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Urban Nature and Well-Being: Some Empirical Support and Design Implications

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This article is a literature review of empirical research on the relationship between exposure to nature and the well-being of city inhabitants. Two scales of nature are discussed – urban green space and wilderness. Urban green space may reduce physiological stress levels, restore mental abilities, and foster neighborhood social ties. Wilderness experiences may provide the stress-reducing and attention-restoring benefits of everyday nature in a longer-lasting way. They are also associated with a variety of spiritual/transcendent experiences that provide benefits such as greater self-confidence, a sense of belonging to something greater than oneself, and renewed clarity on “what really matters.” At each scale, the article considers the physical features key to the natural area’s benefits on well-being and the implications of the research for urban planning. The article concludes that providing both types of restorative natural environments in cities will make urban life more livable and environmental protection more instinctual.

Introduction

The idea that exposure to open space, vegetation, and wilderness areas reduces stress, improves psychological well-being, and promotes physical health has been advocated for over a century. In the late 1800’s, the preeminent American city planner Frederick Law Olmsted wrote about the power of nature to restore the spirit of urban dwellers. Being in a natural setting, he wrote, “employs the mind without fatigue and yet exercises it; tranquilizes it and yet enlivens it; and thus, through the influence of the mind over the body, gives the effect of refreshing rest and reinvigoration to the whole system” (Olmsted 1865, cited in Ulrich et al. 1991).

In the last two decades, a broad range of empirical research has begun detailing the effects of contact with natural elements on people’s physical, psychological, and spiritual well-being (Frumkin 2001, Kaplan and Kaplan 1989, Fredrickson and Anderson 1999). Despite the power of this evidence, few resources exist to guide city planners and

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designers in the application of this research to the planning of built environments (Kaplan et al. 1998). What follows is a literature review of environmental psychology research. The intent of this article is to help city planners and urban designers better articulate and defend the importance of nature on the well-being of city residents and to consider what the empirical research can contribute to design and planning decisions. This article will examine the empirical research regarding two scales of “nature” – urban green space and regional wilderness – first examining the overall effects on the well-being of city residents and then considering important physical features at both scales. Preceding this will be a short history of the current conception of nature.

A Very Brief History of “Nature”

A positive consideration of “nature” is a relatively modern development in Western thought. Robert Nash’s seminal history *Wilderness and the American Mind* (1967), upon which this discussion is based, demonstrates the changing effect of societal circumstances and philosophical trends. Two things are new in the concept that “nature” is good: the land types categorized as “nature” and the idea that this “nature” is good. Not only is it new to value large areas where human influences are absent but placing those wilderness areas in the same category as town greens would have been quite odd a few centuries ago. Only in the last couple centuries did a city/nature duality begin to compete with the civilization/wilderness duality that had been salient for millennia.

Throughout these millennia, gardens and the rural, pastoral landscape were generally idealized, although the form of the ideal garden did change. In contrast, until recently “wilderness” was a threatening, horrible place. Greek and Roman poetry celebrated cultivated, pastoral nature but regarded the proliferation of wild natural areas as a “serious defect” of the earth; pre-civilized life was considered a miserable, eat-or-be-eaten nightmare (Jackson 1929, p. 155. Cf. Lovejoy and Boas 1935). Not only physically threatening, wilderness was filled with evil. Northern European mythology housed supernatural beasts in the wilderness, and the Judeo-Christian tradition, with minor exceptions, considered wilderness the dominion of Satan, cursed by God. Jumping ahead, early American wilderness experience proved no different. Settlers arrived to a “howling” and “dismal”

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wilderness that threatened not only their survival but their civilized nature and moral integrity (Nash 1967).

In the 1700's, intellectual developments in Europe sparked a philosophical movement that would become one of three strands in today's positive attitude toward wild natural areas. Romanticism and its offshoot, Transcendentalism, idealized nature, individuals' inner being, and so-called primitive societies. In this view, wilderness was the purest form of God's creation and the raw source of human vitality. In the early 1800's, this European intellectual movement spread to nascent American cities where it incubated in artistic and literary circles, though it never seriously challenged pioneers' hostility to wilderness, based as it was on their daily battles against weeds, wolves, and starvation. But by the late 1870's, the frontier was almost defeated, and John Muir became the hugely popular publicist of a Romantic love for wilderness.

John Muir's popularity coincided with the ascendance of another strand in American wilderness appreciation: national pride. As the frontier receded and then disappeared, nostalgic regret at its loss led to widespread desire to preserve what was considered an essential influence on American character. Frederick Jackson Turner argued that the freedom of the wilderness experience – “the freedom of the individual to seek his own” – was central to American values like democracy and self-reliance (Turner 1896). In this time, “wilderness also acquired importance as a source of virility, toughness, and savagery – qualities that defined fitness in Darwinian terms” (Nash 1967, p. 145). Thus, by the turn of the century, national pride and Romanticism had paired to defend wilderness as both the place where boys became men and as a wellspring of beauty, purity, truth, and vitality.

Aldo Leopold was the spokesperson for the final element of today's positive conception of wilderness: the infusion of ecological science with ethics. To Leopold, ecological science was “the outstanding discovery of the twentieth century” because it revealed ecosystems to be an interconnected web of components functioning as a complex organism (Leopold 1953, p. 147). With humans only one creature in this web, they had a responsibility to expand their concept of the human community “to include soils, waters, plants, and animals, or collectively the land,” “change the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it,” and to show “respect for his fellow-members, and also respect for the

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community as such” (Leopold 1949, p. 204). Leopold’s call for an *ecological conscience* scientifically strengthened the moral arguments of previous wilderness advocates while adding an ethical dimension.

