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the International Park Strategic Partners Group

Healthy Parks Healthy People

The Health Benefits of Contact with Nature in a Park Context

A Review of Current Literature

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Authors Ms Cecily Maller¹

Dr Mardie Townsend¹

Mr Peter Brown²

Associate Professor Lawrence St Leger¹

¹ School of Health Sciences, Faculty of Health & Behavioural Sciences, Deakin University

² The Lort Smith Animal Hospital, North Melbourne, Victoria

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Foreword

Parks Victoria has 'Healthy Parks, Healthy People' as its key message to the community of Victoria. Likewise, many other park management agencies in Australia and worldwide are seeking to communicate a similar message. It is important these agencies improve their understanding of what this message means, and determine ways to communicate the importance of parks and nature for human health and wellbeing to governments and the community at large.

This project is the result of a joint initiative between Parks Victoria, the International Park Strategic Partners Group, and Deakin University. All recognise the significance of the health and wellbeing benefits from interacting with nature in park settings, the implications for public health, and the lack of collated information on this topic.

This review identifies significant research that has not previously been compiled. It will provide key information for decision making by park managers, forming the basis of a program of future research to overcome the limited knowledge in this area. It is part of stage two of this project, funded by the International Park Strategic Partners Group. It builds on an earlier review (completed early in 2002 with funding provided by Parks Victoria) by addressing the health and wellbeing benefits of contact with nature in a parks context, at an individual and community level.

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Executive Summary

In many disciplines there have been concerted attempts to understand the human relationship with nature and how humans might benefit from nature in terms of health and wellbeing. Although in the preliminary stages, research indicates that contrary to popular thinking, humans may be dependent on nature for psychological, emotional, and spiritual needs that are difficult to satisfy by other means. Findings so far demonstrate that through providing access to nature, parks play a vital role in human health, wellbeing, and development that has not been fully recognised. This review is an examination of a broad cross-section of published literature that relates to the potential and actual health benefits of contact with nature in a park context.

City living involves an extraordinary disengagement of humans from the natural environment that is likely to be detrimental to health and wellbeing. Parks may be the only means of accessing nature for the majority of people in urban areas, yet most people are unaware of their full range of potential health benefits. Humans have forgotten how much the natural world means to them. Yet, signals abound that the loss of life's diversity endangers not just the body but also the spirit. It has been reported that modern people are experiencing a spiritual famine and that alcohol, food, and drug addictions are futile attempts to fill the spiritual emptiness that has arisen from loss of contact with nature.

In terms of health, parks have been viewed almost exclusively as venues for leisure and sport. Yet recent research shows that 'green nature', such as parks, can reduce crime, foster psychological wellbeing, reduce stress, boost immunity, enhance productivity, and promote healing. In fact, the positive effects on human health, particularly in urban environments, cannot be over-stated. As a result, urban planning should ensure that communities have adequate access to nature.

Evidence in the literature shows that viewing nature is positive for health in terms of recovering from stress, improving concentration and productivity, and improving psychological state, particularly of people in confined circumstances such as prisons and hospitals. Furthermore, wilderness and related studies clearly demonstrate that being in a natural environment affects people positively, particularly in terms of mental health. There are also multiple benefits from brief encounters with nature, or experiencing nature on a smaller scale, such as in urban parks. Surveys have shown that nature is important to people, and the numbers of people seeking nature-based recreation are increasing.

Other studies demonstrate that plants and nearby vegetation can have profound effects on individuals, small groups, or even entire neighbourhoods. Some health

benefits of interacting with plants include facilitation of healing in the elderly and mentally disadvantaged, improving mental capacity and productivity of office workers, improving job and life satisfaction of residents, attracting consumers and tourists to shopping districts, and aiding community cohesion and identity.

While the relationship between social capital and health has been the subject of considerable research and reflection, the relationship between social capital and the biophysical environment is only now beginning to be explored. It seems likely, however, that human interactions with nature through parks may have significant capacity for building social capital. As social and natural capital benefit one another, it could be worthwhile investigating the facilitative role parks play in linking one to the other.

A large body of research demonstrates that contact with companion 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 the opportunity to nurture. All of these factors improve quality of life and enhance health and wellbeing. Parks are important in providing a setting for pet-owners to interact both with their pet and with other pet-owners and parks users, which can positively influence the social aspects of health. In addition, parks are essential in the preservation of habitat for native wildlife, as well as providing people with the opportunity to observe or encounter animals in their natural environment.

Parks are a fundamental health resource, particularly in terms of disease prevention. The initial evidence documenting the positive effects of nature on blood pressure, cholesterol, outlook on life and stress-reduction is sufficient to warrant its incorporation into strategies for the Australian National Health Priority Areas of 'Mental Health' and 'Cardiovascular Disease'. These two disease categories place a considerable health and economic burden on Australians, and worldwide will be the two biggest contributors to disease by the year 2020. However, due to the positive effects of nature overall on human health and wellbeing, the health benefits of nature have relevance to all National Health Priority Areas (cardiovascular health; cancer; injuries; mental problems and disorders; diabetes; and asthma). The extent to which parks can contribute to these areas, however, awaits investigation.

There is a clear message for park managers to join public health fora, as not only do parks protect the essential systems of life and biodiversity, but they also are a fundamental setting for health promotion and the creation of wellbeing, that to date has not been recognised.

Recommendations

Recommendations to government departments, planners, park management bodies, and health policy makers are:

1 Support Further Research

Research is required to:

- a) Collect further empirical evidence demonstrating the health and wellbeing benefits of contact with nature;
- b) Explore new opportunities for application of the health and wellbeing benefits of contact with nature by investigating nature-based interventions to address existing and emerging health problems;
- c) Explore opportunities for using the health and wellbeing benefits of contact with nature as a preventive 'upstream' health measure.

2 Encourage & Facilitate the Repositioning of Parks

- a) By communicating to governments and the wider community, the health and wellbeing benefits of nature as provided by parks;
- b) By educating government departments, health professionals, and the wider community as to these benefits;
- c) 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, sustainable attitude towards life and health.

3 Develop Ways of Integrating Parks & Nature into Public Health

- a) 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;
- b) Health promotion agencies have already recognised the need for innovative, 'upstream' approaches to health and wellbeing, and are seeking potential alliances/ opportunities to this end;
- c) 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;
- d) The use of parks and nature to improve health and wellbeing is supported by The Ottawa Charter for Health Promotion (World Health Organization, 1986) which calls 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.

Introduction

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, psychology, and psychiatry to empirically examine the human relationship with the natural world. Many researchers have come to the conclusion that humans are totally dependent on nature not only for material needs (food, water, shelter, etc), but perhaps more importantly for psychological, emotional, and spiritual needs (Wilson, 2001; Frumkin, 2001; Roszak et al., 1995; Friedmann & Thomas, 1995; Katcher & Beck, 1987; Wilson, 1984). Just how dependent 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 play a vital role in human health and wellbeing through providing access to nature. This is likely to change the way parks and nature are currently viewed and managed by Governments and the general community.

