

Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context

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Ed. note: With the increasing recognition of the value of nature to human health and well-being, Parks Victoria will host the first International Healthy Parks Healthy People Congress in 2010. The aim of the congress is to raise awareness of recent research, highlight case studies, and facilitate discussion regarding the advantages of, and opportunities for, future collaboration. The congress will be staged in Melbourne, Australia, 11–16 April 2010. See healthy-parkshealthypeoplecongress.org for further details.

This paper is an abridgment, made with the authors' permission, of a much longer monograph, "Healthy Parks, Healthy People: The Health Benefits of Contact with Nature in a Park Context—A Review of Relevant Literature (2nd ed., March 2008). The original monograph in its entirety can be found at the congress website, above. This version focuses on the sections of the monograph most directly related to parks.

Introduction

THAT THE NATURAL ENVIRONMENT IS A KEY DETERMINANT OF HEALTH IS UNQUESTIONED. A report published by the World Health Organization (Prüss-Üstün and Corvalán 2006:6) claims that "approximately one-quarter of the global disease burden, and more than one-third of the burden among children, is due to modifiable environmental factors." However, even in its attempt to quantify the environmental burden of disease, WHO has focused on *environmental degradation*—"the amount of death and disease caused by factors such as unsafe drinking-water and sanitation, and indoor and outdoor air pollution" (Prüss-Üstün and Corvalán 2006: 6), paying little if any attention to the impacts of *environmental deprivation*. The same focus is reflected more broadly within "environmental health" as a discipline and a profession.

Despite the prevailing attitude in society that humans are separate from, outside of, or above nature (Suzuki 1990; Martin 1996), as human understanding of the natural environment has developed, and the massive destruction that human activities can have on natural systems has been observed, a more enlightened view has emerged. This view recognizes that plants and animals (including humans) do not exist as independent entities as was once thought, but instead are parts of complex and interconnected ecosystems on which they are entirely dependent, and of which they are fundamentally a part (Driver et al. 1996). In the

foreword to its Millennium Ecosystem Assessment report “Ecosystems and Human Well-being: Health Synthesis,” the World Health Organization (2005:iii) stated:

Nature’s goods and services are the ultimate foundations of life and health, even though in modern societies this fundamental dependency may be indirect, displaced in space and time, and therefore poorly recognised.

The human relationship with the natural world is deeply intertwined with the human conscious and subconscious mind and is therefore not easy to access for analysis. Nonetheless, in recent years, there have been concerted attempts, particularly in the disciplines of ecology, biology, environmental psychology, and psychiatry, to empirically examine the human relationship with the natural world.

Many researchers have come to the conclusion that humans are dependent on nature not only for material needs (food, water, shelter, etc) but perhaps more importantly for psychological, emotional, and spiritual needs (Wilson 1984; Katcher and Beck 1987; Friedmann and Thomas 1995; Roszak et al. 1995; Frumkin 2001; Wilson 2001). Just how dependent on nature humans are, and exactly what benefits can be gained from interacting with nature, are issues that have only just begun to be investigated. Findings so far, however, indicate that parks and other natural environments play a vital role in human health and well-being through providing access to nature. This is likely to change the way parks and nature are currently viewed and managed by governments and the wider community.

The idea that contact with nature is good for human health and well-being is the subject of research in diverse disciplines such as environmental psychology, environmental health, psychiatry, biology, ecology, landscape preferences, horticulture, leisure and recreation, wilderness, and of course public health policy and medicine. Driving these divergent streams is the central notion that contact with nature is beneficial, perhaps even essential, to human health and well-being. While the strength of the evidence for this assertion varies, due in part to “methodological limitations of [some of] the research,” and the mechanisms by which nature influences health outcomes is generally unknown, nevertheless acceptance of the association of nature with human well-being is increasing (Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning, *Nature and Environment* 2005:81).

In the last few hundred years, however, there has been an extraordinary disengagement of humans from the natural environment (Katcher and Beck 1987; Axelrod and Suedfeld 1995; Beck and Katcher 1996). This is mostly due to the enormous shift of people away from rural areas into cities (Katcher and Beck 1987). Here, contact with nature is often only available via parks. Never have humans spent so little time in physical contact with animals and plants, and the consequences are unknown (Katcher and Beck 1987). Further to this, modern society, by its very essence, insulates people from outdoor environmental stimuli (Stilgoe 2001) and regular contact with nature (Katcher and Beck 1987). Some researchers believe that too much artificial stimulation and an existence spent in purely human environments may cause exhaustion, or produce a loss of vitality and health (Katcher and Beck 1987; Stilgoe 2001).

A subject that has attracted some concern is the lack of opportunities for nurturing in urban environments. Nurturing living organisms, such as animals and plants, could be an essential part of human development that, if denied, could have adverse effects on the health, and perhaps even the long-term survival, of the human species (Katcher and Beck 1987; Lewis 1992; Wilson 1993; Bustad 1996; Kellert 1997). Katcher and Beck (1987) state that there is a critical need for continued exploration of the emotional and health value of nurturing living things; they believe it will reveal a human health requirement equal in importance to exercise and touch.

The idea that isolation from the natural world may be harmful to health is not limited to scientists and researchers but is also seen in the choices of everyday people. For example, it is estimated that 42% of the American public uses some form of complementary medicine (Clark 2000), and worldwide the use of complementary medicine has doubled in recent decades (New Scientist 2001). A recent Australian review of the literature on the use of complementary and alternative medicines, with a particular focus on their use in treating asthma, found that “20–30% of adults and 50–60% of children with asthma may be using CAM at any one time” (Slader et al. 2006:386). The rise in popularity of complementary medicines may not only be due to disenchantment with modern techniques, but also the expression of a desire to take a more natural approach to health (Clark 2000). In fact, many patients cite “naturalness” as the appeal of complementary medicine, yet others are drawn by spiritualism or the emphasis on holism (New Scientist 2001). Both of these qualities are often assigned to nature. Yet, there is still a lack of understanding in the general populace, governments, and institutions about the significance of the human connectedness with nature, and its relevance to current social problems, particularly in terms of health.

The following is a review of the potential and actual health benefits of contact with nature. Although the primary interest of this review concerns human contact with nature in a park context, we have examined the literature within the broader context of human health and nature. This has meant the inclusion of fields such as environmental psychology, psychology, psychiatry, medicine, environmental economics, biodiversity conservation, ecology, complementary and alternative medicine, landscape design and urban planning, recreation and leisure, environmental health, public health policy and health promotion, adventure and wilderness therapy, and religion and spirituality.

The emphasis on parks in this document is for the simple reason that they are the chief means of maintaining intact natural ecosystems and preserving biodiversity in a world that is becoming increasingly urbanized. Because of this, parks play an essential role in public health, as they are the most readily available (or sometimes the only) source of nature for the majority of people who live in urban areas. This review is the first step toward collating current knowledge on this topic with the aim of undertaking further empirical research in the near future.

Parks, nature, and health: What is the connection?

The context: Parks and people

When parks were first designed in the nineteenth century, city officials had a strong belief in

the possible health advantages that would result from open space (Hamilton-Smith and Mercer 1991; Rohde and Kendle 1997). It was hoped that parks would reduce disease, crime, and social unrest, as well as providing “green lungs” for the city and areas for recreation (Rohde and Kendle 1997). At this time, it was also believed that exposure to nature fostered psychological well-being, reduced the stresses associated with urban living, and promoted physical health (Ulrich 1993). These assumptions were used as justification for providing parks and other natural areas in cities, and preserving wilderness areas outside of cities for public use (Parsons 1991; Ulrich 1993).