This historical overview reveals that “nature” is a shifting concept shaped by the societal and philosophical context. Nash concludes that wilderness was not valued when it *was* the societal context but that it is a valued component of an urbanized society. The following research needs to be understood as taking place within a largely urbanized society and within a society influenced by shifting philosophies.

Urban Green Space

Everyday forms of urban green space, such as landscaping, greenery, or neighborhood parks, have been found to substantially affect people’s health and well-being. In this context, “nature” can be defined as “a great variety of outdoor settings that have substantial amounts of vegetation. The focus is on the setting rather than the plants, and on flora rather than fauna...” (Kaplan and Kaplan 1989, p. 1). This definition includes a wide variety of everyday outdoor settings, such as yards, gardens, street trees, vacant lots, and fields or forests.

Theories

Early Research

In the late 1960’s, psychologists studying perception and aesthetic pleasure were conducting experiments to ask questions like – How do people process a scene? What do people consider beautiful? To discover relations between a scene’s generic structural characteristics (e.g., boundary sharpness, textures, light patterns), collative properties (e.g., novelty and complexity) and the degree to which subjects liked an image, studies presented subjects with computer-generated images of dots and polygons (Gibson 1950, Gibson 1966, Berlyne 1960, Wohlwill 1968). In a novel experiment, Wohlwill (1973) presented subjects with works of art and photographs of natural scenes. Coming from an information-processing background where content was carefully avoided, Wohlwill and colleagues were surprised to find that natural features significantly influenced view preference scores. Subjects considered a scene natural “if it contained predominantly vegetation and/or water and if man-made features such as buildings or cars are absent or inconspicuous” (Ulrich 1986, p. 36). Scores for natural and man-made scenes barely overlapped, even when they were

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matched for complexity and other properties thought to be important (Kaplan et al. 1972, Kaplan 1987). That study and others that followed suggested that people's responses are "fundamentally different to natural and man-made materials, irrespective of visual properties" (Ulrich 1986, p. 36).

The second surprise was the extent to which results were stable, repeatable, and consistent across cultures (Kaplan 1987). Participants made preference decisions quickly and easily (Ulrich 1986). Although some cultural and ethnic differences were eventually found that have proved quite important in park management decisions (e.g., Kaplan and Talbot 1988, Kaplan and Kaplan 1989), the initial results showed many more similarities than differences. As "[i]ncreasingly preference came to look like an expression of an intuitive guide to behavior, an inclination to make choices that would lead the individual away from inappropriate environments and toward desirable ones," some authors began suggesting that these preferences resulted from the shaping of human tendencies through natural selection (Kaplan 1987, p. 14).

View preference studies then began to focus more specifically on natural scenes. One typical summary (Ulrich 1983, p. 105) identifies the following visual properties as key to an aesthetically pleasing scene:

- Complexity is moderate to high.
- The complexity has structural properties that establish a focal point, and other order or patterning is present.
- There is a moderate to high level of depth that can be perceived unambiguously.
- The ground surface texture tends to be homogenous and even and is appraised as conducive to movement.
- A deflected vista is present, suggesting the possibility of further discovery.
- Appraised threat is negligible or absent.

Given general agreement on the important attributes of a scene and a shared assumption that these attributes are evolutionarily adaptive, debate centered on internal physiological and cognitive mechanisms that govern people's reactions to nature. Of the range of theories, the two that were defended in the most detail and tested in further research proposed that nature improved well-being through physiological stress reduction or cognitive restoration.

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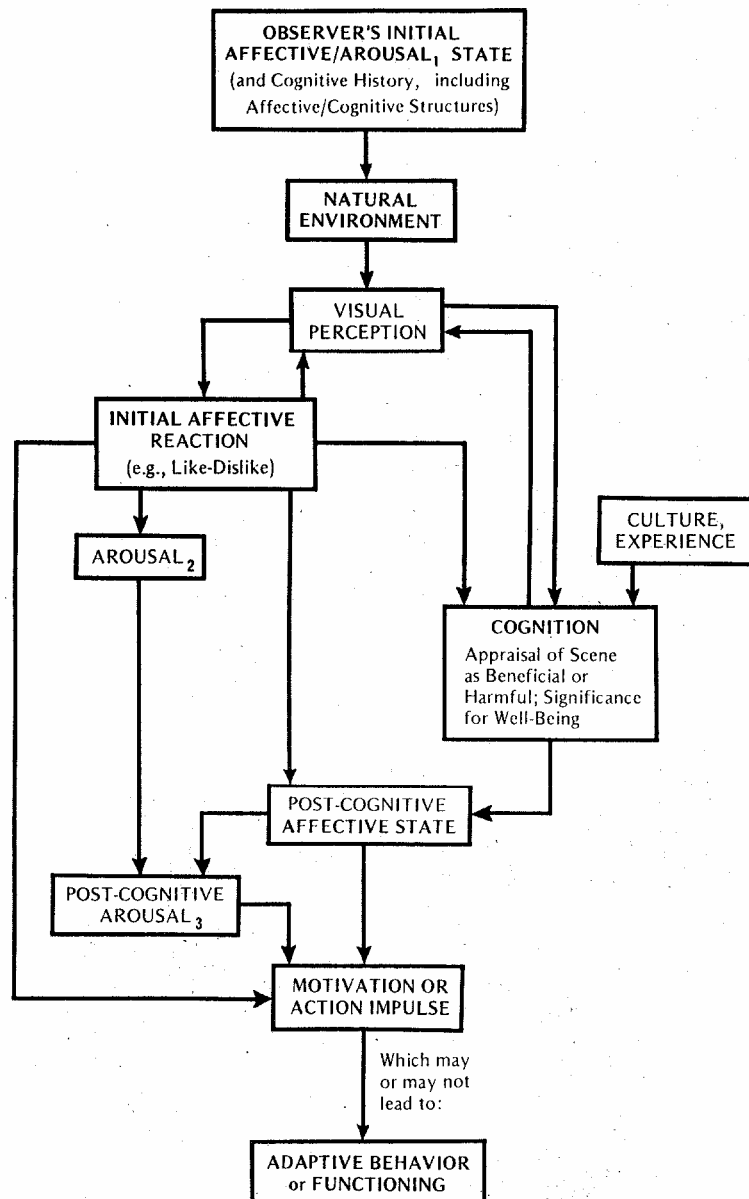
Stress Reduction