The idea that contact with nature is good for human health and wellbeing is the subject of research in diverse disciplines such as 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 interacting with nature is beneficial, perhaps even essential, to human health and wellbeing. Despite this, the prevailing attitude in society is that humans are separate from, outside of, or above nature (Martin, 1996; Suzuki, 1990). Yet, 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 recognises that plants and animals (including humans) do not exist as independent entities as was once thought, but instead are part 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 last few hundred years, however, there has been an extraordinary disengagement of humans from the natural environment (Beck & Katcher, 1996; Axelrod & Suedfield, 1995; Katcher & Beck, 1987). This is mostly due to the enormous shift of people away from rural areas into cities (Katcher & 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 & Beck, 1987). Further to this, modern

society, insulates people from outdoor environmental stimuli (Stilgoe, 2001) and regular contact with nature (Katcher & 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 (Stilgoe, 2001; Katcher & Beck, 1987).

A subject that has attracted recent 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 (Kellert, 1997; Bustad, 1996; Wilson, 1993; Lewis, 1992; Katcher & Beck, 1987). 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 the last decade (New Scientist, 2001). 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 in a park context. Contact with nature is defined as viewing natural scenes, being in natural environments, or observing, encountering or otherwise interacting with plants and animals. 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 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 urbanised. Because of this, parks play an essential role in public health, as they are the most readily available (or sometimes, 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.

The first part of the review comprises a discussion on public health and nature, as well as the current concerns of public health in Australia. This is followed by the connection between parks, nature and health, how parks can contribute to public health, and the need to reposition parks in terms of health. Next is a discussion on understanding the human-nature relationship that examines some current

theories of the human place in nature. Evidence for the health benefits of contact with nature is presented in the following section, including the benefits arising from viewing nature, being in nature, contact with plants, and contact with animals. A brief discussion on some unique forms of nature-based therapy follows, which is then followed by a summary on the principal health outcomes of interacting with nature on an individual or personal level, and at a community level. Finally, a brief comment on policy outcomes and triple bottom line reporting, and some key recommendations are presented. There are also a number of assertions that can be made about current knowledge of the health and wellbeing benefits of the human relationship with nature. These are included in Appendix A. Appendix B contains potential research topics and opportunities for future funding.

Public Health & Nature

What is Health and How is it Determined?

Health is one of life's most valued assets. Practically all people have it in their 'top three' of important life factors. In the 5th Century B.C., a Greek statesman by the name of Pericles stated that 'Health is that state of moral, mental, and physical wellbeing that enables a person to face any crisis in life with the utmost grace and facility' (Burn, 1956). However, it is only through research carried out in the latter half of the 20th Century that society has discovered the factors that enhance health. Current theories of disease have become more complex and moved away from single cause explanations to ones in which multiple behavioural, environmental, biological and genetic factors combine over time, resulting in one or more of a number of different diseases (House et al., 1988).

The World Health Organization (WHO) states health is 'A state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity' (World Health Organization, 1946). The word 'health' is derived from the Greek word 'hal' or whole. It is this holistic perspective of health which has emerged in the last 50 years. Nevertheless, it is not possible in reality to achieve the WHO goal. Rene Dubos stated, 'The concept of perfect and positive health is a utopian creation of the human mind. It cannot become reality because man will never be so perfectly adapted to his environment...It is true that the modern ways of life are creating disease that either did not exist a few decades ago or are now more common than in the past...The utopia of positive health [however] constitutes a creative force because like other ideals, it sets goals and helps medical science to chart its course towards them (Dubos, 1965 p. 346).

Dubos (1965) was one of the first to explore the interconnections of humans with their environment. Since that time, there has been a great deal of research and the development of models and frameworks about the different factors that shape human life and human health and wellbeing. The physical environment is one of these.

The Canadian Government produced a major report in 1974, which examined 'The Health Field Concept' (Lalonde, 1974). It identified four key factors that shaped people's health: genetics; the environments in which they live; lifestyle

behaviours; and the provision and accessibility of medical services (Lalonde, 1974). Since that time a major shift has occurred in how health is viewed. It is often called 'an ecological theory of public health' and has emanated from such writers as Kickbusch (1989a), Antonovsky (1984), WHO (1986), and recently, the World Bank (Murray & Lopez, 1996). Put simply, it is the recognition that health is influenced by many factors and most of them are interrelated.

Hancock and Perkins (1985) mapped this ecological perspective in their Mandala of Health. Their model shows that there are three core aspects of health, namely physical, mental, and spiritual, and the various factors that influence these (Figure 1).



Figure 1: The Mandala of Health developed by Trevor Hancock and Fran Perkins (Hancock & Perkins, 1985)

In industrialised countries chronic disease has increasingly replaced acute infectious disease as the major cause of disability and death (House et al., 1988). These types of afflictions are often long-term and are potentially much more expensive in terms of health care requirements and cost to the community. Some of the health problems facing society include: disease patterns linked to social inequities and ways of life in industrial societies; health problems that are social rather than medical in nature; health problems that tend to be cumulative, long-term, chronic and not amenable to curative measures; and a general public that is changing its social perception of health risks and is expressing new expectations (Kickbusch, 1989b). In Australia, the Commonwealth and State Governments have been proactive in developing frameworks, strategies, priorities, and tactics to improve people's quality of life and their longevity. It is often referred to as 'adding years to life and life to years'.

The establishment of Health Promotion and Development Foundations has been just one example of government initiatives. There is now a greater emphasis on working 'upstream' (to prevent people 'falling into' ill health), than just supplying 'downstream' (rescue) services (e.g. medical treatment and rehabilitation). The work done in cardiovascular disease (CVD) prevention through encouraging physical activity, healthy dietary practices, and tobacco reduction programs (e.g. QUIT) are examples of this approach. It is now happening in most areas of health and is certainly a cornerstone of addressing Australia's national health priorities

(cardiovascular disease; cancer; injuries; mental problems and disorders; diabetes; and asthma). The environment, however, plays a pivotal role in all of these.

Better collection of data and accurate models of future health trends and issues means there can be careful planning for the next 20-30 years. The Victorian Burden of Disease Study (Vos & Begg, 1999) found a number of important changes occurring. This study used similar methods to the WHO/World Bank sponsored Global Burden of Disease study (Murray & Lopez, 1996).

Some key findings were:

- Men have a life expectancy six years shorter than women but the gap is narrowing;
- The gap between the LGA (Local Government Area) with the lowest and highest life expectancy is seven years in men and four in women. Socio-economic disadvantage is an important predictor of lower life expectancy;
- The life expectancy of Aboriginal men may be between eight and 18 years shorter than the state average. In women, the gap is estimated to be as large as nine to 18 years;
- Rural residence, especially in the least populated parts of Victoria, is the most important predictor of premature mortality from injuries. Traffic accidents, suicide, machinery accidents, and drowning are the main types of injury responsible for this difference;
- Favourable trends in life expectancy and mortality from many causes have been witnessed in the last two decades. The most favourable trends are observed in deaths from cardiovascular disease and injuries, with a mean annual decline of five percent. Tobacco-related illness in young women, diabetes in older men, drug overdose and suicide in young men show unfavourable trends (Vos & Begg, 1999).

