger social ties among neighbors are key to creating more effective, safer neighborhoods, and treed spaces help promote ties among neighbors, perhaps the greenness of neighborhood landscape ultimately affects levels of safety and security in a neighborhood.

In inner-city neighborhoods, do treed spaces influence neighborhood safety and security? It seemed plausible that residents might feel safer in a setting if they knew, trusted, and could count on their neighbors—in other words, if they had strong social ties with their neighbors. At the same time, it seemed possible that even the high-canopy trees characteristic of public housing might reduce visibility, thereby reducing residents' sense of safety.

Our findings suggest that, in fact, residents living in greener buildings feel significantly safer than do their

counterparts living in more barren buildings. Further, our findings suggest that residents of greener buildings feel more comfortable or adjusted in their surroundings in general. We asked 145 public housing residents “How safe do you feel living here?” and “How well have you adjusted to living here?” We then compared the responses for residents assigned to relatively green versus relatively barren buildings. As predicted, individuals living adjacent to greener common spaces reported that they felt both safer and better adjusted than did their counterparts living adjacent to relatively barren spaces (Kuo et al. 1998).

### **Graffiti and Other Signs of Disorder**

Findings from another study suggest that not only do residents in greener settings feel safer but also that they experience systematically fewer “incivilities”—the nuisances and petty crimes that signal the breakdown of normal territorial functioning. We asked 90 residents of an inner-city neighborhood to report on the incidence of graffiti and other so-called incivilities in the spaces adjacent to their apartment building. Residents of greener buildings reported systematically fewer incidences of vandalism, graffiti, and litter than their counterparts assigned to more barren buildings (Brunson 1999). Moreover, greener buildings were subject to significantly fewer “social incivilities”—noisy, disruptive individuals; strangers hanging around; and illegal activities.

There are a number of possible explanations for the link between trees and a lower incidence of incivilities. The presence of trees and grass may signal a more well-cared for space and, therefore, a higher likelihood of perpetrators being noticed (Brown and Altman 1983). Alternatively, the greater use of greener spaces may introduce more “eyes on the street” (Jacobs 1961). Yet another explanation may lie in the greater social cohesiveness around greener spaces—perhaps residents who know and trust each other are more effective in instituting “local social control” over what goes on in the spaces outside their homes (Greenberg et al. 1982). Any and all of these factors might contribute. In any case, it appears that the presence of trees in residential outdoor spaces is linked with more successful territorial functioning. Treed spaces appear to be less vulnerable to incursions and minor outside threats.

### **Property Crimes, Violent Crimes**

To the extent that trees confer some protection against incursions, it seemed possible that they might provide some measure of defense against more significant threats as well. To examine this question, we collected 2 years of police crime reports for 98 apartment buildings in one inner-city neighborhood and used the extent of tree and grass cover outside each apartment building to predict the number of crimes reported for that building (Kuo and Sullivan 2001). We

found systematically negative relationships between the greenness of the landscape and the number of crimes per building reported to the police. The greener a building’s surroundings, the fewer total crimes; moreover, this relationship extended to both property crimes and violent crimes.

### **DISCUSSION**

The role of the urban forest in the biological health of cities is well established; could the urban forest play a pivotal role in healthy social ecosystems as well? The findings reviewed here suggest so. In a series of large-scale, highly controlled field studies, “greener” buildings and spaces were consistently characterized by better performance on a wide range of social ecosystem indicators. Trees and grass cover were linked with greater use of residential outdoor spaces by adults and children, healthier patterns of children’s outdoor activity, more social interaction among adults, healthier patterns of adult–child interaction and supervision, stronger social ties and greater resource sharing among adult residents, greater sense of safety and adjustment, lower levels of graffiti and other signs of social disorder, fewer property crimes, and fewer violent crimes.

When these findings are reframed in the traditional terms used to describe biological ecosystems, interesting parallels emerge. Specifically, green spaces may have a substantial impact on each of the following facets of ecosystem functioning: territorial patterns within an ecosystem (greater use of space, different use of space by children), interrelationships among different resident subpopulations (adult–child interaction, social interaction, and social ties), patterns of resource flow within an ecosystem (greater resource sharing), and residents’ capacity to resist incursion and outside threats (reduced graffiti and crime, greater sense of safety).