Although parks have not entirely lost their connection with health, the modern emphasis is almost exclusively on their use as a venue for leisure and sport (Rohde and Kendle 1997). The importance of physical activity for health is well known, yet physical inactivity contributes significantly to the burden of disease and is on the rise in developed countries (Duncan et al. 2005). A wealth of literature exists, linking parks with varying levels and types of physical activity. For example, Wendel-Vos et al. (2004) used GIS databases to objectively measure the amount of green and recreational space in neighborhoods, and found that there was an association between greater amounts of parks and sports grounds in an area and increased levels of cycling. Similarly, a study by Zlot and Schmid (2005) found that there was a significant correlation between parkland acreage and walking and cycling for transportation. However, other research has shown that it is not only the size but the quality of parkland and public open space (e.g., Giles-Corti et al. 2005), as well as its physical and economic accessibility (e.g., Bengoechea et al. 2005), that influences people’s use of such areas. As Lee et al. (2005) note: “Merely building a park in a deprived area may be insufficient for insuring its intended use. . . . It is critical to provide ongoing support for maintenance and civic improvements.” Exploring the role of personal, social and environmental attributes as mediating factors in socioeconomic variations in women’s walking behaviors, Ball et al. (2006) found that while all three elements play a part, access to environments conducive to walking is a key factor which needs to be taken into account. Two aspects of parks and open spaces which influence their use are perceptions of safety and aesthetic appeal (Evenson et al. 2006).

Aside from this recent focus on parks as venues for physical activity, parks tend to be viewed as optional amenities rather than as necessary components of urban (as well as rural) infrastructure (Kaplan and Kaplan 1989). Moreover, there is a prevailing lack of awareness about opportunities for enhancing health provided by larger, wilderness parks such as national parks. Why the benefits of parks understood by early landscape designers and park engineers have been overlooked is a mystery. Yet, research on the benefits of nature carried out over the last two decades is indicating that in fact, they may have been right. Amongst other evidence, data so far have shown that “green nature” can reduce crime (Kuo 2001), foster psychological well-being (Kaplan and Kaplan 1989; R. Kaplan 1992), reduce stress (Parsons 1991; Ulrich et al. 1991b), boost immunity (Rohde and Kendle 1994; Parsons et al. 1998) enhance productivity (Tennessen and Cimprich 1995), and promote healing in psychiatric and other patients (Katcher and Beck 1983; Beck et al. 1986), and is most likely essential for human development and long-term health and well-being (Driver et al. 1996).

Despite the prevailing emphasis on sport and leisure, park management agencies have recently focused on the social and environmental values of parks. For example, the Canadian Parks/Recreation Association recently published *The Benefits Catalogue* (1997) documenting the health and well-being benefits of all aspects of recreation, including that carried out in parks. In Australia, the recent repositioning of Parks Victoria's key message to "Healthy Parks, Healthy People" acknowledges the symbiotic relationship between parks and people (de Kievit 2001). However, although the government and much of the community are aware of how people can benefit parks (e.g., by legislation, activism, or friends of parks groups), the benefits that parks can bestow on people (in terms of health and well-being) through contact with nature have, until recently, gone largely unrecognized.

As summarized in this review, the evidence from recent research demonstrates clearly that there are many and varied health effects to be derived from contact with nature, and that, in urban environments in particular, experiencing nature through parks may in fact be a vital component of human health that for too long has been ignored.

Parks, public health, and well-being

The ecosystem is the fundamental capital on which all life is dependent (Suzuki 1990). Because our water quality, air quality, economic vitality, and personal well-being are as dependent on natural resources as they are on transportation, communications, and public safety systems, parks, by providing access to nature and protecting ecosystems, are an essential part of the infrastructure of our cities and communities (Gutowski 1994, cited in Lewis 1996). The threat of climate change has heightened awareness of the ecosystem services provided by parks and other green spaces. Yet, despite a growth in conservation activities over recent years, there still appears to be a lack of acknowledgement and acceptance on the part of planners, decision-makers, and developers of the need for "a healthy and diverse natural environment in the modern city" (Kellert 2004:9).

In addition to their contribution to public health and well-being through ecosystem services, parks also contribute to health and well-being through the provision of settings for community engagement. Baum (1999) states that healthy communities should provide varied opportunities for their citizens to meet and interact in both formal and informal settings. Recent research has shown that parks make a key contribution to meeting this requirement (e.g., Krenichyn 2005). However, it has been asserted that, if not well-maintained and -used, parks which form boundaries between neighborhoods of different cultural, ethnic, and socioeconomic characteristics may become "green walls" dividing communities, rather than places of community interaction (Solecki and Welch 1995).

In the urban environment, the best access that people have to nature (apart from that available in their homes and gardens) is via parkland. Parks vary in size, shape, quality, and character, and hence satisfy the whole spectrum of opportunities for contact with the natural world at various levels. Yet, Wilson's (1984) biophilia hypothesis has prompted many researchers to re-evaluate their understanding that plants and engineered ecosystems, such as parks, please people only on a cultural (Stilgoe 2001) or superficial level (Driver et al.

1996). From an evolutionary perspective, parks are ideal environments in which to reap some of the positive contributions to personal health that are inseparable from our evolutionary history, but which are virtually impossible to obtain in modern society (Furnass 1979). These contributions include the physiological and psychological benefits derived from physical activity over varied terrain, the dramatic change in sensory input, and the spiritual values which can accrue from direct contact with the natural world (Furnass 1979). A common conclusion in the literature is that humans may not be fully adapted to an urban existence (Glendinning 1995; Kellert and Wilson 1993; Kellert 1997; Burns 1998). Hence, they live in an environment so different to that from which they evolved that natural selection has not had time to revise human bodies for coping with many aspects of modern life, including fatty diets, vehicles, drugs, artificial lights, and central heating (Nesse and Williams 1996, cited in Burns 1998). The reasoning for this argument is that humans have spent many thousands of years adapting to natural environments, yet have only inhabited urban ones for relatively few generations (Glendinning 1995; Roszak et al. 1995; Suzuki 1997; Gullone 2000). Moreover, although humans may have all of their physical needs well satisfied by the urban environment of large cities, our internal psyche is profoundly disturbed (Suzuki 1997; Gullone 2000).

Frederick Law Olmsted, the 19th-century American landscape architect, believed in the restorative quality of green nature that “operates by unconscious processes to relax and relieve tensions created by the artificial surroundings of urban life” (Lewis 1992). Olmsted (cited in Lewis 1996) also believed that parks improved health and vigor and extended the life expectancy of citizens. These ideas are now being confirmed by research in psychology and geography, as well as in many other fields. Examples of how parks and nature can contribute to some of the components of health are displayed in Table 1. Although the physical, mental, and social components of health have been identified by health authorities, such as the Victorian Health Promotion Foundation (VicHealth 1999), this review advocates an ecological definition of health by also including the spiritual and environmental components.

Parks and nature have enormous untapped health potential as they provide an opportunity for people to re-establish and maintain their health in a holistic manner. Recent developments in public health and health promotion have recognized the benefits of a holistic approach. For example, it has been stated that the major determinants of health have little to do with the health care system (Hancock 1999), and that public health needs to focus on the environmental and social aspects of health (Chu and Simpson 1994). Parks are in an ideal position to address both these, and other aspects, of human health and well-being.