The WHO/World Bank report identified cardiovascular disease (CVD) and poor mental health as the two biggest contributors to disease by the year 2020 (Murray & Lopez, 1996). CVD is currently number one, and will remain so, but poor mental health will rise from position number eight to position number two. The environment has a major influence on both of these areas. Evidence cited in this report shows that parks and nature can be a significant contributor to reducing premature death and disease in these two fields. Promising evidence is also emerging that positive influences from park environments, and associated flora and fauna, enhance wellbeing in relation to other health issues.

Parks are one of our most vital health resources. The following sections provide an evidence-based case to support this claim, and suggest that both the health and parks/environment sectors need to act more proactively in collaboration to enrich the role that parks play in improving and sustaining the Nation's health.

Ecological Theory of Public Health

In response to these changes in the way health is being conceptualised and managed, researchers and health care professionals are adopting a more holistic approach. Although not always referred to as such, this approach is based on an ecological theory of public health. As mentioned, the concept of an ecological public health has emerged recently in response to a new range of health issues and problems (Chu & Simpson, 1994; Kickbusch, 1989a). Traditional modes of public health seem ill prepared for this new reality and the health risks posed to populations, which has led to a reconsideration of the interdependence between

people, their health, and their physical and social environments (Kickbusch, 1989a). It is now known that human health cannot be considered in isolation from physical or social environments (Chu & Simpson, 1994). In fact, some authors state that the separation of the health of the environment and the health of humans is done so at the peril of the human species (Brown, 1996).

In recognition of this, the Ottawa Charter for Health Promotion was developed at an international conference sponsored by the WHO in 1986 (World Health Organization, 1986). The Charter identified the importance of environments supportive of health, stating that the inextricable links between people and their environment are the basis for a socio-ecological approach to health (World Health Organization, 1986). It advocated the protection of natural and built environments as well as the conservation of natural resources as essential in any health promotion strategy. The central theme of the conference, however, was the promotion of health through the maximisation of the health values of everyday settings. Settings are places or social contexts where people engage in daily activities in which environmental and personal factors interact to affect health and wellbeing (Chu, 1994). This includes where people learn, live, work, play etc. The consequence for public health policy is to strengthen the health potential of the settings of everyday life, starting where health is created (Kickbusch, 1989b). Parks are a setting that is health creating (perhaps more so than many other settings) yet their health potential is currently unacknowledged and under-utilised.

Apart from the identification of the health value of everyday settings, the Australian Institute of Health and Welfare (1998) identifies holistic wellbeing as a crucial concept for understanding health. They nominate seven dimensions of health: biological and mental wellbeing, social wellbeing, economic wellbeing, environmental wellbeing, life satisfaction, spiritual or existential wellbeing, and 'other characteristics valued by humans' (Australian Institute of Health and Welfare, 1998). Although our understanding of these dimensions is slowly increasing, the majority of health statistics still measure illness or the absence of health. Despite this, much data is accumulating for the positive effects of social relationships on health. It has been demonstrated that social relationships provide a buffer for potentially harmful health effects arising from psychological stress in particular (House et al, 1988). However, the significance of sustainable ecosystems for the dimensions of human health needs greater exploration, as well as inclusion and emphasis in the knowledge base of public health (Brown, 1996).

An ecological theory of public health recognises that not only is health itself holistic and multidisciplinary, but also that a holistic or multidisciplinary approach is needed to promote and manage health successfully. This requires inventive new efforts in the collaboration between environmental scientists and biomedical researchers on one hand, and between health and environmental policy makers on the other (Wilson, 2001). Our objective for the future should be healthy people in a healthy environment, with healthy relations to that environment (Birch, 1993). In terms of parks, not only do they preserve and protect the environment, they also encourage and enable people to relate to the natural world. For these reasons they have a key role in an ecological approach to health.

Social Capital and Health

The term 'social capital' has become increasingly common in the social science literature over recent years. Though there are variations in the way it is defined, the term generally refers to social structures such as networks, trust, and norms which facilitate co-operation and cohesion in communities, and which result in benefits for community members (Kawachi et al., 1997; Putnam et al., 1993; Coleman, 1988; Bourdieu, 1986). There are, therefore, at least two aspects to social capital: the sources or relational aspects of the capital (i.e. the structures and mechanisms by which it is established and maintained), and the consequences or material aspects of the capital (i.e. the flow-on effects or benefits to community members which result from their membership) (Hawe & Shiell, 2000; Wilkinson, 1999; Portes, 1998)

Recent research suggests that differences in social capital may explain differences in morbidity and mortality within and between different population groups (Leeder & Dominello, 1999; Baum, 1999; Runyan et al., 1998; Lynch & Kaplan, 1997; Kawachi et al., 1997; Putnam, 1995). However, there are differing explanations for the ways in which health is influenced by social capital. Hawe & Shiell (2000) point out that while Kawachi et al (1997) focus on the relational aspects of social capital, arguing that a large gap between rich and poor people leads to higher mortality through the breakdown of social cohesion, Lynch & Kaplan (1997) offer an explanation based on the material aspects of social capital where income inequality may be a marker for a set of other concrete societal characteristics and policies that influence health. This difference in explanations highlights the fact that the relationships between variables may be complex and multi-directional. Nevertheless, whatever the mechanism by which social capital influences health, there is clear evidence that it does have an effect. At a population health level, Baum (1999) highlights the association between 'the quality and extent of social interaction and relationships' and the health of populations. This view is supported by Wilkinson (1999) who states that the quality of people's social relations seems to have a powerful influence on their health. Wilkinson (1999) goes on to highlight research by Berkman (1995, in Wilkinson, 1999) and House et al. (1988) which 'reported death rates two or three times as high among people with low levels of social integration compared to people with high levels'. At an individual level, Baum (1999) reports on a US study by Kawachi et al. (1996, in Baum, 1999) which found that, by comparison with 'people who had many social ties, those who were socially isolated were 6.59 times less likely to survive a stroke, 3.22 times more likely to commit suicide and 1.59 times less likely to survive coronary heart disease'.

While the relationship between social capital and health has been the subject of considerable research and reflection, the relationship between social capital and the biophysical environment is only now beginning to be explored. Hawe and Shiell (2000) highlight the lack of exploration of place-level effects within the literature on social capital, but even they do not specifically refer to the effects of place in terms of biophysical environments. Moreover, where this link has been explored (Pretty & Ward, 2001; Cavaye, 1999) the work has largely focused on the impacts of varying levels of social capital on environmental management, rather than on the contribution of biophysical environments to social capital. One strand of work linking social capital and the environment has been the work of the Civic Practices Network on 'civic environmentalism'. However, like the previous example, this also links social capital and the environment in a unidirectional 'social capital environmental improvement' model.

Anecdotal evidence, however, suggests that engagement in civic environmentalism (through groups such as Friends of Parks) has spin-off social capital benefits in addition to the benefits that such groups were originally designed to achieve. One of the key elements of social capital is 'civic engagement'. Putnam (1995) states that dense networks of interaction probably broaden participants' sense of self, developing the 'I' into the 'we'. Yet, Putnam (1995) observes, America (and indeed many other nations) is experiencing a decline in civic engagement and social connectedness. One of the factors associated with this decline has been 'the technological transformation of leisure' (Putnam, 1995). If we consider the anecdotal evidence, and Putnam's (1995) observations, in the light of Frumkin's (2001) evidence of the effects of wilderness experience in increasing capacity for cooperation and trust, it seems likely that human interactions with nature through parks may have significant capacity for building social capital. It is interesting to note the 'symbiotic' relationship between social and natural capital. As one benefits the other it could be worthwhile to investigate the facilitative role that parks could play in linking one to the other. This area needs exploration.