At present, the most ready explanation for a connection between trees and social ecosystem health lies in a straightforward extension of defensible space theory. Defensible space theory suggests that vital, well-used residential spaces are key to the development of neighborhood social ties and the discouragement of potential perpetrators because they provide opportunities for informal social contact among neighbors and introduce informal surveillance (Newman 1972). Our findings suggest that the presence of trees can be a decisive factor in the extent to which residents actually use and “take ownership of” residential outdoor spaces. In other words, successful residential outdoor spaces are pivotal in the healthy social ecology of a community, and trees are a key element in creating successful residential outdoor spaces.

To what extent might a connection between trees and social ecosystem health extend to contexts other than those studied here? The signs are unsystematic but encouraging. The lore on the value of community gardens in mending the social fabric of poor neighborhoods is impressively consistent

and extensive (Brunson 1999), and the first systematic data on this question echo the lore (Glover et al. 2002). Moreover, there is some indication that a tie between green residential spaces and strength of community is not exclusive to poor neighborhoods. An article in *The Atlantic Monthly* (Drayton 2000) lauds the growing movement toward “community greens,” shared parks tucked away on the inside of residential blocks. Most of these community greens have been developed in middle- or upper-income neighborhoods—houses on a community green in New York City’s Greenwich Village sell for several million dollars apiece. Yet the pattern of neighborhood ties developing from the shared use of these common green spaces exactly mirrors our findings from some of the poorest communities in the United States; moreover, this pattern appears across different community greens with striking consistency. Clearly, the extent to which trees promote healthy social ecosystems in diverse settings and populations bears further investigation.

Regardless of how widely trees are linked to social ecosystem health, it is important to note that the context of these studies—poor urban neighborhoods—is precisely the context where social ecosystem health is at greatest risk and where urban trees are least present. While poverty is not synonymous with alienation and risk of crime, too many poor urban neighborhoods are characterized by high levels of mistrust, isolation, graffiti, property crime, and violent crime. It may be that the greatest benefits of urban forestry accrue to some of its historically most underserved constituencies.

The findings here have a number of implications for arboriculture and urban forestry. First and foremost, they reinforce the growing recognition of the vital role trees play in the ecological, social, and economic health of our communities. Second, they argue for a much tighter integration of the urban forest into the residential urban fabric. Third, the findings suggest that arborist–resident partnerships may be an important factor in fully reaping the healthy social ecosystem benefits of trees.

### **Vital Municipal Functions**

These findings broaden our understanding of the functions trees serve in urban communities. At present, the role of arboriculture in urban ecosystems is primarily conceptualized in terms of the aesthetic, environmental, and wildlife habitat functions trees serve. The findings reviewed here suggest a substantially expanded conceptualization may be in order. Arboriculture may be vastly undervalued relative to its contributions.

Within the literature on the social benefits of urban forests, this work reinforces and extends the research on trees and healthy human functioning. Recent evidence links green residential settings to reduced aggression (Kuo and Sullivan 2001); enhanced cognitive functioning, life functioning, and well being (e.g., Kuo 2001; Kaplan 2001); and

greater capacity for self-discipline (Faber Taylor et al. 2002). Together, the evidence reviewed here suggests a vital role for trees in the healthy functioning of not only individuals, but neighborhoods as well.

More generally, the findings reviewed here complement and extend the larger literature documenting the functions trees provide in urban communities. Together with the evidence linking trees and other vegetation to clean air and clean water, this new evidence linking trees to healthier patterns of individual and neighborhood functioning points to a much larger theme—trees and public health. Far from being an amenity, then, it appears that trees play multiple, fundamental roles in the continued health of urban communities and should be regarded in the same light as other urban infrastructural elements.

In linking trees with some of our most challenging and important civic goals, this work contributes a new and politically compelling addition to the arguments for urban forestry. While providing cleaner air, cleaner water, and other environmental benefits is obviously important and valuable, the fact remains that few urban politicians view these issues as central to their agendas. Stronger communities, reduced crime rates, and healthier, more vital neighborhoods—these are outcomes that mayors and city councils strive for, often with little or no success. The findings here suggest that urban forestry helps address some of our most recognized and most challenging societal needs.