According to the stress reduction hypothesis, natural elements in the urban landscape can counteract physiological stress reactions through a stream of instantaneous affective (emotional) reactions (Ulrich 1983). Each affective reaction (e.g., a burst of pleasure at seeing a flower), interacts with a person's current state of physiological arousal, which then effects and is modified by her conscious consideration of the situation, generating a new level of stress or relaxation. This interaction is shown in Figure 1.

For example, videotaped natural scenes speed physical and emotional recovery from traumatic events (Ulrich et al. 1991). Subjects watched a stress-inducing videotape of workplace accidents including simulated mutilation and then watched one of six recovery videotapes, two natural scenes (a forest or a flowing river) and four urban scenes (street traffic [high or low] or pedestrians in a plaza [many or few]). Viewers of nature videos recovered more quickly and completely than viewers of urban videos. Physiological stress indicators, which were monitored regularly, returned to baseline levels within four to seven minutes. Emotional states were compared at the beginning and end, and although no differences existed between groups before the experiment, post-test results found nature-viewing subjects to have higher positive affect and lower fear and anger/aggression than other subjects. In fact, subjects viewing nature videos had higher positive affect at the post-test than at their arrival. This experiment tentatively supports Ulrich's model of stress reduction, in which nature's restorative power comes from triggering quick, positive emotions that then help reduce physiological stress (Ulrich et al. 1991).

This study also implies that urban dwellers might constantly be experiencing low-level stress reactions which impact their physical health, cognitive abilities, and behaviors which could be alleviated by exposure to natural scenes (Ulrich et al. 1991). Other research supporting this stress-reduction hypothesis focuses on stress-induced health impacts. For example, prisoners with windows facing surrounding hills instead of the interior prison courtyard less frequently visit the infirmary and report fewer stress-related ailments such as digestive illness and headaches (Moore 1982, West 1985). As public health research implicates stress in a wide variety of physical and behavioral problems, providing environments that support physiological recovery from stress could make people feel happier, improve their cognitive abilities, and reduce negative behaviors used to

Figure 1: Ulrich's model of the interaction between a scene, affect, and physiological arousal.



(Source: Ulrich 1983, p. 91)

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avoid stress (e.g., alcohol consumption) (Ulrich et al. 1991, Baum et al. 1985, Cohen et al. 1986).

Attention Restoration Theory (ART)

Attention Restoration Theory (ART) offers a different mechanism to explain the benefits of exposure to nature. ART suggests that nature has the potential to revive a person after draining cognitive activity has exhausted their ability to focus and concentrate. This theory posits that the mind's ability to suppress distractions and impulses can become exhausted over time. This inhibitory ability, known as *directed attention*, not only affects people's ability to accurately perceive non-interesting material, but also their ability to suppress urges for inappropriate behaviors in favor of thoughtful consideration and their ability to make plans and follow through. Directed attention also has important effects on emotion; people experiencing low attentional capacity show irritability, impatience and an unwillingness to help other people (Kaplan 1995).

Natural environments are theoretically rich in qualities that allow directed attention to rest. For most people, the things in nature that require attention – fire, snakes, rushing rivers, animals, informative views – are inherently interesting; they provide stimulation but place no demands on a person's ability to maintain concentration. Along with this “fascination,” natural areas often provide three other important qualities – a sense of being away from daily pressures, compatibility with a person's desired activities or state-of-mind, and a sense of being in a large and coherent setting (Kaplan 1995).

Field research has strongly supported the relation between nature and attentional capacity. Empirical tests have found that those people with more natural window views perform better on tests of attention (Tennessen and Cimprich 1995). After a mentally draining activity, those people who took walks in natural environments more successfully completed another concentration-requiring task (proofreading) than those who walked along a pleasant, mixed-use city street (Hartig et al. 1991).

Attention levels have been found to be the intermediate variable by which the lushness of vegetation affects women living in a Chicago public housing complex. The lushness of vegetation correlates highly with their scores on attention tests. Women in those buildings that have more exterior grass and trees are also significantly less aggressive towards family members and are better able to proactively

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deal with life challenges (Kuo and Sullivan, 2001; Kuo 2001). However, when controlling for attention scores, the relationships between vegetation and the dependent variables (aggression and proactive coping) disappear. These benefits of yard vegetation appear to be completely mediated by the effect of nature on attention abilities.

No experiment has directly compared the stress reduction and attention restoration theories, so the relative importance of these two mechanisms on a person's response to nature is unknown. Stress reduction theory considers emotion as the initial level of people-nature interactions and believes physiological stress is its central indicator. Attention Restoration Theory considers perception/cognition as the primary response and believes that the mind's ability to concentrate is its central indicator. However, stress and cognitive abilities are interrelated phenomena (Kaplan 1995, Ulrich et al. 1991) and since no experiment has compared the two measurement techniques, researchers may be measuring the same phenomena differently.