Current Australian Public Health Priorities

A collaborative effort involving the Commonwealth Government as well as State and Territory Governments has identified the following National Health Priority Areas: Cardiovascular Disease; Cancers; Injuries; Mental Problems and Disorders; Diabetes; and Asthma (Australian Institute of Health and Welfare, 2000). Most relevant to parks and nature are Cardiovascular Health and Mental Problems and Disorders. There is, however, considerable overlap between all of the Priority Areas in terms of risk factors and barriers to better prevention. Hence, initiatives targeting risk factors and barriers will bring benefits across all Priority Areas (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999).

Cardiovascular Health

Cardiovascular disease is a major health and economic burden for Australia, and is the country's greatest health problem (Australian Institute of Health and Welfare, 2000). Recent estimates of annual costs to the health system were at AU\$3.7 billion, accounting for approximately 40% of deaths in 1998 (Australian Institute of Health and Welfare, 2000). Risks of developing the disease are associated with factors including high blood cholesterol, high blood pressure, physical inactivity, obesity, excess alcohol, and smoking (Australian Institute of Health and Welfare, 1998).

Aside from family history, lifestyle greatly influences cardiovascular health. Through adequate education and health promotion, the burden of this disease to individuals and the community could be dramatically reduced. Although campaigns addressing smoking, physical activity, cholesterol, and alcohol consumption are already in place, they could be supplemented by the promotion of the health and wellbeing benefits arising from exposure to nature through visiting a park, interacting with pets, gardening, habitat restoration, or simply contemplating a natural view.

As a result of public awareness, walking for recreation or exercise has increased with 44.9% of men and 53.3% of women reporting walking in 1995, compared with 41% and 49% respectively in 1989-90 (Australian Institute of Health and Welfare, 2000). Through raising public awareness (i.e. via health education and promotion) the same sort of result is possible for the health benefits of contact with nature.

In fact, if promoted successfully, the health benefits of nature combined with the health benefits of physical activity could be brought together in a joint public campaign. There has been little recent improvement in physical activity levels despite a decline in coronary heart disease, and an increasing percentage of population is becoming overweight (especially children) (Australian Institute of Health and Welfare, 2000). This highlights the pressing nature of this health issue.

Mental Health

The Mental Health Priority Area focuses primarily on depression. This is due firstly, to predictions that depressive disorders will constitute the largest share of the burden of disease in the developing world and the second largest worldwide by 2020, and secondly because it imposes such high social and financial costs on society (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999). For example, 8.3% of total annual health system expenditure in Australia in 1993-94 was on mental disorders (AU\$2.58 billion) (Australian Institute of Health and Welfare, 2000). The World Bank and the World Health Organization, however, have predicted that by the year 2020 the health burden worldwide attributed to neuropsychiatric disorders could increase by about 50%, from 10.5% of the total burden to almost 15% in the year 2020 (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999). In an earlier report, Desjarlais et al (1995) state that mental, behavioural and social health problems are becoming an increasing part of the health burden in all parts of the world. One of the reasons for this is the increase in average life expectancy and the occurrence of an ageing population in developed nations (Desjarlais et al., 1995). But, mental illnesses are also becoming more prevalent in young people and at younger ages (Raphael & Martinek, 1996). This is related to a number of social, ecological and technological processes, including: the polarities of high levels of urbanisation, crowding and social isolation; globalisation of economies, communication and information; human, social, and economic epidemics related to depression, substance abuse and violence (Raphael & Martinek, 1996); the break-up of families; and perhaps an almost complete disconnection from the natural world (Roszak et al., 1995).

As many depressive symptoms and disorders are treatable as well as preventable, improvements in mental health promotion activities, prevention, and early intervention are likely to have a major impact on the level of depressive symptoms and disorders prevalent in the Australian community (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999). Furthermore, depressive symptoms and disorders are related to other disorders both mental and physical (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999), potentially magnifying human suffering and adding further costs to the health care system. Hence, effective prevention and treatment targeted at depression is likely to have a much wider impact on individual and community health. It is imperative, however, that action is taken now.

The Commonwealth Department of Health and Aged Care and the Australian Institute of Health and Welfare (1999) state that interventions to impact upon depression are possible across the entire continuum of health care, from promotion, prevention and early intervention, through to treatment and maintenance care. While the effectiveness of many promotion and prevention activities is yet to be demonstrated, interventions that improve people's mental health literacy, optimistic outlook, resilience to life stress, and social support appear to be helpful (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999). It is here that parks and contact with nature could have the most impact, particularly in terms of facilitating a more optimistic or positive attitude, enhancing social support (via improvements in social capital), reducing stress and tension, and by providing opportunities for physical exercise.

Physical exercise has recently been proven to be as equally effective as medication in the treatment of depression in elderly people (Blumenthal et al., 1999). Blumenthal et al (1999) compared incidence of depression in three treatment groups where indoor aerobic exercise, antidepressants, or a combination of both were prescribed. After four months the clinical symptoms of approximately 65% of patients in all groups had reduced so significantly that they were no longer classified as clinically depressed (Blumenthal et al., 1999). The effects on depression of exercising outside in a nature-based setting, such as a park, compared to exercising indoors, however, are not known. Considering the positive mental health benefits simply arising from viewing nature discussed later in this report, it is likely that exercising in natural environments would be more effective than exercise carried out indoors. This requires further investigation.

Mental health is much more than the absence of mental illness: it is the realisation of one's potential and the capacity of individuals and groups to interact with one another and the environment in ways that promote wellbeing, and optimise development (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999). The positive influence that parks could have in terms of mental health presents many exciting opportunities for dovetailing the agendas of local and state governments in terms of health promotion and the use of parks. Further work, however, is required to determine the risk factors (environmental, social, biological and psychological) associated with mental illness as well as factors that act in a protective manner (e.g. social support, optimism). Additionally, environments such as parks that enhance mental health need to be investigated further in residential, educational, workplace, community and social settings (Commonwealth Department of Health and Aged Care & Australian Institute of Health and Welfare, 1999).

The Future of Public Health

An ecological (or holistic) approach to health encompasses the health of the whole individual and their environment, and in fact, the whole community. This approach is a logical way of managing health as it accounts for the interplay between all of the elements of health (i.e. mental, physical, environmental, spiritual, social), which can impact either negatively or positively on one another. Yet, more research is required to understand these interrelationships.

As stated by the Australian Institute of Health and Welfare (1998; 2000) national health information is needed by consumers and providers of health services, the

health industry, governments, and the community to enable informed decision-making and ensure effectiveness of treatments and interventions. National health information is any information that has national relevance and relates to the health of the whole population, the determinants of population health, health programs or services, and the relationship among these elements (Australian Institute of Health and Welfare, 1998). According to these criteria, the health benefits of contact with nature should be regarded as national health information and be thoroughly investigated. In particular, the health benefits of parks should have priority as parks constitute public-owned nature, and therefore have more significance nationally.