Repositioning parks

Parks and nature are currently undervalued as a means of improving and maintaining health. Although most people are aware of the health benefits of sport and recreation, the range of other health and well-being benefits arising from contact with nature are virtually unknown. Although further research is required, the findings summarized in this report are sufficient to warrant the repositioning of parks in the minds of both the community and government

Component of health	Contribution of parks
Physical	Provide a variety of settings and infrastructure for various levels of formal and informal sport and recreation, for all skill levels and abilities, e.g., picnicking, walking, dog training, running, cycling, ball games, sailing, surfing, photography, birdwatching, bushwalking, rock climbing, camping
Mental	Make nature available for restoration from mental fatigue; solitude and quiet; artistic inspiration and expression; educational development (e.g., natural and cultural history)
Spiritual	Preserve the natural environment for contemplation, reflection, and inspiration; invoke a sense of place; facilitate feeling a connection to something beyond human concerns
Social	Provide settings for people to enhance their social networks and personal relationships from couples and families, to social clubs and organizations of all sizes, from casual picnicking to events days and festivals
Environmental	Preserve ecosystems and biodiversity, provide clean air and water, maintain ecosystem function, and foster human involvement in the natural environment (friends of parks groups, etc.)

Table 1 A summary of the contribution of parks to human health and well-being.

as a positive health resource. Parks need recognition for the essential role they play in preserving, maintaining, and promoting the health of humans, as well as that of their environment.

Parks, in fact, are an ideal catalyst for the integration of environment, society, and health (which have been demonstrated to be inextricably linked) by promoting an ecological approach to human health and well-being based on contact with nature. The potential exists for parks to gain an expanded role, scope, and influence in society, especially in terms of public health, as well as changing the way park management bodies relate to other organizations and agencies (by advocating an integrated approach to government). This would also bring together several disciplines and/or agencies already moving in this direction as well as value-add to the status of parks in the community.

In order to reposition parks, it is necessary for park management agencies to:

1. *Communicate* to governments and the wider community that:

- A growing body of evidence shows that access to, and interaction with, nature is essential to human health and well-being;
- Through providing access to nature, parks improve and maintain human health and well-being (both at an individual and community level);
- By improving and maintaining human health and well-being, parks have the potential to reduce the burden on the health care system;
- Parks facilitate an holistic/ecological approach to health and well-being that is beneficial (and essential) to individuals, society, and the environment;
- Through providing a holistic/ecological approach to health, parks reinstate people with a sense of empowerment and control over their own health and well-being.

2. *Educate* governments and the wider community:

- As to how the above can be applied for improved health and well-being;
- About how to incorporate this knowledge into public health policy and health promotion;
- About how to collaborate in the pursuit of common goals;
- About the need for broadening the knowledge base in this area (via further research) for future dissemination.

3. *Facilitate* the engagement of the community with nature in order to re-establish the importance of nature in people's lives and the cultivation of a holistic and sustainable attitude towards life and health:

- By communication and education as outlined above;
- By continued exploration of the benefits to individuals and communities to be gained from contact with, and preservation of, nature;
- By fostering park management practices which support community engagement with nature.

To accomplish the above will require the cooperation of multiple government departments and/or other agencies (i.e., those whose portfolios/core business relate to any aspect of society, health, or the environment). This in itself would be ground-breaking since traditionally (as is commonly known) government departments (and other similar entities such as university faculties or research institutes) tend to work in isolation, despite opportunities that may exist for mutual benefit. An interdisciplinary approach would reflect a recent insight in health promotion that modern health issues are usually multifaceted and complex, arising from social and environmental conditions of the individual or community concerned (e.g., socioeconomic status, access to basic health and educational services, family issues, social cohesion, and an unpolluted environment).

Mowen (2003) offers seven hints for park professionals in attempting to align with health agencies, including: (1) infant health partnerships require baby steps, (2) know the lingo of the health profession, (3) integrate health benefits into all communications, (4) use solid evidence to justify the link between park use and health, (5) don't reinvent the health promotion wheel, (6) create partnerships that provide an incentive for physical activity, and (7) attempt collaboration not competition.

To reposition parks in this way will mirror other international attempts, such as those in Canada. The Canadian Parks/Recreation Association state in its *Benefits Catalogue* (1997) that in the future parks will be: recognized as champions of personal and community well-being, central to the quest for human potential, builders of social foundations, catalysts for Canada's green movement, and a cornerstone for economic renewal. This is possible for parks everywhere.

Health benefits of nature: The evidence

The belief that contact with nature fosters psychological well-being and reduces the stress of urban living seems to be as old as urbanization itself (Ulrich and Parsons 1992; Ulrich 1993), and, as mentioned, was the guiding principle behind the first parks. There are many ways that humans come into contact with nature, including viewing natural scenes, being in natural settings, or encountering plants and animals. Some of these occurrences are “everyday” interactions, and others are more specific and affect people at a deeper level. This section briefly examines everyday human–nature interactions, as well as those interactions with landscapes, wilderness, plants, and animals (Frumkin 2001).

Viewing nature

In recent decades, landscape researchers have conducted studies to investigate individuals’ preferences for natural scenery (e.g., Talbot and Kaplan 1984, 1986, 1991; Talbot et al. 1987; Kaplan and Talbot 1988; Talbot 1988). From the early work of Talbot and Kaplan (1984) through to more recent work by Kaplan (2001), studies generally indicate that people prefer viewing natural landscapes rather than the built environment. Furthermore, there is now considerable empirical and theoretical evidence for the positive effects that simply viewing natural scenes can have on human health.

The healing effects of a natural view (such as those provided by parks) are increasingly being understood in stressful environments such as hospitals, nursing homes, remote military sites, space ships, and space stations (Lewis 1996). In these environments particularly, as well as for people who work in windowless offices, studies show that seeing nature is important and an effective means of relieving stress and improving well-being (R. Kaplan 1992; Lewis 1996; Leather et al. 1998). Research such as this could have important implications for the placement and planning of parks in urban areas.

One famous study examining recovery rates of patients who underwent gall bladder surgery found that those with a natural view recovered faster, spent less time in hospital, had better evaluation from nurses, required fewer painkillers, and had less postoperative complications compared with those that viewed an urban scene (Ulrich 1984). Similarly, Ulrich and colleagues (1991b) studied the effects of different natural and urban scenes on subjects who had just watched a stressful film (horror genre). Measuring a whole array of physiological measures (including heart rate, skin conductance, muscle tension, and pulse transit time—a non-invasive measure that correlates with systolic blood pressure) they found that recovery was faster and more complete when subjects were exposed to natural rather than urban scenes (Ulrich et al. 1991b). The physiological data measured by this study suggests that natural settings elicit a response that includes a component of the parasympathetic nervous system associated with the restoration of physical energy (Ulrich et al. 1991a).

Similar research conducted in prison environments suggests that cell window views of nature are associated with a lower frequency of stress symptoms in inmates, including diges-

tive illnesses and headaches, and with fewer sick calls overall by prisoners (Moore 1981). Natural views can also result in better performance in attention-demanding tasks (Tennessen and Cimprich 1995). Tennessen and Cimprich (1995) gave university students a test and compared scores of students who had natural views to those that did not. They found that those with a view of nature scored better on the test than those with non-natural views. Furthermore, a study by Heerwagen and Orians (1986, cited in Lewis 1996) compared the preferences of office workers for visual décor (i.e., photographs or posters) in windowed and windowless offices. Findings showed that people who worked in offices without windows were four times more likely to choose photographs or posters of outdoor/natural scenes than those who worked in offices with windows; more than 75% of scenes represented in windowless offices contained no buildings or human-made artifacts at all (Heerwagen and Orians 1986, cited in Lewis 1996).

Further evidence shows that access to nature in the workplace is related to lower levels of perceived job stress and higher levels of job satisfaction (Kaplan and Kaplan 1989). Workers with a view of trees and flowers felt that their jobs were less stressful and were more satisfied with their jobs than others who could only see built environments from their window. In addition, employees with views of nature reported fewer illnesses and headaches (Kaplan and Kaplan 1989). A similar study found that a view of natural elements (trees and other vegetation) buffered the negative impact of job stress (Leather et al. 1998).