Social Ties

A third mechanism by which nature improves the well-being of city-dwellers is its facilitation of social connections. Natural elements, especially trees, encourage people to spend more time outside, making them more likely to have the accidental face-to-face encounters with their neighbors that create friendships and other social ties. Research has found that in apartment building common areas where trees are present, more people tend to congregate, they meet in bigger groups, and the groups more often have a mix of ages that allows children to socialize with adults (Coley et al. 1997). Residents of public housing buildings with more trees and grass also know more of their neighbors and have stronger neighborhood social ties (Kuo and Sullivan 1998). Vegetation and social ties affect people's sense of safety and adjustment and may be an important force in creating a sense of community (Kuo and Sullivan 1998). Because having strong social ties and a sense of community improves people's ability to defend their neighborhood from crime and provides a social safety net, the social interactions facilitated by street vegetation can strongly impact residents' well-being (Kuo and Sullivan 1998).

Key Elements of Urban Greenspace

How should this growing understanding of the potential for nature to positively affect people's lives affect city planning? What can

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this research contribute to questions facing residential designers and urban planners about the quantity and distribution of open space, the need for access to parks and greenways, and the importance of yard vegetation and street trees?

Two important facts emerge very quickly. First, even a relatively small amount of vegetation can make a significant difference. A series of studies have been carried out at Robert Taylor Homes, a Chicago public housing complex of architecturally identical buildings which originally had identical landscaping. Some plants and trees have not survived, and in some buildings, maintenance staff paved over the planting area completely. “Even the greenest pockets. . . are neither especially large nor especially lush;” the most vegetated areas only contain small patches of grass and a few trees (Kuo and Sullivan 2001, p. 554). Still, this difference in vegetation significantly affects residents’ level of aggression (Kuo and Sullivan 2001), their proactive management of important life issues (Kuo 2001), self-discipline among girls (Taylor et al. 2001), and the strength of neighborhood social ties (Kuo et al. 1998). So while designers can only conclude that some grass or trees are better than none, planners at Chicago public agencies have learned that a small public investment in local tree plantings yields large public savings (Enloe 2002).

Second, studies demonstrate the importance of natural elements close to home. All residents in Robert Taylor Homes live within two miles of Lake Michigan and the park system along the lake, “one of the most extensive examples of urban nature in North America,” yet they show significant differences in attentional functioning related to the amount of vegetation present at their apartment building (Kuo and Sullivan 2001, p. 567). Other studies have also found the amount of nature in one’s view to influence residential satisfaction and well being (e.g., a person’s sense of being at peace) despite similar access to local parks (Kaplan 2001, Tennessen and Cimprich 1995). Larger investments in more distant amenities do not adequately substitute for smaller doses of nature near the home.

The research also suggests that the benefits of a natural view on attention continue to rise until no built elements are visible. A study on college students’ dormitory window views found that the naturalness of the view affected the students’ performance on attention tests (Tennessen and Cimprich 1995). Experimenters rated a standardized photo of each view on a 4-point scale from “all built” to “all natural,” averaged the ratings of each view, and then grouped the

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views into quartiles. “All natural” meant that in the window view there was “no evidence of human influence” (Tennessen and Cimprich 1995, p. 80). Students with views in the upper two quartiles of naturalness scored significantly better on three of the four attention tests, and those in the single highest vegetation group scored significantly better than even the second highest group on one attention test. This suggests that, in relation to attentional capacity, nature continues to provide benefits even for those with relatively high levels of naturalness in their view. The study indicates that residential views should contain as few man-made elements as possible, and those structures present should be screened by vegetation or trees. This concept needs to be balanced with other ideals. Surrounding every house with a dense screen of trees seems likely to interfere with other goals, such as being able to observe neighborhood social activity from a window.

The available empirical environmental psychology research provides only limited design guidance. Most studies measure nature or greenness in fairly broad terms. Some experiments compare a natural condition to an urban condition. A famous study of heart surgery patients found patients whose window overlooked a field healed faster and required less pain medication than those with a view of a brick wall (Ulrich 1984). The studies of Robert Taylor Homes divide buildings into two groups of relative greenness (Kuo and Sullivan 2001, Kuo 2001, Kuo et al. 1998, Coley et al. 1997, Kuo and Sullivan 1998). At each building, 18 photos taken from standardized locations were rated as a set in comparison to other buildings on a five-point scale. Raters’ scores were averaged. Buildings with average scores in the upper half were considered “lush” and those in the lower half were considered “barren.” This simplicity in vegetation categories contributes to these studies’ statistical significance and persuasive power but does not yield nuanced design assistance.

More sensitive research could help improve the applicability to urban design. Studies could consider the relative location of vegetation and distinguish between different configurations and structural types of vegetation. Rachel Kaplan conducted one of the most thorough studies on how residential views of natural and built elements affect residents’ satisfaction and well-being (2001). She surveyed residents of six low-rise apartment communities in Ann Arbor, Michigan to determine how natural features in the view influence residents’ satisfaction with the neighborhood, satisfaction with their access to nature, and three aspects

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of well-being related to Attention Restoration Theory: effective functioning, being at peace, and (not) being distracted.

The survey determined the components of individuals' views by asking them to describe the visibility of certain elements (1="I can't see this" to 5="I see it almost always") and to rate pictures' similarity to their view (1="not at all like my view" to 5="very much like my view"). Kaplan included a wide array of natural elements (creeks, shrubs, trees, flowers, grass) and narrowed down significant variables to eight key elements.