### **Tighter Integration into the Residential Urban Fabric**

One striking implication of this body of work is that the location of trees matters at a surprisingly fine-grained scale. Participants in these studies all have ready access to neighborhood green spaces and live within a few miles of one of the most extensive examples of urban nature in North America—Lake Michigan and the parks along Chicago’s Lake Shore Drive. Further, the participants in each study live within the same neighborhood, with the same overall level of tree canopy. Yet in study after study, the finding is that having trees directly outside one’s own building is different than having those same trees just outside neighborhood buildings. To fully reap the social benefits of trees then, the urban forest may need to be substantially more tightly integrated into the residential urban fabric than is currently recommended.

### **Working with Citizens**

The focus of this review has been on the physical products of arboriculture, but the process of arboriculture surely has impacts on the social ecosystem of a community as well. That is, urban forestry programs can be structured such that they promote—or undermine—residents’ appropriation of their neighborhood outdoor spaces. To the extent that greening is

carried out in a way that respects residents' choices and values with respect to the public and private spaces in their neighborhood, it seems more likely to foster the kinds of local social control so effective in deterring crime. Similarly, by inviting and requiring residents' participation, urban forestry may be carried out in a way that helps transform a mere collection of neighbors into a real, functioning community—watching out for each other, each other's property, and each other's children; helping out in times of need; having barbecues and block parties; exchanging gardening tips and life stories; working together to improve the community.