Parsons et al. (1998) reviewed the literature on commuter stress in car drivers and the mitigating effects of roadside environments. Driving is known to be a stressful activity, and causes several physiological changes in the body, including activation of the sympathetic nervous system, increased blood pressure, increased heart rate, and an increase in heart rate variability (Parsons et al. 1998). Stress recovery and immunization were measured in subjects exposed to one of four simulated drives (drives with forest/rural scenery, drives along the outside of golf courses, drives through urban scenes, and drives through mixed roadside scenery), immediately following and preceding mildly stressful events. Findings demonstrated that participants who viewed nature-dominated drives experienced quicker recovery from stress and greater immunization to subsequent stress than participants who viewed artifact-dominated drives (Parsons et al. 1998).

Kaplan (2001) found that apartment residents had enhanced well-being and greater neighborhood satisfaction when they could look out onto more natural rather than more built settings. However, satisfaction was far greater when residents could see even a few trees than when their view was of large open spaces (Kaplan 2001). Similarly, results from a study by Kaplan (1985) suggested that urban residents who could see gardens found their neighbors to be friendlier and felt their housing development had a stronger sense of community, thus contributing to their neighborhood satisfaction. Furthermore, Kearney (2006) found that having a view of natural environments (particularly forests and landscaping) increased residents' neighborhood satisfaction and suggested that higher-density living, such as high-rise living, could be more acceptable if residents have a natural view.

The beneficial effects of viewing nature on psychological state, and in particular mood affect, were examined by Ulrich (1979, 1982, cited in Rohde and Kendle 1994). Ulrich (1979, cited in Rohde and Kendle 1994) found that participants who viewed slides of

unspectacular scenes of nature had an increase in positive mood affect, while those who viewed scenes of urban areas experienced a decline in positive mood affect. In this and a later study, Ulrich (1982, in Rohde and Kendle 1994) concluded that scenes of nature, particularly those depicting water, had a beneficial influence on the psychological state of humans. In their review of the literature, Rohde and Kendle (1994) state that the positive psychological response to nature involves feelings of pleasure, sustained attention or interest, “relaxed wakefulness,” and diminution of negative emotions, such as anger and anxiety.

Kaplan and Kaplan (1989) point out that observing or viewing nature is an important form of involvement with it. Much of the pleasure that people derive out of nature comes from opportunities to observe, and much of this observation occurs, not when people are in nature itself, but when they are looking out a window (Kaplan and Kaplan 1989). This type of observation lets the mind wander and provides an opportunity for reflection. It can also aid recovery from mental fatigue. “Mental fatigue” is a term coined by Stephen Kaplan (1987b, cited in Kaplan and Kaplan 1989) and arises from an intense period of concentration or directed attention (whether pleasant or unpleasant) that eventually results in a worn-out mental state with symptoms including irritability and a lack of concentration. It has been shown that natural environments are ideal environments to foster recovery from this state. The reason for this is that the act of viewing or observing nature does not require directed or focused attention, but instead requires undirected or effortless attention, which is non-taxing and can restore mental capabilities.

Evidence presented here has demonstrated that just by viewing nature many aspects of human health and development can be markedly improved. Some of these benefits in a park context are summarized in Table 2. Although the benefits are mostly psychological, flow-on effects to physical health have also been documented in the literature. Viewing nature is positive for health, particularly in terms of recovering from stress, improving concentration and productivity, and improving psychological state, particularly of people in confined circumstances such as prisons, hospitals, and high-rise apartments/high density living. From these findings, it is clear that visual access to nature in urban settings should be taken into account and given appropriate priority when planning urban areas. As well as viewing landscapes, however, many therapeutic effects can be gained from *being* in nature.

Being in nature

Being in natural environments, whether hiking in a World Heritage area or sitting in a local urban park, has many psychophysiological beneficial effects on health (i.e., positive psychological effects that translate into positive physiological effects). Although there is much anecdotal evidence documenting the benefits of “being in nature,” the exact effects (for example, by using psychophysiological measures) on the human mind, body, and spirit are still largely unknown. It has been suggested that some of the benefits from being in natural settings arise from a mood state of pleasant arousal and relaxation, resulting from returning to a more cyclical and slower sense of time (Furnass 1979; Nettleton 1992).

Nettleton (1992) reviewed some of the literature describing positive emotional states arising out of time spent in natural settings. A study by Russell and Pratt (1980, cited in

Interaction	Health Benefit
Viewing Nature	Improves concentration, remedies mental fatigue, improves psychological health (particularly emotional and cognitive aspects), and positively affects mood state
	Reduces stress and tension and improves self-reports of wellbeing (positively influencing the immune system by reducing production of stress hormones such as cortisol and corticosterone)
	When exposed to scenes of natural environments subjects recover faster and are more resistant to subsequent stress, which also is likely to boost immunity
	Recovery from a stressful event is faster and more complete when subjects are exposed to natural rather than urban scenes, and heart rate and muscle tension decreases (yet it increases when viewing urban scenes)
	Viewing nature improves performance in attention demanding tasks
	Viewing nature aids recovery from mental fatigue (attention restoration) and encourages reflection by requiring involuntary attention
	Views of flowers and trees in the workplace reduce perceived job stress, improve job satisfaction, and reduce the incidence of reported illness and headaches of office workers.
Being in Nature	Trees nearby: decrease levels of fear, incivilities, and violence amongst residents; decrease crime rates in public housing; and improve the life satisfaction of residents
	Natural play settings reduce the severity of symptoms of children diagnosed with Attention Deficit Disorder (ADD) and improve concentration
	Viewing nature enhances residents' satisfaction and makes higher density living more acceptable
	Natural surroundings assist cognitive functioning in children
	Wilderness areas provide spiritual inspiration, enable people to gain a fresh perspective on life, and provide an opportunity to 'get away'.
	Therapy in a wilderness setting heals emotional and psychological conditions and can aid those recovering from substance abuse and violence
	Outward Bound and similar programs use wilderness challenges to boost self-confidence and self-esteem
Observing Plants and Gardens, or Gardening	Community gardens increase community cohesion, reduce graffiti and violence and enhance self-image of residents
	Gardening and gardens help people to feel tranquil and at peace
	In habitat restoration people see a metaphor for their own personal transformation and growth, enhancing psychological wellbeing
	Gardens improve psychological wellbeing, provide environmental stimulation, a means of self-expression, physical exercise, and social interaction for residents of retirement communities
	Residents who have nature nearby or regularly pursue nature-related activities (e.g. gardening, bird-watching) have greater neighbourhood satisfaction, overall health and life satisfaction than residents who do not
Observing / Encountering Animals (Pets and Wildlife)	Pets provide companionship, and an opportunity to nurture and express intimacy, as well as facilitating social networks
	The sight of, or touching a pet can reduce stress, decrease blood pressure and heart rate
	Pet owners report fewer minor health problems and have better mental health than non-owners (regardless of overall health, socio-economic status and physical exercise)
	Owning a pet can reduce the risk factors for cardiovascular disease (systolic blood pressure, plasma cholesterol, plasma triglycerides) independent of lifestyle and other health factors
	Observing native animals, having them nearby, or interacting with them improves quality of life

Table 2 Some known health benefits of contact with nature in a park context.

Nettleton 1992) found that parks and gardens were perceived as relaxing and peaceful and were associated with a positive mood state, while supermarkets were perceived as distressing and associated with a negative mood state. A later study conducted at one of the train stations in the Melbourne underground railway system (Parliament Station) found that when asked about what they liked about the station, commuters mentioned a small park (MacArthur Gardens) located just outside the exit of the station that they walked through on their way to the train, whereas the station itself was viewed as sterile, daunting, and stark (Joske et al. 1989, cited in Nettleton 1992).