The initial evidence documenting the positive effects of nature on blood pressure, cholesterol, outlook on life and stress-reduction is sufficient to warrant incorporation into strategies for the National Health Priority Areas of Mental Problems and Disorders, and Cardiovascular Disease in particular. These two disease categories place a considerable health and economic burden on Australians. However, due to the positive effects of nature on overall health and wellbeing, the health benefits of contact with nature have relevance to all National Health Priority Areas. The extent to which parks can contribute to these areas awaits investigation.

Parks, Nature, & Health: What is the Connection?

The Context: Parks & 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 (Rohde & Kendle, 1997; Hamilton-Smith & Mercer, 1991). 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 & Kendle, 1997). At this time, it was also believed that exposure to nature fostered psychological wellbeing, 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 (Ulrich, 1993; Parsons, 1991).

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 & Kendle, 1997). Aside from this, parks are viewed as optional amenities rather than as necessary components of urban (as well as rural) infrastructure (Kaplan & Kaplan, 1989), not to mention the 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. 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 has shown that 'green nature' can reduce crime (Kuo, 2001), foster psychological wellbeing (Kaplan, 1992a; Kaplan & Kaplan, 1989), reduce stress (Ulrich et al., 1991b; Parsons, 1991), boost immunity (Parsons et al., 1998; Rohde & Kendle, 1994), enhance productivity (Tennessen & Cimprich, 1995), promote healing in psychiatric and other patients (Beck et al., 1986; Katcher & Beck, 1983), and is most likely essential for human development and long-term health and wellbeing (Driver et al., 1996).

Despite the prevailing emphasis on sport and leisure, park management agencies have long 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 wellbeing 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 wellbeing) through contact with nature are unrecognised.

As summarised 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 experiencing nature through parks may in fact be a vital component of human health that has for too long been ignored.

Parks, Public Health, & Wellbeing

The ecosystem is the fundamental capital on which all life is dependent (Suzuki, 1990). Because our water quality, air quality, economic vitality, and personal wellbeing 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 in Lewis, 1996). Baum (1999) states that healthy communities should provide varied and ample opportunities for their citizens to meet and interact in both formal and informal settings. Perhaps not surprisingly, parks constitute a significant portion of these settings.

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 (see section titled 'Understanding the Human-Nature Relationship') 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 (Burns, 1998; Kellert, 1997; Glendinning, 1995; Kellert & Wilson, 1993). 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 & Williams, 1996 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 (Gullone, 2000; Suzuki, 1997; Roszak et al., 1995; Glendinning, 1995). 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 (Gullone, 2000; Suzuki, 1997).

Frederick Law Olmstead, a famous 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). Olmstead (1870, in Lewis, 1996) also believed that parks improved health and vigour 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.

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 organisations of all sizes, from casual picnicking to events day 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 & Wellbeing

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 recognised 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 & Simpson, 1994). Parks are in an ideal position to address both these, and other aspects, of human health and wellbeing.

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 health and wellbeing benefits arising from contact with nature are virtually unknown. Although further research is required, the findings summarised in this report are sufficient to warrant the repositioning of parks in the minds of both the community and government as a positive health resource. Parks need recognition for the essential role they play in preserving, maintaining, and promoting the health of the 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 wellbeing 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 organisations 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 Government and the wider community that:

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

2 Educate Government and the wider community:

- As to how the above can be applied for improved health and wellbeing;
- 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 the 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 groundbreaking 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 multi-faceted and complex, arising from social and environmental conditions of the individual or community concerned (e.g. socio-economic status, access to basic health and educational services, family issues, social cohesion, and un-polluted environment).

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

Understanding the Human-Nature Relationship

Introduction

To realise the potential benefits to human health and wellbeing to be gained from interacting with nature, it is important to understand how and why humans relate to nature. The simplest explanation is that humans *are part of* nature, but more often than not, modern thinking views human beings as separate from, or even above nature, despite our obvious animal status. Although the concept of nature as a human construct is subject to debate and often leads to philosophical, 'chicken and egg' type arguments, these are not applicable here.

Generated from numerous disciplines exploring the human relationship with nature (including religion) are a number of theories to explain why humans interact with nature the way they do, the effect nature has on the human psyche, spirit, and wellbeing, the effect that humans have on the biosphere (both positive and negative), and how this in turn affects human society (particularly human health and wellbeing). This section briefly examines some of these theories, including those generated by biophilia, human ecology and landscape preferences, biohistory, and spirituality and religion.

The Biophilia Hypothesis

The Biophilia Hypothesis was developed by Harvard biologist Edward O. Wilson (Wilson, 1984) and has been expanded and debated by Wilson and numerous others (e.g. Gullone, 2000; Fawcett & Gullone, 2001; Takacs, 1996; Kellert, 1993; Kellert & Wilson, 1993; Wilson, 1993; Wilson, 1984). The Hypothesis states that early in human history there was an evolutionary advantage in knowing about the natural world, particularly information concerning plants and animals, and that this knowledge contributed to survival (Kellert, 1997). The essential aspect of biophilia, however, is that apart from knowledge, attraction and respect for nature also contributed to survival (Kellert, 1997). Kellert (1997) believes that an affiliation for nature addresses innate psychological needs such as intellectual capacity, emotional bonding, aesthetic attraction, creativity and imagination that

are a product of our evolution and otherwise not easy to satisfy. It is believed by some that these innate psychological and neurological needs are mismatched with the results of technological progress (Gullone, 2000; Suzuki, 1997; Lewis, 1996; Glendinning, 1995). This notion is not new, and has been expressed by authors as early as 4,600 years ago (Benson, 1976).

Advocates of biophilia believe that humans evolved in the company of other living organisms and in a matrix of conditions making human existence possible, and that we continue to rely intellectually, emotionally, physically, and spiritually on our affiliations with nature (Gullone, 2000; Suzuki, 1997; Kellert, 1997; 1993). According to the theory therefore, biophilia is inherent, part of the human species' evolutionary heritage, associated with increased chances of survival via genetic fitness, likely to increase the possibility for achieving meaning in life and personal fulfilment, and a self-interested basis for the care and conservation of nature (especially biodiversity) (Kellert & Wilson, 1993).

Although still in the process of being explored, the biophilia hypothesis is not a romanticised idealisation of nature (Kellert & Wilson, 1993). In fact, multidisciplinary teams of researchers have formed recently to support and explore this notion further (Takacs, 1996) and it is now gaining wider acceptance in the scientific community. Suzuki (1997) states that biophilia provides us with a conceptual framework through which human behaviour can be examined, and that it appears to be scientifically verifiable that human beings have a profound need for an intimate bond with the natural world.

Wilson (1984) and others (Gullone, 2000; Kellert, 1997) believe that modern city-dwelling humans still possess this innate tendency to associate with nature (although they admit, it is more evident in some people than others) and that in modern times it has the potential to give meaning to human life and development, and result in greater health and wellbeing. As Wilson (1993) states, human history began hundreds of thousands or millions of years ago with the evolution of the genus *Homo* and for more than 99 percent of our history we have lived totally involved with other organisms. Only in the very recent part of human history has the delusion arisen that people can flourish apart from the rest of the living world (Kellert, 1997; Wilson, 1992). Unfortunately, this could prove to be to our detriment. Satisfying our affinity with the natural world, however, may be an effective way to reverse this trend and enhance health (as well as being cheaper and freer of side effects than medication) (Frumkin, 2001). If so, then medicine and other professions will need to articulate a broad vision of environmental health, one that encompasses many disciplines (Frumkin, 2001) and adopts an holistic or ecological approach to health.