### LITERATURE CITED

- APA Commission on Violence and Youth. 1983. *Violence and Youth: Psychology's Response*. American Psychological Association, Washington, DC.
- Belle, D.E. 1982. The impact of poverty on social networks and supports. *Marriage Family Rev.* 54:89–103.
- Brown, B.B., and I. Altman. 1983. Territoriality, defensible space and residential burglary: An environmental analysis. *J. Environ. Psychol.* 33:203–220.
- Brunson, L. 1999. Resident appropriation of defensible space in public housing: Implications for safety and community. Unpublished Doctoral Dissertation, University of Illinois, Urbana-Champaign, IL.
- Cisneros, H.G. 1995. *Defensible Space: Detering Crime and Building Community*. U.S. Department of Housing and Urban Development, Washington, DC.
- Coley, R.L., F.E. Kuo, and W.C. Sullivan. 1997. Where does community grow? The social context created by nature in urban public housing. *Environ. Behav.* 29:468–492.
- Cooper, C.C. 1975. *Easter Hill Village: Some Social Implications of Design*. The Free Press, New York, NY.
- Drayton, W. 2000. Urban planning: Secret gardens. *The Atlantic Monthly* 285(6):108–111.
- Dubow, F., and D. Emmons. 1981. The Community Hypothesis. In Lewis, D.A. (Ed.). *Reactions to Crime*. Sage Publications, Beverly Hills, CA.
- Dwyer, J.F., E.G. McPherson, H.W. Schroeder, and R.A. Rowntree. 1992. Assessing the benefits and costs of the urban forest. *J. Arboric.* 185:227–234.
- Ebbesen, E.B., G.L. Kjos, and V.J. Konecni. 1976. Spatial ecology: Its effects on the choice of friends and enemies. *J. Exp. Soc. Psychol.* 12:505–518.
- Faber Taylor, A., F.E. Kuo, and W.C. Sullivan. 2002. Views of nature and self-discipline: Evidence from inner-city children. *J. Environ. Psychol.*, Special Issue: Environment and Children 22:49–63.
- Faber Taylor, A., A. Wiley, F.E. Kuo, and W.C. Sullivan. 1998. Growing up in the inner city: Green spaces as places to grow. *Environ. Behav.* 30:1:3–27.
- Gans, H. 1967. *The Levittowners*. Pantheon Books, New York, NY.
- Glover T., K. Shinew, and D. Parry. 2002. Race and its relationship to the benefits of community gardening in St. Louis. *Canadian Congress on Leisure Research Annual Book of Abstracts* 10:127–130.
- Greenbaum, S.D. 1982. Bridging ties at the neighborhood level. *Soc. Networks* 4:367–384.
- Greenberg, S.W., W.M. Rohe, and J.R. Williams. 1982. Safety in urban neighborhoods—A comparison of physical characteristics and informal territorial control in high- and low-crime neighborhoods. *Popul. Environ.* 53:141–165.
- Jacobs, J. 1961. *The Death and Life of Great American Cities*. Random House, New York, NY.
- Kaplan, R. 2001. The nature of the view from home—Psychological benefits. *Environ. Behav.* 33:507–542.
- Kaplan, R., and S. Kaplan. 1989. *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, Cambridge, UK.
- Kuo, F.E. 2001. Coping with poverty: Impacts of environment and attention in the inner city. *Environ. Behav.* 33:1:5–34.
- Kuo, F.E., M. Bacaicoa, and W.C. Sullivan. 1998. Transforming inner-city neighborhoods: Trees, sense of safety, and preference. *Environ. Behav.* 30:1:28–59.
- Kuo, F.E., and W.C. Sullivan. 2001. Environment and crime in the inner city: Does vegetation reduce crime? *Environ. Behav.* 33:3:343–367.
- Kuo, F.E., W.C. Sullivan, R.L. Coley, and L. Brunson. 1998. Fertile ground for community: Inner-city neighborhood common spaces. *Am. J. Community Psychol.* 26:823–851.
- Kweon, B.S., W.C. Sullivan, and A. Wiley. 1998. Green common spaces and the social integration of inner-city older adults. *Environ. Behav.* 30:6:832–858.
- Miller, P.J., and L.L. Sperry. 1987. The socialization of anger and aggression. *Merrill-Palmer Q.* 33:1–31.
- Newman, O. 1972. *Defensible Space: Crime Prevention Through Urban Design*. Macmillan, New York, NY.
- . 1996. *Creating Defensible Space*. U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Washington, DC.
- Ochs, E., and B. Schieffelin. 1984. Language acquisition and socialization: Three developmental stories and their implications, pp 276–320. In Schweder, R., and R. Levine (Eds.). *Culture Theory: Essays on Mind, Self and Emotion*. Brunner/Mazel, NY.
- Perkins, D.D., P. Florin, R.C. Rich, A. Wandersman, and D.M. Chavis. 1990. Participation and the social and physical environment of residential blocks: Crime and community context. *Am. J. Community Psychol.* 18:1:83–115.
- Stack, C.B. (Ed.). 1974. *All Our Kin: Strategies for Survival in a Black Community*. Harper & Row, New York, NY.
- Sullivan, W.C., F.E. Kuo, and S. DePooter. In press. The fruit of urban nature: Vital neighborhood spaces. *Environ. Behav.*
- Talbot, J.F., L.V. Bardwell, and R. Kaplan. 1987. The functions of urban nature: Uses and values of different types of urban nature settings. *J. Architect. Plann. Res.* 41:47–63.

- Taylor, R.B. 1988. *Human Territorial Functioning*. Cambridge University Press, New York, NY.
- U.S. Department of Housing and Urban Development. 1998. *Crime Prevention Through Environmental Design*. <http://www.hud.gov/progdesc/cpted.html>
- Warren, D.I. 1981. *Helping Networks*. University of Notre Dame Press, Notre Dame, IN.

**Acknowledgments.** Space limitations preclude thanking each of the many individuals and institutions that played key roles in this work. Special thanks go to Andrea Faber Taylor for leading the work on children, to William Sullivan for access to the site and help in site analysis, to Rebekah Levine Coley and Esther Davis for their roles in interviewing, to the Chicago Housing Authority and residents for their support and cooperation throughout, and to the National Urban and Community Forestry Advisory Council, the U.S. Forest Service, U.S. Department of Housing and Urban Development, and the Cooperative State Research, Extension and Education Service for funding the research.