City life is dominated by mechanical time (punctuality, deadlines, etc.), yet our bodies and minds are dominated by biological time. Conflicts between mechanical and biological time can result in a variety of unpleasant psychosomatic symptoms, including irritability, restlessness, depression, insomnia, tension and headaches, and indigestion (Furnass 1979). If unaddressed, these problems have the potential to eventuate into illnesses that are more serious. The experience of nature in a neurological sense can help strengthen the activities of the right hemisphere of the brain, and restore harmony to the functions of the brain as a whole (Furnass 1979). This is perhaps a technical explanation of the process that occurs when people “clear their heads” by going for a walk in a park and emphasizes the importance of parks in providing communities with access to nature. Furthermore, in the act of contemplating nature, researchers have found that the brain is relieved of “excess” circulation (or activity), and nervous system activity is also reduced (Yogendra 1958).

Nature does have great importance to people. In a survey of 1,900 adults in the US, Cordell et al. (1998) found that approximately 45% of respondents rated wilderness as “very important” or “extremely important” for spiritual inspiration, and a further 56% stated that just knowing it exists was “very important” or “extremely important.” This confirms the conceptual importance of nature to people described by Kaplan and Kaplan (1989).

Being in natural environments invokes a sense of “oneness” with nature and the universe, and can lead to transcendental experiences (Rohde and Kendle 1994). This is more likely to occur in wilderness settings, although as it relates to subjective experience it is probable that nature in urban environments could produce the same effect.

In order to encourage people to be in nature, the accessibility of urban green spaces should be considered. With current trends in Australia and other Western countries towards an aging demographic, it is important to make urban green space accessible to all. Furthermore, urban green spaces should be created as beautiful places in cities—places that are socially cohesive and promote social solidarity (Ward Thompson 2002).

Restorative settings

The increasing complexity of both technological tasks and the built environment is generally a source of many negative stress response patterns for the majority of people (West 1986, cited in Lewis 1996). In contrast, the natural environment has been found to have a restorative quality, particularly for people who live in urban environments. Natural places such as parks offer an opportunity to become revitalized and refreshed. Living in urban areas often means dealing with environmental demands such as crowds, noise, pollution, and primarily

uniformed structures. It has been demonstrated that these factors can cause mental fatigue and exhaustion (Furnass 1979; Rohde and Kendle 1994), whereas exposure to nature has been demonstrated to have the opposite effect. Symptoms of mental fatigue include: decreased ability to concentrate and solve problems, heightened irritability, and a greater susceptibility to make mistakes or cause accidents (Herzog et al. 1997).

Rachel Kaplan and Stephen Kaplan (Kaplan and Kaplan 1989, 1990; R. Kaplan 1992; S. Kaplan 1992, 1995) have developed the notion of “restorative environments” that foster recovery from this state of mental fatigue. Restorative environments require four elements: fascination (an involuntary form of attention requiring effortless interest, or curiosity); a sense of being away (temporary escape from one’s usual setting or situation); extent or scope (a sense of being part of a larger whole); and compatibility with an individual’s inclinations (opportunities provided by the setting and whether they satisfy the individual’s purposes) (Kaplan and Kaplan 1989; Hartig et al. 1991). Parks are ideal for restorative experiences due to their ability to satisfy the four elements described above. When comparing a walk in a natural setting (a park), a walk in an urban setting, and relaxing in a comfortable chair, Hartig et al. (1991) found that mental fatigue was most successfully relieved by a walk in a park.

Furthermore, Kaplan et al. (1998) suggest that the implications for design and management of natural environments to be restorative are vast and vital. They suggested that the natural setting may be beneficial to not only its immediate users but also to those who view it from afar. In addition, they stated that “if treated as the opportunity for increasing the sanity and welfare of those who can see it, it becomes every bit as important as hallways and lighting” (Kaplan et al. 1998:77). Herzog et al. (2002:295), reporting on a study of undergraduate students in the USA, concluded that “the restorative potential of natural settings is probably underappreciated.” This is supported by the results of research by Hartig et al. (2003), also involving university students, in which the restorative effects of natural settings were accentuated by the negative effects associated with the urban surroundings and windowless room that acted as “controls.”

In recent years, Frances Kuo and her colleagues (2001) have conducted research to examine the effectiveness of the attention restoration theory in the inner city context. Their work has focused on high-rise residents and the effects of nearby nature on a range of factors, including the ability to cope with major life issues, attention deficit disorder (ADD), and children’s self-discipline. For example, a study conducted by Taylor et al. (2002) examined the relationship between nearby views of “green” nature and children’s ability to concentrate, inhibit impulses, and delay gratification. They found that the more “green” a girl’s view from her high-rise window was, the better able to concentrate and the more self-disciplined she was.

Similarly, Kuo (2001) examined whether nearby nature affects high-rise residents’ ability to cope with poverty and life issues. She found that residents with “green” surroundings were able to pay attention more effectively and found their major life issues to be less difficult to deal with than their counterparts with “barren” surroundings. Furthermore, Taylor et al. (2001) tested whether attention restoration theory could be applied to children and their capacity to deal with ADD. Through the use of parental surveys, children were tested for their attentional functioning in a range of play settings, and green settings were found to be

most effective in enhancing attention. The authors concluded that the “greener” a child’s play setting, the less severe her ADD symptoms appeared (Taylor et al. 2001).

Leisure and recreation

Leisure and recreation experiences in natural environments probably reduce stress through a number of mechanisms, including a sense of control through active coping or escape, and the therapeutic effects of exposure to natural environments that most likely have learned as well as biological origins (Ulrich et al. 1991a). For example, many people each year flock to parks and wilderness areas for their annual holiday to “experience” the wilderness, and the number of people seeking these experiences is increasing (Freimund and Cole 2001). Associated with this is a rise in the number of people pursuing non-consumptive nature-related recreational activities, such as bird-watching. This is often referred to as “wildlife-watching” or “watchable wildlife” and includes observing, feeding, or photographing wildlife (US Department of the Interior et al. 1996). Much work has been carried out on this topic in the United States, and although similar trends are likely in Australia, there are almost no data on wildlife watching by Australians or visitors to Australia (D. Jones, personal communication).

Recreation in the natural settings provided by parks is becoming increasingly important as our lives become dominated by indoor activities. Some authors anticipate that allowing people to interact with nature (such as spending time in parks during the working week) to reduce tension and increase competence and productivity, will eventually become socially accepted and actively encouraged (S. Kaplan, cited in Lewis 1996). Pursuing recreation in a park setting enables people to develop a clearer understanding of their relatedness to nature, which can influence their everyday lives and preferences (Martin 1996). This can have quite a powerful effect as a form of intervention treatment—for example, as used in wilderness therapy.

Wilderness and related studies clearly demonstrate that being in a natural environment affects people positively, although the exact benefits are still largely unknown. There are also multiple benefits from brief encounters with nature or experiencing nature on a smaller scale, such as in urban parks. As outlined by Woolley (2003), the most obvious benefits and opportunities that urban green spaces may provide for inner-city living are social benefits: that is, opportunities for people to participate in events and activities. Similarly, the Sydney Urban Parks Education Research (SUPER) Group (2001) stated that urban green space, in particular parks and gardens, may generate a range of social and economic values for the Australian community. These benefits may include:

- Opportunities for activity for older people;
- Supervised child-care;
- Health improvement and fitness motivation;
- Education in sport, environment and other endeavors; and
- Individual personal development.

Survey work has shown that nature is important to people, and the number of people seeking nature-related recreation overseas is increasing. Similarly, research indicates that in

Sydney, Australia, inner-city residents have the highest visitation rate to urban parks, no doubt due to small or non-existent personal gardens or backyards (Veal 2001). Some of the benefits of being in nature in a park context are presented in Table 2.