After excluding the structures and busy streets, natural elements in the view and outdoor activities explained 24% of a person's satisfaction with their neighborhood and 38% of their satisfaction with their access to nature. They also contributed significantly to well-being, explaining 12% of a person's opinion of their ability to function effectively in life, 10% of their sense of being at peace, and 7% of their sense of not being easily distracted. In no case did outdoor activities outweigh the effect of a view. The study also provides an interesting, hopeful result. View preference studies have found that people dislike images of impenetrable woods with dense undergrowth (Kaplan and Kaplan 1989). Some logically worry that providing wilderness habitat and providing aesthetically-pleasing residential views could be mutually exclusive goals (Parsons 1994). But this study found that people most preferred window views similar to photos of dense woods. Aesthetic pleasure may be different in a residential context; when looking at a photograph people generally imagine themselves into the picture (Kaplan and Kaplan 1989), but when looking out a residential window, perhaps people know they will remain in a safe, hospitable environment. Providing wildlife habitat may therefore simultaneously improve residents' satisfaction with their access to nature.

Much criticism of these studies has emphasized the simplicity of both the dependent and independent variables. Critics point out that two-dimensional photographic studies privilege the aesthetic over almost everything else, while real life is a constantly-moving, three-dimensional experience affected not only by the view but also by the sound of rippling water, the feel of wind on one's face, the smell of flowers, and the bodily experience of movement. The simplification and isolation of variables in these controlled studies makes those studies of limited usefulness to people attempting to design a landscape. Though these are important caveats, they do not negate the

overall message. The variety of experimental methods and the increasing amount of research conducted in real-world conditions make it hard to refute that nature in one's daily environment has important effects on well-being.

Planners and urban designers should consider methods for increasing the proportion of people's daily environment that contains vegetation. The most accessible method is through the design of city-owned property, particularly street right-of-ways. Street trees, grassy planting strips, and stormwater swales will provide a certain amount of vegetation to people driving or living along a street, and space for these elements should be allocated, especially when narrowing streets. Another simple method is through the design guidelines contained in the zoning ordinance. The zoning ordinance typically specifies the width of setbacks and can be expanded to specify the proportion that should be landscaped. The guidelines can also be written to encourage particular types of planting; in Vancouver, for example, some developing areas of downtown are required to have tiered front setbacks, partially to encourage creative planting by the homeowners. Many options exist for increasing the amount of urban vegetation; the greater problem is overcoming the perception that it is an unnecessary expense. Research linking vegetation to residents' well-being, behavior, neighborhood satisfaction, and social ties suggests urban green space is a critical component of protecting the public welfare.

Wilderness

Theories

Other research has examined people's well-being in relation to nature on a much bigger and wilder scale. The 1964 Wilderness Act explains "a wilderness... is... an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain... retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions." Wilderness seems to provide the attention restoring benefits of everyday nature in a deeper and longer-lasting way and also to incite experiences of a different and more significant character.

Clinical Psychology and Extensions of ART

Guided wilderness programs have attempted to harness healing powers of wilderness as treatment for drug addiction, psychiatric

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patients, rape and incest survivors, and emotionally disturbed children (Frumkin 2001). Most empirical studies of these wilderness experiences suffer from experimental problems such as small sample sizes, researchers with commercial interest, researchers not blind to experimental conditions, lack of appropriate control groups, and self-selection bias (Driver et al. 1987, Byers 1979, Burton 1981, Frumkin 2001). In determining the effects of wilderness experiences, the most critical difficulty is that of separating the wilderness contact itself from other potential influences on subjects, including the programmatic structure of the experience, the group bonding, being on vacation, or daily physical exercise (Frumkin 2001). Although research flaws limit the validity of the conclusions, wilderness programs do consistently report results that are either equal or better than similar non-wilderness programs, suggesting it can be a useful tool in healing from trauma, improving mental or emotional stability, or overcoming an addiction (Burton 1981).

One study (Hartig et al. 1991) attempted to overcome these experimental design problems by using only physically fit backpackers as subjects who were then divided into a wilderness vacation group (n = 25) and two control groups: a non-wilderness vacation group (n = 18) and a non-vacation group that continued their daily routines (n = 25). Immediately before and after trips, subjects completed proofreading tasks and surveys on their emotional states and overall happiness. The vacations lasted four to seven days and the control group was tested twice with a four to seven day gap between tests. A 21-day follow-up survey again measured all groups' emotional states. The study found that the backpacking group significantly improved their ability to concentrate while the other two groups declined. Further, the wilderness vacationers had significantly higher overall happiness than the other groups at the 21-day follow-up (before and immediately after the trip, the groups were statistically equivalent). This study fits with Attention Restoration Theory, and it suggests that long-term experiences in natural environments may have the same benefits as short-term experiences but with longer-lasting effects. The researchers suggested that restorative natural settings may "have proactive effects, preparing people to better cope with the stress and strain of daily life" and may "'inoculate' people against stress" (Hartig et al. 1991, pp. 15 and 22).