The modern environmental crisis has been viewed as symptomatic of a fundamental rupture of the human emotional and spiritual relationship with the natural world (Kellert & Wilson, 1993). Biophilia urges researchers to address the question of what will happen to the human psyche when the natural environment, such a defining part of human evolutionary experience, diminishes or disappears.

Human Ecology & Landscape preferences

The fact that there may be a biophilic basis for the adaptive responses humans have for certain natural stimuli is being used to explain both positive/approach (biophilic) responses and negative/avoidance (biophobic) responses that people

have to nature (Ulrich, 1993). It is likely that a predisposition in early humans for biophilic or biophobic responses to certain natural elements and settings contributed to their chance of survival (genetic fitness) (Ulrich, 1993). Examples of this include the virtually universal attraction humans have for the round faces and large eyes of infant animals (including humans), and the widespread fear of snakes and spiders (Ulrich, 1993; Kellert & Wilson, 1993).

In animals, choice of habitat exerts a powerful influence on survival and reproductive success, so behavioural mechanisms involved in habitat selection in humans would have been under strong selection pressure for millennia (Orians, 1986). In all organisms habitat selection presumably involves emotional responses to key features of the environment that produce 'positive' or 'negative' feelings leading to settling in or rejection in a particular place (Orians, 1986). Parsons (1991) suggests that the process of habitat selection is also associated with triggering certain physiological processes that influence the immune system and affect physical wellbeing. These physiological responses are concerned with the release of hormones, which can impair or enhance immunity and cardiovascular function (Parsons, 1991). A positive response to an environmental feature presumably also has a positive effect on physiological state, and a negative response has a negative effect. If so, the ability of a habitat to evoke such emotional states should evolve to be positively associated with survival and reproductive success of an organism in that habitat (Orians, 1986).

Modern urban environments differ considerably from the natural habitats that have been the home of humans for thousands of years. As humans have lived in cities for relatively few generations it is most likely that adaptation to this environment has not yet occurred, and humans are still dictated by habitat preferences formed by their ancestry (Kellert, 1997; Kellert & Wilson, 1993; Heerwagen & Orians, 1993). Therefore, there should be evidence that when given a choice, people prefer natural environments to urban ones. Newell (1997) studied the favourite places of subjects from Senegal, Ireland and the United States for cross-cultural comparison of environmental preferences. Participants were asked to identify their favourite place and give the reason it was chosen, the aim being to test whether people from different cultures share a preference for certain environments or features, including both built and natural environments. Sixty-one percent of participants identified a part of the natural environment as their favourite place, and across all countries the reasons given were 'relaxation' or 'to recharge', 'safety', or ecological reasons (Newell, 1997). This indicates that across the human population there is a preference for natural environments, regardless of nationality or culture. This clearly supports the hypothesis of biophilia (Newell, 1997). One example of cross-cultural preferences is the almost universal attraction humans have for water bodies (Williams, 1999; Kellert, 1997; Ulrich, 1993; Wilson, 1984). Ulrich (1993) proposes that this attraction has a genetic basis throughout our evolution, as it signalled the presence or likelihood of finding two survival necessities: water and food. Also, Williams (1999) believes that the general attraction Western cultures have for water has a healing or therapeutic meaning dating back to classical Greek and Roman times where water bodies were renowned for their healing powers. Regardless, evidence today for our attraction to water can be seen in the popularity (and real estate value) of houses built overlooking water, and the high volume of visitors that travel to beachside National Parks or those with rivers and lakes.

Parsons (1991) considers the stress associated with urban living a direct result of the unsuitability of urban environments as optimum habitat for humans. The features of urban living known to induce stress include crowding, noise, air pollution, and traffic. As mentioned, some authors believe that time spent solely

in urban environments is detrimental to human health and wellbeing (Stilgoe, 2001). Although they may not elicit a full-blown stress response once acclimatised to, these features could produce slight elevations in stress hormones which compromise immunocompetence and cardiovascular functioning, resulting in deleterious health effects over time (Rohde & Kendle, 1994; Parsons, 1991).

Biohistory

Stephen Boyden has merged human culture with natural history (or the study of nature, society, and history) in the field of 'biohistory', which reflects the broad sequence of events in the history of the biosphere and of human civilisation, from the beginning of life to the present day (Boyden, 1999; 1992). Among other aspects of evolution and human history, biohistory pays particular attention to the changing patterns of interplay between cultural and biophysical systems, or the interplay between culture and nature (Boyden, 1992). Biohistory considers human culture as an ecological force, due to its ability to shape the natural world and alter ecological processes. Boyden (1999) asserts that it is impossible to overstate the ecological and health potential of human beliefs, knowledge, and ideas.

Biohistory aims to improve understanding of the human situation by investigation of the human place in the natural world by examining interactions between biological and cultural processes (Boyden, 1992). Three important aspects identified by Boyden (1992) are:

- Humans are totally dependent for sustenance, health and wellbeing, and enjoyment of life on the biosphere, and all products of culture are negligible if biologically determined health requirements of the biosphere and of human bodies are not met;
- Every human situation from individuals to societies involves continual interplay between biological and cultural elements, the effects of which influence human health and wellbeing, and/or the health of ecosystems on which humans depend;
- Human culture has influenced biological processes on which humans depend, and of which they are a part, and although some of these influences are beneficial, others are detrimental and threaten the survival of the human species.

Aspects of culture that have detrimental effects on the environment and/or on human health and wellbeing are referred to as 'cultural maladaptations' (Boyden, 1999). Some of the central assumptions of western culture that result in cultural arrangements and human activities that are ecologically unsustainable are examples of cultural maladaptations. A more specific example is the current pattern of unsustainable resource/energy use and waste generation and its detrimental effects on the environment and human health. Although cultural maladaptations have been present throughout the history of human culture and civilisation, an essential difference between the past and the present is in the scale of the consequences (Boyden, 1999). The consequences of current cultural maladaptations for the biosphere and human health will potentially be catastrophic due to the degree and extent that humans now dominate the environment. Boyden (1999) believes that in order to divert catastrophe, significant cultural reform in the dominant cultures of global society is required: nature once again should be placed at the centre of human culture. In order to achieve this reform, Boyden (1992) states that biohistory should become part of

the educational curriculum, and should be used as a framework for integrative research on human situations (particularly health and wellbeing) to achieve wise policy formulation and decision-making.

Spirituality and Religion

A symposium held in 1990 titled 'Spirit and Nature: Religion, Ethics and the Environmental Crisis' brought together speakers from Buddhist, Christian, Islamic, Jewish, Native American, and liberal democratic traditions to discuss why the environmental crisis is fundamentally a moral and religious problem (Rockefeller & Elder, 1992). Its purpose was to foster ways of living that promote sustainable development, and to join scientific understanding with life-affirming, and world-affirming moral and religious values (Rockefeller & Elder, 1992). In the introduction to the published proceedings, Rockefeller and Elder (1992) state that the great issue for the 1990s and the twenty-first century is to channel the freedom and power modern humanity has acquired into new creative directions by spiritual awareness and a moral commitment that transcends, among other things, the dualism between human culture and nature.