Contact with plants: Incidental exposure to plants

What effect does simply having plants, parks, and gardens in close proximity have on human health? Street trees and other people's gardens, fields and unused lots, courtyards, and landscaped areas that are encountered in one's daily travels (as separate from parks or designated recreational areas) constitute important opportunities for experiencing nature (Kaplan and Kaplan 1989). In a study of apartment dwellers in the USA, Kaplan (2001) found that views of trees, gardens, and grassy areas were important for participants' well-being and were factors in neighborhood satisfaction. Kaplan suggests that "incidental" exposure to plants via window views may be far from "incidental"—that it may, in fact, provide "micro-restorative opportunities" that may accumulate to "provide long-term contact with the natural environment" (2001:540). Similarly, in a study of low-income children in the USA, Wells (2000) found that the "greenness" of their home environment (predominantly related to views from various windows) impacted on their cognitive functioning, with greater levels of "greenness" associated with higher cognitive functioning. Kearney, reporting on a study of residential density and neighborhood satisfaction, found that density per se was less important than "opportunities to visit nearby shared space and having views of nature from the home" (2006:112).

Even the knowledge that there is nature nearby (e.g., parks) has proven to have important effects on residents' satisfaction with their neighborhood, despite the fact that they may not make use of it regularly (Kaplan and Kaplan 1989). Rachel Kaplan and Stephen Kaplan refer to this as "conceptual" involvement in nature. Its benefits stem from the fact that nature is important to people and they value its presence, even though they may not experience it on a daily basis. Another study found higher neighborhood and life satisfaction among individuals who more regularly pursued gardening and other nature-related activities (such as bird-watching) than among those who did not have such interests (Frey 1981, cited in Kaplan and Kaplan 1989). People with access to nearby natural settings or parks have been found to be healthier overall than other individuals, and the long-term, indirect impacts of "nearby nature" can include increased levels of satisfaction with one's home, job, and with life in general (Kaplan and Kaplan 1989). A study by Wells and Evans of nearby nature as a buffer against stress among rural children found that "the impact of life stress was lower among children with high levels of nearby nature than among those with little nearby nature" (2003:311).

The observational mode of experiencing plants mentioned previously can occur wherever and whenever people encounter plants (Lewis 1990). Whether in parks or buildings, they are islands of green that provide opportunities for people to become refreshed by experiencing nature. Research has demonstrated that even brief encounters with nature can improve one's capacity to concentrate and remedy mental fatigue (Kaplan and Kaplan 1990; S. Kaplan 1992, 1995).

Failure to recognize, and to maximize, the benefits available from nearby plants, parks, and other natural settings could have serious consequences (Kaplan and Kaplan 1989). Considering the positive psychological effects that vegetation has on all sectors of the community, it seems unwise not to use this knowledge to improve productivity and quality of life. Too often parks and landscaping are considered as optional “amenities” rather than as essential components of urban design (Kaplan and Kaplan 1989).

Contact with animals: Companion animals

It is now widely recognized that healing influences exist in the relationships of humans to their pets (Birch 1993) and that people who own pets have better mental health and well-being than non-pet owners (Straede and Gates 1993; Rowan and Beck 1994). On the strength of this evidence, Rowan and Beck (1994) and others (Beck 1987; National Institutes of Health 1987; Bustad 1996; Fawcett and Gullone 2001) believe that there is a pressing need for detailed and serious research of human–animal interactions in large study populations. Some authors believe that because pet ownership cannot be patented and sold as a drug, however, there has been less than satisfactory research interest and funding into the health benefits of pet-keeping for individuals. A similar scenario exists for the effect of companion animals on societal health, and here too there is enough evidence to indicate that there are many benefits to be gained (Rowan and Beck 1994).

In terms of companion animals, parks provide an important outlet for people to interact with their pet (mostly applicable to dog owners), both formally (e.g., training) and informally (e.g., play). An added benefit is the opportunity to also interact socially with other pet owners and park users, expanding or enhancing social networks. It is also important to emphasize the opportunity that parks provide for observing or encountering wildlife, particularly in those protected area parks that preserve the habitat of native fauna.

Contact with animals: Wildlife

Apart from interactions with pets and other domesticated animals, humans also interact in various ways with wildlife. In the US and Canada more people visit zoos and aquariums each year than attend all professional sports events combined (Wilson 1993). Since its opening in the year 2000, the Melbourne Aquarium boasts an annual visitation rate of one million (Oceanis Australia 2002). In zoos and aquariums, visitors can safely view, interact with, and learn about animals that they would rarely encounter (or that are too dangerous to encounter) in the wild. There are also increasing numbers of people seeking contact with animals in their natural environment, particularly marine mammals, such as dolphins and whales. In Port Phillip Bay in Victoria up to 15,000 visitors each summer book organized tours to view and swim with dolphins. Increasing visitor pressure from tourists is so great in fact, that concerns are mounting for the welfare (and long-term survival) of the animals (Linnell 2002; Dolphin Research Institute Inc., n.d.).

Furthermore, in a national US survey on recreational interests (the National Survey on Recreation and the Environment, conducted in 1995) bird-watching was found to be the

fastest-growing recreational activity (Cordell et al. 1999). Other specific wildlife-watching pursuits are also emerging, such as butterfly-watching and whale-watching (Youth 2000). Whale watching in particular has gained immense popularity over the last couple of decades, and is the backbone of the tourist industry in towns such as Hervey Bay, Queensland, Australia. The enormous increase in wildlife-based ecotourism is indicative of the desire humans have to interact with nature, particularly animals.

Interacting with animals has multiple positive physiological and psychological effects on human health including: decreasing blood pressure, heart rate, and cholesterol; reducing anxiety and stress, and providing protection against stress-related diseases; provision of companionship and kinship; and offering the opportunity to nurture. All of these factors improve the quality of life and health. Parks are important in providing a setting for pet owners to interact both with their pet and with other pet owners and park users, which can positively influence the social aspects of health. Parks also preserve the habitat of native wildlife, providing people with the opportunity to observe or encounter animals in their natural environment. Some of the main benefits with specific relevance to parks are presented in Table 2.

Health benefits of nature: In practice

Further evidence for the positive effects on health and well-being from contact with nature is found in some unique forms of therapy based on the human relationship with nature. These forms of treatment have proven to be successful where conventional treatments have often had limited success.

Ecopsychology, or nature-guided therapy Ecopsychology, or nature-guided therapy, considers every aspect of the human–nature relationship. It is primarily concerned with the fundamental alienation of humans from nature and its effects on human health (Burns 1998; Gullone 2000; Scull 2001). The person–environment relationship is both the unit of analysis and the basis of treatment (Burns 1998). Although only relatively recently adopted in modern Western society, ecopsychology is essentially a modern interpretation of ancient views of humans and nature held by many indigenous peoples. In essence, most native cultures view humans as part of the rest of nature by believing that human beings are intricately linked to all life forms and life-like processes, and that by harming nature we harm ourselves (Suzuki 1990; Rockefeller and Elder 1992; Orr 1993; Knudtson and Suzuki 1994; Martin 1996; Burns 1998).

As echoed by researchers in other fields, ecopsychologists believe that disconnection from nature has a heavy cost in impaired health and increased stress (Katcher and Beck 1987; Glendinning 1995; Burns 1998; Gullone 2000; Scull 2001). Clinical ecopsychology operates on the premise that many psychological and physical afflictions can be due to withdrawal from the healing forces of the natural world (Levinson 1969; Roszak et al. 1995; Scull 2001). No longer able to identify with nature and its representatives, humans find themselves in a psychological void (Nasr 1968). However, people may be able to regain some emotional harmony by re-establishing a bond with the animate and inanimate world (Levinson 1969, 1983).