Stephen and Rachel Kaplan spent ten years measuring the experiences of 176 people participating in 9-14 day small group

outdoor challenge trips in Michigan's McCormick Experimental Forest (Kaplan and Kaplan 1989). Kaplan (1984; cited in Kaplan and Kaplan 1989) identified changes that occurred in the moods and feelings of two years' participants (N = 47): more psychological energy, more satisfaction with a simple life style, a more positive outlook, more tuned in with nature, and less feeling of being hassled and irritated. All of these showed significant improvement after a two week program ($p \leq .01$). One of the most striking results emerged in the subjects' self-confidence. In the first year of testing, at the six-month follow-up, one-third of the controls (N = 25) responded that they would like to change themselves physically to be taller, bigger, more handsome, and so on. Of the ten program participants, only one requested a physical change (better eyesight). The following year, the pattern repeated as significantly fewer participants desired physical changes after the backpacking trip. Instead, 40% of the campers wished to become more independent, self-reliant, self-disciplined, and patient (Kaplan and Kaplan 1989). These results together show that wilderness experiences may provide attention-restoring benefits while having deeper effects on mood, self-confidence, and well-being.

Spiritual Experiences

Research may continue to extend the application of the theories regarding everyday nature to wilderness experiences. In addition, a different set of research examines experiences of a completely different magnitude. These experiences seem charged, mystical, spiritual, or transcendent. Nature is the most common trigger of "ecstasy" among nonbelievers and the third most common trigger among Christians (Laski 1961). Even people who do not report one particularly significant moment describe wilderness trips using words that have moral or spiritual connotations like "wholeness," "oneness," "purity," and "what...really matters" (Kaplan and Kaplan 1989, pp. 145 and 143). These mystical and inspirational experiences are associated with wilderness, rather than with everyday forms of nature (Frederickson and Anderson 1999). This may explain why the most passionate advocates for the natural world call not just for any type of nature but for wilderness, using words like those of John Muir: "In God's wildness lies the hope of the world" (Wolfe 1979, p. 317).

The literature studying these powerful landscape experiences often attempts to move beyond numerical scales and statistical methods to a more complex interpretation of the person-place interaction. These

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studies criticize other methodologies for focusing solely on the appearance or potential function of a location rather than considering the three dimensional nature of the experience and the background a person brings to the experience (Ohta 2001). Some studies also critique standard methodologies for considering only a one way interaction, from person to place, without considering the place-to-person interaction or “the affective appeal that place impresses *upon* the individual” (Fredrickson and Anderson 1999, p. 22, Fishwick and Vining 1992). These authors often turn to qualitative research methods intended to discover people’s direct and subjective experience of the world such as content analysis of journals or interviews.

Reviewing different types of transcendence, Kathryn Williams and David Harvey identify the shared characteristics of “transcendent experiences”: “strong positive affect, feelings of overcoming the limits of every day life, a sense of union with the universe or some other power or entity, absorption in and significance of the moment, a sense of timelessness” (Williams and Harvey 2001, p. 249). Similarly, Fredrickson and Anderson (1999) explain experiences that the participants consider “spiritual” are described as being ineffable, intangible, centering, timeless, and with heightened sensory awareness. These experiences leave participants feeling empowered, hopeful, grounded, and secure, with a sense of wonder, awe, and humility (Frederickson and Anderson 1999).

Key elements of wilderness areas

Williams and Harvey (2001) summarize three different understandings of why or how wilderness triggers transcendent experiences. The psychodynamic view believes the power of nature exists in archetypes and symbols, perhaps stored in the Unconscious (Jung 1964), which trigger and structure deep emotional experiences (Dwyer et al. 1991, Madondo 1997, Schroeder 1996). A second approach emphasizes the complex transactions between person and setting, including cultural attitudes, social factors, the physical setting, the bodily experience, and emotions that occur while inhabiting the setting (Altman and Rogoff 1992, Mazumdar and Mazumdar 1993, Fredrickson and Anderson 1999). The third approach focuses on physical activities and that when a person is engaged in a pleasurable and all-absorbing task, the person’s outside and inside world seem to merge into a single *flow* (Csikszentmihalyi 1992). This approach believes natural settings trigger transcendent experiences because they

are settings for activities likely to cause this feeling, such as mountain climbing and surfing. These three categories are not exclusive and some authors create combinatory typologies of transcendent experiences (Mitchell 1983, Williams and Harvey 2001).

Little agreement therefore exists on the importance of the setting and even less exploration has been done on specific aspects of wilderness key to these experiences. Though many classification systems exist for mystic experiences in general, most of these studies group all nature-related experience into a single category (Williams and Harvey 2001). Many note that transcendent experiences occur because of intense physical or emotional challenge (Fredrickson and Anderson 2001). Studies suggest that wilderness experience leads to more meaningful experiences through a combination of heightened sensory acuity and extreme states of consciousness (McDonald and Shreyer 1991).

Features of wilderness key to its impact begin to appear in its definitions. Kaplan and Talbot provide a “psychologically oriented definition” of wilderness: 1) “a dominance of the natural,” 2) “relative absence of civilized resources for coping,” 3) “relative absence of demands on one’s behavior that are artificially generated or human imposed” (Kaplan and Talbot 1983, p. 199, cited in Kaplan and Kaplan 1989, pp. 148-149). According to Fredrickson and Anderson (1999, p. 32), wilderness is “a region which contains no permanent inhabitants, no possibility for motorized travel, and is spacious enough so that a traveler crossing it by foot must have the experience of sleeping out of doors... somewhat hard to get to, somewhat difficult to travel through, and by default, possess certain rugged characteristics.”