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**Résumé.** Dans les communautés urbaines, l'arboriculture contribue clairement à la santé de l'écosystème biologique; mais contribue-t-elle également à la santé de l'écosystème social? Des faits provenant d'études intrinsèques de la ville de Chicago suggèrent cela. Dans une série d'études impliquant plus de 1300 observations personnes-milieu, 400 entrevues, des données-maison des autorités et des rapports de police de deux années, il apparaît que le couvert arboré et gazonné était systématiquement lié à un vaste nombre d'indicateurs sociaux. Parmi ces indicateurs, on retrouvait: un lien de voisinage plus fort, un plus grand sens de sécurité et d'adaptation, plus de surveillance des enfants à l'extérieur de la maison, des milieux de jeux plus sains pour les enfants, plus d'utilisation des espaces communs du voisinage, moins de comportements non civilisés, moins de crimes contre la propriété, et moins de crimes violents. Le lien entre l'arboriculture et un écosystème social plus sain est devenu de façon surprenante facile à expliquer. Dans les milieux résidentiels, les zones stériles et sans arbre deviennent souvent des « no man's lands », ce qui décourage les interactions avec les résidents et invite au crime. La présence d'arbres et de gazon bien entretenus peuvent transformer ces no man's lands en espaces plaisants,

invitants et utilisés. De plus, les espaces publics bien utilisés par le voisinage favorisent le renforcement des liens entre les résidents et détournent le crime, ce qui crée un milieu plus sain et sécuritaire pour le voisinage.

**Zusammenfassung.** In Städten und Kommunen trägt die Baumpflege eindeutig zur Gesundheit des Ökosystems bei, ist es aber auch relevant für die Gesundheit des sozialen Ökosystems? Die Ergebnisse einer Studie aus dem Zentrum von Chicago zeigen dies. In einer Studie mit über 1300 Personenbeobachtungen, 400 Interviews, Berichten von Hausgesellschaften und 2 Jahre Polizeiberichten, wurden die Bäume und Grünflächen systematisch verbunden mit einer Reihe von Sozialökosystem-Indikatoren. Diese Indikatoren beinhalten: stärkere Verbindungen mit den Nachbarn, größerer Sinn für Sicherheit und Anpassung, mehr Beaufsichtigung der Kinder draussen, gesünderes Spielverhalten von Kindern, mehr Gebrauch von kommuneeigenen Grünflächen, weniger Straftaten, weniger Eigentumsdelikte und weniger Gewaltverbrechen. Die Verbindung zwischen Baumpflege und gesünderem sozialen Ökosystem ist erstaunlich einfach zu erklären. In bewohnten Gebieten werden aufgelassene Flächen leicht Niemandsland, was die Anwohner entmutigt zu agieren und es lädt zu Verbrechen ein. Die Anwesenheit von Bäumen und gepflegten Grünanlagen kann diese Niemandsbereiche in erfreuliche, willkommenheißende, genutzte Flächen umwandeln. Und vitale viel genutzte Gemeinflächen sorgen für eine positive Verbindung unter den Nachbarn und verhindern viele Verbrechen.

**Resumen.** En las comunidades urbanas, la arboricultura claramente contribuye a la salud de los ecosistemas biológicos; ¿lo hace también con el ecosistema social? La evidencia de los estudios en la ciudad de Chicago así lo sugiere. En una serie de estudios con 1300 observaciones espacio-persona, 400 entrevistas, registros de autoridades y dos años de reportes criminales de policía, las coberturas de los árboles y pasto fueron sistemáticamente ligadas a un rango amplio de indicadores del ecosistema social. Estos indicadores incluyeron: ligas fuertes entre vecinos, gran sentido de seguridad y regulación, mayor supervisión de los niños en espacios abiertos, patrones de juegos más saludables de los niños, mayor uso de los espacios comunes por los vecinos, menores faltas cívicas, pocos crímenes a la propiedad y pocos crímenes violentos. La liga entre la arboricultura y un ecosistema social saludable es fácil de explicar. En áreas residenciales, los espacios áridos, sin árboles, con frecuencia se convierten en "tierras no-humanas", las cuales no animan la interacción de los residentes e invitan al crimen. La presencia de árboles y céspedes bien mantenidos puede transformar estas tierras "no-humanas" en espacios bien usados y placenteros. Y los espacios comunes, bien utilizados, sirven tanto para estrechar las ligas en el vecindario como para detener el crimen, creando comunidades más seguras y saludables.