Many Western psychologists are now readily adopting ecopsychology as a form of treatment or are subscribing to its views (Durning 1995; Hillman 1995; Roszak et al. 1995; Burns 1998). In fact, the field of mainstream psychology is undergoing a paradigm shift as a result of new problems brought about by urban existence and the destruction of the natural environment that are proving difficult to treat (Hillman 1995). The Australian psychologist George Burns (1998) reviewed a selection of nature-based interventions. The work cited by him included the following beneficial effects from contact with nature: enhancement of positive affect, stress reduction, improvement in parasympathetic nervous system functioning, and enhancement of self-concept, self-esteem, and self-confidence.

Although ecopsychological treatment usually involves excursions into wilderness, it is now recognized that any exposure to nature, such as spending time with plants and animals, or going to a park, can have positive benefits (Cohen 2000; Scull 2001). Burns (1998) has documented his success treating patients with simple nature-based assignments. These assignments use natural objects or natural processes that have in the past assisted the patient with achieving a therapeutic goal, or are likely to do so in the future. Burns has successfully treated patients suffering from a variety of negative psychological states associated with severe trauma, cancer, depression, and anxiety, using nature as the basis for treatment.

Although there is a lack of scientific research in this area, in a similar way that wilderness therapy and outdoor adventure therapy also lack research evidence of their efficacy, anecdotal evidence suggests that ecopsychology is particularly successful in treating stress-related illness. However, unlike wilderness therapy and outdoor education, from which the benefits may be short-term, ecopsychological treatment is believed to have more lasting positive benefits than ordinary outdoor recreation (Scull 2001).

Stainbrook (1973, cited in Lewis 1996) states that an over-urbanized, dirty environment, and a lack of natural surroundings, confirm the negative self-appraisal a person may have developed through other negative contacts with society. Since self-esteem is the keystone to emotional well-being, a poor self-appraisal, among other factors, determines how people treat their surroundings and how destructive they will be towards themselves and others (Stainbrook 1973, cited in Lewis 1996). If the self were expanded to include the natural world, behavior leading to destruction of natural systems would be interpreted as self-destruction (Roszak 1995).

Hence, to suggest with the full weight of professional psychological authority that people are bonded emotionally to the earth gives a powerful new meaning into our understanding of the term "sanity" (Orr 1993; Roszak 1995). Furthermore, as Levinson (1969, 1983) states, humans must remain in contact with nature throughout life if they are to maintain good mental health, not too mention their humanity. It has been proposed that the modern life as prescribed by Western society results in adverse outcomes on the human psyche (Gul-lone 2000), the full impacts of which are yet to be realized.

Attention restoration Attention restoration theory suggests that contact with nature improves the ability to concentrate and aids recovery from mental fatigue. Mental fatigue, as mentioned earlier, can arise from extended periods of directed attention on a particular task, while shutting out distractions (Herzog et al. 1997). Symptoms include a lack of concentration, increased irritability, and a proneness to mistakes or accidents. The effect of nature on

children's capacity for concentration was studied by Taylor et al. (2001), who tested the ability of nature to improve the concentration of children diagnosed with ADD. They found that children functioned better after activities were carried out in natural play settings, and that the "greener" a play setting, the less severe the attention deficit symptoms (Taylor et al. 2001). ADD affects many children and can have a detrimental effect on most aspects of life, including school, interpersonal relationships, personal growth, etc. (Taylor et al. 2001). It is not an easy disorder to treat, but natural settings could be used to improve children's concentration, thereby somewhat alleviating the need for drugs, which have serious side effects and do not aid children's long-term health or development (Taylor et al. 2001). This research highlights the importance of "green" playgrounds and the availability and access to parks and nature for child-care centers, kindergartens, and schools.

However, attention restoration is not just relevant for children, but has increasing relevance for adults in the current social and economic environment in which people are working longer hours and spending long periods of time looking at computer screens. While Hartig et al. (2003) demonstrated that natural environments have both stress-reducing and attention restoration benefits for young adults (university students), a study by Herzog et al. (2002), also involving university students in the USA, found that recognition of the restorative effects of natural environments was limited. Herzog et al. (2002) suggest that strategies to address this lack of awareness should include communication of the benefits through images and narratives, and urban design that brings people closer to nature.

Wilderness experience and wilderness therapy As well as being restorative in terms of attention enhancement and stress reduction, natural environments can also be used educationally and therapeutically for other purposes. The terminology for such activities varies, and includes "outdoor education," "outdoor adventure," "wilderness experience," "wilderness therapy," "wilderness adventure therapy," and "bush adventure therapy." Whatever the terminology, participation in such activities is typically undertaken for physical, emotional, and/or psychological health reasons (Mitten 2004). However, its potential as a population-wide health promotion tool has only recently been recognized (Pryor et al. 2005).

Challenges presented by wilderness are used in wilderness experience programs such as Outward Bound to boost the self-confidence and self-esteem of participants. These programs encourage leadership ability, social cohesiveness, and facilitate an increased awareness of, and respect for, nature (Furnass 1979). Although these benefits can be substantial and have a long-term effect on individuals, it has been claimed that they are somewhat superficial compared to the psychological and spiritual benefits that can arise from contact with wilderness itself (Cumes 1998).

At least one wilderness program, however, draws on this aspect, namely the Wilderness Vision Quest Program, run in the United States (Easley 1991). This program, founded in 1976, emphasizes the spiritual dimensions of contact with the natural world and focuses on fostering conscious efforts to heal, enrich, and expand the human spirit (Brown 1984, cited in Easley 1991). Deeper experiences with wilderness are used in the emotional and psychological treatment of patients suffering from any number of conditions, including psychosis, substance abuse (Bennett et al. 1997) or violence, and injury (Crisp and O'Donnell 1998;

Beringer 1999). The combination of physical activity and social connection in the context of the natural environment has been found to be effective in preventing both the onset and the escalation of depression (Crisp and Hinch 2004). However, the multifaceted nature of the outcomes of such programs (particularly their broader social and environmental well-being outcomes) is often forgotten in the intense focus on the outcomes for individual participants. “When small groups of people adventure together in natural environments, the health and well-being of humans, communities and the natural environment are enhanced” (Pryor et al. 2005:11).

This area is only just beginning to be understood and no appropriate terms exist for the powerful effect of nature on the human psyche, although the term “wilderness rapture” has recently been suggested by Cumes (1998). More thorough research on wilderness therapy programs is required, particularly to determine whether beneficial effects on participants’ lives are long-term. One commonly reported outcome of wilderness therapy is that self-perceptions and perceptions about the one’s relationship to the natural world change (Kaplan and Kaplan 1989). This can assist people in finding meaning or higher purpose in life.

Horticultural therapy Historically, plants are associated with healing (Lewis 1996) and the medicinal properties of plants used by ancient societies are still employed in the present day (e.g., traditional Chinese medicine, naturopathy). However, the use of plants in mental health therapy has now also been well established by the field of horticultural therapy (Relf 1992; Lewis 1996; Frumkin 2001). The restorative and therapeutic aspects of gardening are being used in a wide range of settings, including hospitals—where they are often referred to as “healing gardens” (Hartig and Cooper-Marcus 2006:536)—geriatric centers, drug rehabilitation centers, prisons, and schools for the developmentally disabled (Lewis 1990).

In a study conducted in retirement communities, residents had a strong preference for natural landscapes and, in fact, “pleasantly landscaped grounds” were a determining factor in their choice of retirement home (Browne 1992). The same study described how contact with plants (and nature) affected well-being. Five benefits were identified: psychological well-being, environmental stimulation, self-expression and personalization, motivation for physical exercise, and social interaction and networking (Browne 1992). Similarly, the use of horticultural therapy within a residential facility for people experiencing on-going mental health problems has provided benefits in terms of encouraging social interaction, providing opportunities for creativity and self-expression, and increasing self-esteem and confidence (Parker 2004).