Williams and Harvey (2001) surveyed over one hundred people who live, work, or visit forest environments (N = 131) to create a more detailed typology of nature-related transcendence and the environmental factors that trigger it. Table 1 summarizes the types of transcendence, the associated feelings, and crucial landscape elements. They conclude that the particular details of the place are central to the experience. They emphasize that “[e]ach natural landscape is a unique and complex system of matter, energy, human purpose, and action. Each element of this system – perceived, interpreted, and altered by human knowledge and behaviour – contributes to this entity we call a ‘human-environment transaction.’ Our understanding of the spiritual meaning of nature depends on recognizing the situational characteristics that contribute to deep emotional experiences in natural environments” (p. 256). Different environmental characteristics trigger

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Table 1: Transcendence typology and key landscape elements. Summarized from Williams and Harvey 2001

Experience	Feelings	Landscape elements	Fascination	Novelty	Compatibility
Highly Transcendent					
Diminutive	Feelings of insignificance or humility. No sense of relaxation or belonging.	Distinctive, powerful elements: tall trees, waterfalls, extremes of heat and cold, dense settings where movement is blocked.	High	Very High	Low
Deep Flow	A sense of ease or effortless attention. Sense of oneness, no separation between self and forest.	Relatively open terrain, familiar and considered with affection and belonging.	High	Medium	High
Weakly Transcendent					
Aesthetic Experiences	Heightened awareness. Similar to Diminutive Experiences, except less sense of insignificance.	Beautiful or interesting single elements (e.g., nice view, butterfly flitting through the grass).	Slightly Low	High	Low
Restorative-Familiar	Refreshment, peace and quiet, sense of renewed energy.	Familiar locations (e.g., returning to the family's country home).	Slightly Low	Very Low	Moderate
Restorative-Compatibility	Refreshment, peace and quiet, sense of renewed energy. Less intense form of Deep Flow.	Non-distinctive elements that are highly compatible with doing desired activities.	Low	High	Very High
Non Transcendent					
Non Transcendent		Dense, fairly familiar, not potent or complex.	Very Low	Low	Very Low

both experiences of awe/appreciation (which they call Diminutive and Aesthetic experiences) and experiences of affection (which they call Deep Flow, Restorative-Familiar, and Restorative-Compatibility).

Laura Fredrickson and Dorothy Anderson (1999) compared the experiences of ten women traveling through two different wilderness areas in small groups to discover what effect, if any, was created by the biophysical, social, or managerial setting of the wilderness areas. Through journal analysis and loosely-structured interviews, Fredrickson and Anderson determined that the women felt that being in an all-women group was more “meaningful,” but that the wilderness setting was spiritually inspiring and key to creating a contemplative, self-reflective trip experience.

Fredrickson and Anderson determined that the wilderness character of the setting was more important than any management or natural attribute. One group backpacked through the Grand Canyon and the other canoed through a river canyon in northern Minnesota. Participants described the environment differently: Minnesota travelers described the dense forest as an organismic whole, while Grand Canyon travelers highlighted singular features of the desert. But both areas filled the participants with senses of belonging and spiritual inspiration. The researchers emphasized that “the most fundamental aspect of the trip itself that provoked a more contemplative and self-reflective examination of the experience overall – [is] that the whole thing took place in an unmodified, untamed, and wild area” (Fredrickson and Anderson 1999, p. 37). The wilderness setting provided three key elements: “direct contact with nature,” “periods of solitude,” and “inherent physical challenge” (1999, p. 29). As shown in Table 2, these three elements are similar to three aspects highlighted by Kaplan and Talbot’s “psychologically oriented definition” of wilderness (Kaplan and Talbot 1983, p. 199, cited in Kaplan and Kaplan 1989, pp. 148-9).

Table 2: Two three-part definitions of wilderness.

<i>Fredrickson and Anderson 1999</i>	<i>S. Kaplan and Talbot 1983</i>
Direct experience with nature	Dominance of the natural
Solitude	Relative absence of demands on one’s behavior that are artificially generated or human imposed
Physical challenges	Relative absence of civilized resources for coping

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Through extensive quotations of the women, Fredrickson and Anderson (1999) convey the interaction of these three key elements on the women's perceptions and intentions. Table 3 distills these complex explanations down to the critical elements provided by the wilderness. The table is not comprehensive and depends on the quotes provided by the researchers and the feelings articulated by the participants while making that statement.

Kaplan and Kaplan (1989) also provide a descriptive overview of their conclusions from their years of wilderness study. Four features seemed to be the most distinctive: 1) The simplicity of the natural environment and social context reduces the conflict between what one wants to do and what needs to be done, which allows mental restoration and fosters well-being and a sense of wholeness. 2) Observing one's surroundings in greater detail reveals one's coexistence with other organisms, giving a new perspective on one's self, one's place in the larger world, and a sense of comfort. 3) Confronting challenging experiences and environments previously feared allows one to overcome mental barriers and gain self-confidence. And 4) Being in an environment quite different from one's everyday life and a situation focused on physical necessities provokes reflection and yields a revised sense of what really matters.

Table 3: Important attributes of wilderness. Summarized from Fredrickson and Anderson 1999.

<i>Wilderness Character</i>	<i>What did the wilderness provide?</i>	<i>How did it improve well-being?</i>	<i>Deeper feelings expressed by participants.</i>
Direct experience with nature	<input type="checkbox"/> Sensory affordances (presence of wildlife, no light pollution, e.g.) <input type="checkbox"/> Immersion.	<input type="checkbox"/> Sense of freedom or at being able to directly experience. <input type="checkbox"/> Sense of at-homeness.	Experience of simplicity. In touch with what is really important. Awe. Sense of merging with nature.
Solitude	<input type="checkbox"/> Places to go off and be alone. <input type="checkbox"/> Separation from inessential elements of daily life. <input type="checkbox"/> Wide open spaces.	<input type="checkbox"/> Ability to follow own desires. <input type="checkbox"/> Heightened sensory awareness when alone.	Connection to one's true self. Feeling centered. Feeling at home in nature.
Physical Challenges	<input type="checkbox"/> Challenging terrain, roadblocks or omnipresent problems – could not avoid challenges.	<input type="checkbox"/> Renewed awareness of the body. <input type="checkbox"/> Greater confidence in abilities.	Sense of empowerment and self-confidence.