Conversely, the original teachings of most world religions including Judaism, Christianity, Islam, and Hinduism are based on a deep reverence for nature, and a profound understanding of the relationship between humans and the natural world around them (Suzuki, 1997). For example, in classical Islamic thought, the Koran (or Quran) does not regard humans and nature, or the natural and the supernatural, as separate from one another but as an integral part of the same universe, 'sharing in its earthly life and also in its ultimate destiny' (Nasr, 1992). As Suzuki (1997) claims, however, most of these religions have changed their beliefs over time to consider the individual as an entity separate from family, clan, and nature. As a result, people are increasingly finding themselves alienated from their cultural and natural surroundings.

Every worldview of indigenous humans describes a universe in which everything is connected with everything else: stars, clouds, forests, oceans, and human beings are interconnected components of a single system in which nothing can exist in isolation (Suzuki, 1997). Indigenous cultures around the world regard nature as the realm of the spirit and the sacred; the natural world is seen as inherently spiritual, and humans are seen as an integral part of it (Metzner, 1995). From this perspective follows an attitude of respect, and an instinctive understanding of the need to consider future generations and the future health of our ecosystem. In other words, this perspective promotes a sustainable approach to life and health (Metzner, 1995).

A study on health promotion and illness prevention in Chinese elders revealed that the elders believed conformity with nature was the key to health and wellness (Yeou-Lan, 1996). This comes from the teachings of Taoism, Confucianism, and Buddhism, which emphasise harmony with nature, simplicity, and love as the way to achieve 'ultimate wellbeing' (Yeou-Lan, 1996). The study by Yeou-Lan (1996) defined nature as all things and events that surround an individual, such as air, mountains, plants, animals, people, society, and belief in a higher force, identified as 'Supreme Nature'. To conform with nature Chinese spirituality requires three interrelating categories: harmonising with the environment, following bliss, and 'listening to heaven' (Yeou-Lan, 1996). Harmonising with the environment is the process of allowing oneself to gain access to experience of, interact with, and be

aware of nature. In agreement with recent findings (e.g. by Parsons et al., 1998; Ulrich et al, 1991b; Kaplan & Kaplan, 1989), the Chinese elders believed that exposure to natural scenes gave them peace of mind, and promoted health and wellbeing (Yeou-Lan, 1996).

The 14th Dalai Lama refers to the Buddhist understanding of interdependence in order to understand the human relationship with nature (Gyatso, 1992). This principle essentially implies the interdependence of all life, matter, and consciousness, as well as the interdependence between causes and conditions (Gyatso, 1992). This is practised by the Australian Aborigines, who believe that each person is not only the offspring of their physical parents, but also that they are in some essential way a spirit of the land with an eternal and intimate connection with it (Kingsley, 1995 in Suzuki, 1997). This connectedness of people to country and kin to that which is outside of time is integral to the Aboriginal sense of wellbeing (Anderson, 1996), and it implies that when harm is done to the land or to people, the other is adversely affected.

Humans have forgotten how much the natural world means to them (Wilson, 1992). Yet, as Wilson (1992) states, signals abound that the loss of life's diversity endangers not just the body but also the spirit. If that much is true, the changes occurring now will visit harm on all generations to come (Wilson, 1992). It has been reported that modern people are experiencing a spiritual famine. Alcohol, food, and drug addictions are futile attempts to fill the spiritual emptiness that has arisen from loss of contact with nature (Canadian Parks/Recreation Association, 1997; Glendinning, 1995; Nasr, 1968). Along a similar line of thought, Metzner (1995) states that human beings have forgotten how to empathise and identify with non-human life, have lost respect for the mysterious, and lack humility in the relationship to the infinite complexities of the natural world (Metzner, 1995). Yet, the evidence irrefutably demonstrates that both the cultural and natural history of the human species is entirely based upon an intimate relationship with, understanding of, and respect for the natural world. Recognising and respecting worldviews and spiritual practices that are based on oneness with nature, and searching for similarities in the dominant religions is, according to Metzner (1995) perhaps the best antidote to 'the West's fixation on the life-destroying disassociation between spirit and nature'. Similarly, Nasr (1992) states that to rediscover the spirit in oneself and then see its reflection in nature is essential to reverse the humanity's current destructive attitude towards the natural environment.

There is no doubt that nature can evoke powerful responses in people, and can sometimes be responsible for life-changing experiences. Katcher and Beck (1987, page 175) describe one such response: '...[it] generated a feeling of being intact, complete, as if the solid distinct otherness of that natural world had acted as a mirror reflecting myself back to myself. That sense of being intact and comfortable in myself crystallized precisely at the moment when the sense of being a separate self was lost in contemplation'. A second example concerns The Stein Valley Festival held in Lytton, British Columbia, which celebrates the physical and spiritual values of the Stein Valley. When two young Indian men were asked independently describe what the Stein meant to them they both described the valley in terms of a church or a cathedral where they could go to find spiritual sustenance and restoration (Suzuki, 1990).

A small study conducted on a random sample of residents in New York also demonstrates the spiritual effect that nature can have on people. The study by Mausner (1996) revealed that respondents viewed themselves as separate from nature, but felt 'compelled to re-insert themselves'. The author interpreted this

yearning for reintegration with nature as a reaction to the separation from the natural world deeply ingrained in Western culture (Mausner, 1996). When the respondents were in natural environments, they claimed to be more perceptive of their surroundings, to have an increased awareness of themselves, to feel at one with the world, and simultaneously detached from the people in their everyday lives (Mausner, 1996). Mausner (1996) concluded that the experience of being in nature appeared to give people the opportunity to transcend the fundamental dualism of people vs. nature. To understand the human relationship with nature by looking to traditions of spirituality and religion confirms that by harming nature, humans harm themselves.

Health Benefits of Nature: The Evidence

Introduction

The belief that contact with nature fosters psychological wellbeing and reduces the stress of urban living seems to be as old as urbanisation itself (Ulrich, 1993; Ulrich & Parsons, 1992), 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 (after Frumkin, 2001).

Note: We have included here only those human relationships with animals and plants where no economic benefit is to be gained from the relationship (so the interactions between farmers and their stock and/or crops are not included, nor are other commercial nature-based industries). This is not to say that the same benefits as described here may not also arise from these relationships. However, there have been virtually no studies examining the potential health benefits of people working with nature in these industries and as the majority are now large-scale operations; whatever benefits may be gained in terms of health are likely to be overshadowed by the impersonal nature of any interactions that may occur.

Viewing Nature

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 to people and is an effective means of relieving stress and improving wellbeing (Leather et al., 1998; Lewis, 1996; Kaplan, 1992a). 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 to 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 digestive illnesses and headaches, and with fewer sick calls overall by prisoners (Moore, 1981). Natural views can result in better performance in attention demanding tasks (Tennessen & Cimprich, 1995). Tennessen & Cimprich (1995) gave university students a test and compared scores of students who had natural views to those that had 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, in Lewis, 1996) compared the preferences of office workers for visual décor (i.e. photographs or posters) in windowed and window-less 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 window-less offices contained no buildings or human-made artefacts at all (Heerwagen & Orians, 1986 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 & Kaplan, 1989). Workers with a view of trees and flowers felt that their jobs were less stressful and they 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 & Kaplan, 1989). A similar study found that a view of natural elements (trees and other vegetation) buffered the negative impact of job stress on intention to quit (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 immunisation 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 immunisation to subsequent stress than participants who viewed artifact-dominated drives (Parsons et al., 1998).