The increasing popularity of therapeutic gardens within hospitals is supported by a study which found that visiting the garden associated with a children’s hospital was a restorative experience (Whitehouse et al. 2001). Pilot data collected in a later study of the same facility (Sherman et al. 2005:181) revealed positive benefits in terms of “anxiety, sadness, anger, worry, fatigue, and pain” when comparing those inside the gardens with others inside the hospital building. Some healing gardens are reported to serve a dual purpose: as a place of prayer for those of faith, and as a place of nurture for others. In one facility for Alzheimer’s patients, a “wandering garden” featuring a secure area for walking through a garden of non-toxic plants helps to evoke memories and to reconnect patients with the world

(Rauma 2003). Similar “wander gardens” have been used elsewhere with patients undergoing post-stroke rehabilitation, and have been shown to be beneficial for stimulating both mental and physical functions (Detweiler and Warf 2005).

Horticultural therapy is based on our emotional responses to nature, in this case to plants. Sensory gardens used in horticultural therapy provide people with a range of ways to respond to the plants and the setting, using the five senses (Lynch 2005). Plants, like animals, are non-judgmental, non-threatening, and non-discriminating, and can be an effective means of reaching someone who is not responding to conventional treatment (Lewis 1996). The growth of plants has a universal attraction in that it presents opportunities for interaction at a number of levels of intelligence, skill, and maturity (Lewis 1996). Of course, different people have different responses to nature, and what works for some may not work for others. Despite this, advocates for horticultural therapy rely on the innate connection that human beings have with living nature and the positive feelings that plants evoke within people (Lewis 1996). Horticultural therapy has been found to be highly beneficial, particularly to people with disabilities and to the elderly (e.g., Heliker et al. 2000; Pachanal et al. 2003).

However, although there appear to be health benefits to be bestowed on all age and ability groups in the act of gardening, further empirical research is warranted (Söderback et al. 2004; Relf 2005). It is likely that many of the benefits of horticultural therapy are experienced also by members of friends of parks and other environment groups, although the health of these groups has not yet been investigated.

Policy outcomes

Parks, nature, and triple bottom line reporting Triple bottom line reporting is a framework for measuring and reporting corporate performance against economic, social, and environmental parameters (SustainAbility Limited 2002; Elkington 1997). With their environmental and social focus, park management agencies were perhaps some of the earliest organizations to pursue the triple bottom line, before it was popularized as such. As it has become established in the business community, however, park organizations have almost seamlessly updated their approach to conform to contemporary triple bottom line concepts.

In parks management, the social bottom line previously has been satisfied by tailoring parks to visitor/user needs, enabling access for all user groups, supporting extensive volunteer and community projects (particularly friends groups and providing community grants), providing education and interpretation, and promoting and protecting significant environmental and cultural heritage sites. Now, parks have the opportunity to expand their social bottom line in terms of the key role they play in human health and well-being.

Human health and well-being is taking on an expanded role in triple bottom line reporting and sustainability. In fact, it has been hailed as one of the key indicators for sustainable development (Kickbusch 1989a). What is needed, however, is a focus on social equity, social investment, and social innovation in health and environment policy (Kickbusch 1989b). By promoting the health benefits of interacting with nature, and assuming a role in public health, parks could provide the innovation required.

The triple bottom line and public health The triple bottom line is almost effortlessly integrated into public health if an ecological approach to public health is adopted. Public health requires an expansion of the knowledge base underlying environmental health to include the triple bottom line of social, economic, and environmental outcomes in interpreting human–environment interactions (Brown 1996). In other words, these two disciplines can easily be combined in order to satisfy the requirements of the triple bottom line. Furthermore, it is important that the scope is broadened to include links between global, national, and international scales (Brown 1996). This is echoed in the concept of biohistory established by Stephen Boyden (Boyden 1992, 1996, 1999), relating to global human health and its total reliance on the health of the biosphere. As Boyden (1999) states, human society and culture have the capacity to affect the biosphere, both positively and negatively, and vice versa.

The triple bottom line concept is essentially the principle of an ecological theory of health put into practice. It entails enhancing individual and community health, well-being, and welfare by following a path of economic development that does not impair the welfare of future generations, providing for equity between and within generations, and protecting biodiversity and maintaining essential ecological processes and life support systems (Brown 1996).

Recommendations

It is clear from the evidence that humans have strong ties to nature that include physical, mental, and spiritual ties. Understanding how and why has partly been explained by theories such as biophilia, but researchers are still a long way from knowing all of the answers. More work is needed. Unfortunately, if governments, other decision-makers, and individuals wait for complete knowledge before changing current policies and lifestyles that are not sustainable, we may damage the health of the biosphere beyond repair, with potentially devastating consequences for humans.

As an outcome of the findings reported here, recommendations to governments, planners, park management bodies, and health policy makers are:

Support further research Further research is required to remedy gaps in current knowledge, to further knowledge in this area, to facilitate decision-making and policy formulation, and to foster interdisciplinary research into the benefits to individuals and communities to be gained from contact with nature. Specifically, research should be focused on:

- Collecting further empirical evidence demonstrating the health and well-being benefits of contact with nature;
- Exploring new opportunities for application of the health and well-being benefits of contact with nature by investigating nature-based interventions to address existing and emerging health problems;
- Exploring opportunities for using the health and well-being benefits of contact with nature as a preventive “upstream” health measure.

Encourage and facilitate the repositioning of parks First, by *communicating* to governments and the wider community that:

- Contact with nature is essential to human health and well-being;
- Through providing access to nature, parks improve and maintain human health and well-being (both at an individual and community level);
- By improving and maintaining human health and well-being, parks have the potential to reduce the burden on the health care system;
- Contact with nature and parks facilitates an holistic/ecological approach to health and well-being that is beneficial to individuals and society, as well as to the environment; and
- Through providing an holistic/ecological approach to health, contact with nature and parks reinstate people with a sense of empowerment and control over their own health and well-being.

Second, by *educating* government departments, health professionals, and the wider community about:

- How the above can be applied for improved health and well-being;
- How to incorporate this knowledge into public health policy and health promotion;
- How to collaborate in the pursuit of common goals; and
- The need for broadening the knowledge base in this area (via further research) for future dissemination.

Third, by *facilitating* the engagement of the community with nature in order to re-establish the importance of nature in people's lives and cultivate a holistic attitude towards life and health by:

- The communication and education outlined above;
- Continued exploration of the benefits to individuals and communities to be gained from contact with, and preservation of, nature through parks and other reserves; and
- Fostering park management practices that support community engagement with nature.

Develop ways of integrating parks and nature into public health Several considerations are relevant:

- Cooperation through a partnerships approach is required between government departments, park management agencies, health professionals, and researchers to successfully integrate parks and nature in public health.
- Health promotion agencies have already recognized the need for innovative, “upstream” approaches to health and well-being, and are seeking potential alliances and opportunities to this end.
- It may be beneficial to initiate this process by examining how contact with nature via parks could be used as a preventive measure, potentially contributing to, for example,

the Australian National Health Priority Areas of Cardiovascular Disease and Mental Health.

- The use of parks and nature to improve health and well-being is supported by the Jakarta Declaration (World Health Organization 1997) and its predecessor, the Ottawa Charter for Health Promotion (World Health Organization 1986), which call for creating supportive environments (both natural and social) and a reorientation of health services to be shared among individuals, community groups, health professionals, health service institutions, and governments.

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