The descriptions of these experiences suggest that the following are key attributes to successful wilderness areas:

- Separation from elements of daily life created by a transition or journey
- Absence of built form or social influences
- Rugged landscape that presents physical challenges
- Terrain for roaming, rocks for climbing, and other affordances for physical activities
- A size large enough for immersion and exploration
- Fascinating individual elements to trigger sensory awakening
- Specificity and coherence as a functioning ecological system
- Opportunity for solitude

Can urban planners and designers create places for these experiences in urban environments? Could the city be designed so that both children and adults can access a wild ground that is big enough to completely immerse, absorb, and challenge them? Admittedly, the degree to which many of these can be met in an urban area is limited. Space limitations, dense populations, and the importance of accommodating people of all abilities present problems in creating wilderness within a small area. Still, different urban forms have attempted to preserve a connection between city inhabitants and wilder nature. Strategies include protecting a natural area at the city's core, alternating fingers of urbanity and natural land, and restricting development to create an interior greenbelt. Urban limit lines will ensure that wilderness areas within a city can connect to larger preserves outside the city boundary, and restored river corridors or steep terrain can be ribbons tying internal areas to wilderness outside the city. Each strategy has advantages and disadvantages in the degree to which it provides the wilderness attributes explained above and in its effects on other form-related goals, such as the facilitation of transit and the prevention of sprawl. Further research should evaluate these strategies as applied in different cities, examining their impacts on city functioning, their accessibility, and their success in providing significant wilderness experiences.

After preserving or creating wilderness areas near urban areas, management decisions will be crucial to these areas' success. Management should be as unobtrusive as possible, existing primarily to protect public safety. One critical management decision is whether to allow off-trail use and camping. Existing urban and regional park

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authorities almost always outlaw camping or restrict it to identified campsites. The pace of benefits described above seems to accelerate after one sleeps in an area. Kaplan and Kaplan (1989) found that the greatest sensory awakening occurs between the first night and the second night. Fredrickson and Anderson defined wilderness as having the key quality of being “spacious enough so that a traveler crossing it by foot must have the experience of sleeping out of doors.” An admirable target for a region would be that a person living anywhere in the city could leave home in the morning on foot, walk to a park, and by nightfall have hiked to an area where she can select her own patch of sleeping ground. Allowing migratory, exploratory camping while preserving ecological integrity and solitude, preventing the construction of semi-permanent camps, and enforcing laws is a tricky balance. However, national land management agencies such as the U.S. Forest Service have been perfecting strategies and regional open space authorities should examine whether national best management practices would make camping permissible on portions of their land.

For those people who do not have time to experience designated wilderness locations, can the city be designed as a wild land into which human settlement has been artfully placed? Certain of the key attributes listed above could be provided in an urban setting. For example, functional ecological coherence could be enhanced through native vegetation regimes, natural succession processes, and a respect for natural topography and drainage. Several authors have focused on this challenge, notably Anne Whiston Spirn (1984). Spirn critiques the artificial and philosophical distinctions between city and nature that have led to disregard for natural processes in urban planning and she suggests how urban planners should respond to and communicate the fact that nature (sun, wind, water, geology, and animals) permeates cities. Other key elements of wilderness, such as physical challenges and the opportunity to roam, could be provided by establishing informal pathways separate from the street network. However, in many ways, wilderness is fundamentally different than the urban environment; “[n]ature is a continuum with wilderness at one pole and the city at the other” (Spirn 1984, p. 4). Key elements of the wilderness experience will always be quite difficult to provide in cities.

Conclusion

Natural features and environments are valuable for people’s daily well-being and the fulfillment of their deeper spiritual needs. The

implications of providing the full spectrum of natural environments in urban areas are larger than simply the health of each individual. Realizing, responding to, and communicating the importance of nature to people's well-being may be the most effective mechanism for protecting those environments. Harvard naturalist and philosopher E.O. Wilson believes that the environmental movement today urgently needs "the formulation of a sound conservation ethic grounded in the deep psychological and spiritual needs of human beings" (Wilson 2001, p. 242). He and other proponents of *biophilia* outline the many needs people have for nature as a metaphor, as a setting for brain development, as the environment to which people react most viscerally. His idea is simple: as the message spreads that meaningful contact with intact ecosystems makes people's lives more fulfilling, society will increasingly protect and restore these ecosystems. Environmentalism will rely less on altruism and increasingly on informed self-interest.

Even without conscious acknowledgment of the importance of nature, human ecology and ecological sustainability could be powerful and self-reinforcing partners and should be linked. People who have experienced an emotional affinity with nature are more likely to show nature-protective behavior (Kals et al. 1999). Those people who perceive natural environments as restorative are more likely to recycle and engage in pro-environment organizing (Hartig et al. 2001). Designing ecologically-valuable elements such as stormwater swales with attention to the naturalistic aspects that improve human well-being could make them not an extra burden on developers but an amenity that the market rewards, which would allow them to be implemented more widely (Minick 2003). On a larger scale, designing cities to recognize and communicate the importance of nature to people's well-being may reduce the alienation between "city" and "nature" that makes ecological degradation seem unavoidable. Incorporating restorative natural environments into cities holds the potential to not only make urban life more livable but to make environmental protection more instinctual.

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