The beneficial effects of viewing nature on psychological state, and in particular mood affect were examined by Ulrich (1979, 1982, in Rohde & Kendle, 1994). Ulrich (1979, in Rohde & 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 & 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 & 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 occasions to observe, and much of this observation occurs, not when people are in nature itself, but are looking out a window (Kaplan & 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 S. Kaplan (1987b, in Kaplan & Kaplan, 1989) that 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 (see below). The reason for this is that the act of viewing or observing nature does not require directed or focussed 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 summarised 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 and hospitals. 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, have 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 (based for example on 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 (Nettleton, 1992; Furnass, 1979).

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, in 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 Square 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 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 head' by going for a walk in a park and emphasises 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).

The importance of the natural environment is common in all cultures and nationalities. By bringing people in contact with one another, nature could be used as means of breaking down racial barriers, or facilitating cooperation and communication between different groups. Some of the benefits of contact with nature for migrants were described by Wong (1997, in Rohde & Kendle, 1997) as:

- Increased sense of identity and ownership of the country they live in;
- Sense of integration rather than isolation;
- A reunion with nature (i.e. particularly important for first generation immigrants who have rural backgrounds);
- The reawakening of a sense of possibility;
- Restoration and a relief from daily struggles;
- Empowerment, skill development and the enabling of opportunity to participate in caring for the environment.

Being in natural environments invokes a sense of 'oneness' with nature and the universe, and can lead to transcendental experiences (Rohde & 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.

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 in Lewis, 1999). 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 revitalised 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 (Rohde & Kendle, 1994; Furnass, 1979), 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).

The Kaplans (Kaplan, 1995; 1992b; Kaplan, 1992a; Kaplan & Kaplan, 1990; 1989) 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) (Hartig et al., 1991; Kaplan & Kaplan, 1989). For a more detailed discussion, see Hartig et al (1991) or Kaplan & Kaplan (1989). Parks are ideal for restorative experiences due to their ability to satisfy the four elements described above (Kaplan, 1995; 1992b; Kaplan, 1992a; Kaplan & Kaplan, 1990; 1989). 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 the walk in a park.

Leisure & Recreation

Although many benefits arise from the act of recreation itself, whether it be a hobby or playing a team sport, the concern here is with the types of recreation that occur in natural or semi-natural settings and the particular benefits that may arise from carrying out the activity in those settings.

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 & Cole, 2001). Associated with this is a rise in the number of people pursuing non-consumptive nature-related recreational activities, such as birdwatching. This is often referred to as 'wildlife-watching' or 'watchable-wildlife' and includes observing, feeding, or photographing wildlife (U.S. 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 is 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, increase competence and productivity, will eventually become socially accepted and actively encouraged (S. Kaplan 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 as used in wilderness therapy (see section titled 'Health Benefits of Nature: in Practice').

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. Survey work has shown that nature is important to people, and numbers of people seeking nature-related recreation overseas is increasing. Trends for Australia are unknown at this time. Some of the benefits of being in nature in a park context are presented in Table 2.

Contact with Plants

Gardens and Gardening

According to some authors, there is no other nature-based activity that is so widely shared by people across the globe than gardening (Lewis, 1996; Kaplan & Kaplan, 1989). There is now a growing body of empirical evidence that gardening has many psychological as well as physical health benefits. One of the most passionate advocates for the psychological health benefits of plants is Charles Lewis. Lewis (Lewis, 1996; 1992; 1990) believes that vegetation, whether part of a garden, park or wilderness setting has great potential for healing. According to Lewis (1990), when humans first view it, a park or garden is a visual experience. However, the image is then transmitted from the eye to the brain where it is decoded, recognised, and can be transferred to a deeper level of being (Lewis, 1990).

It has been demonstrated that plants heal via two modes: *observational* mode and *participatory* mode (Lewis, 1990). Observational mode occurs when viewing vegetation in a garden or wilderness, but the observer has no responsibility for its care (e.g. in a park or wilderness area). Participatory mode occurs when an individual is responsible for nurturing a plant or garden (or even wilderness), and it is through their efforts that the plant/s thrive. Lewis (1990) has stated that the act of nurturing and being responsible for plants at a more intimate level is a more intense experience than that gained through observation alone, however, both observation and participation produce wellbeing (Lewis, 1990). Interestingly, a questionnaire sent to members of the American Horticultural Society and readers of an organic gardening magazine found that the most beneficial aspects of gardening cited by respondents were peacefulness and tranquillity, rather than the tangible benefits of food or flower production (Kaplan & Kaplan, 1989).

The Kaplan's notion of restorative experiences was an idea that emerged from their work in wilderness research, but they found that it is also relevant to the experience of gardening (Kaplan & Kaplan, 1990). As noted previously, restorative experiences are based on the fact that mental effort, stress, and the demand of everyday living cause fatigue and affect one's capacity to concentrate, or direct attention to one particular task (Kaplan & Kaplan, 1990). A restorative environment fosters recovery from this state. It requires four elements: fascination, a sense of being away, extent or scope, and compatibility with an individual's inclinations (Kaplan & Kaplan, 1989). These four factors are found in natural places such as parks and gardens, or in the act of gardening itself.

The importance of the health benefits of gardening in relation to parks and nature is apparent when considering environment groups like Friends of Parks. These groups regularly volunteer their time to restore and rehabilitate parks by planting, watering, and weeding among other activities. Although the health of people who have private gardens has been investigated somewhat, there is nothing known about the potential health benefits from membership and participation in an environment group.

Community gardens

The positive effects of gardening can be observed in the transformation of whole neighbourhoods that occurs with the simple act of establishing a community garden. An annual gardening competition in a public housing area of New York, along with many other urban community garden schemes in impoverished neighbourhoods, have been found to increase community cohesion, reduce graffiti and violence, and give residents a more positive attitude about themselves and their neighbourhood, resulting in personal and neighbourhood transformation (Lewis, 1996; 1992; 1990). Community gardens provide opportunities for socialising with, and learning from, fellow gardeners and residents that may normally be unavailable. This aids community cohesion by dissolving prejudices about race, and economic or educational status (Lewis, 1996; 1990).

Similar benefits may result from membership of Friends of Parks or other environment groups where members actively restore the natural environment by weeding, replanting, rubbish removal, and interpretation. It is likely that they gain a sense of ownership of their local environment (or park) and are provided with the opportunity to learn from, and socialise with, other members of the community. In fact, Friends groups have much potential to satisfy the components of wellbeing described by Furnass (1996). These components include: satisfactory human relationships, meaningful occupation, opportunities for contact with nature, creative expression, and making a positive contribution to human society (Furnass, 1996). Membership of Friends groups would also enhance social capital. As mentioned, however, no work has been carried out in this area.

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 & Kaplan, 1989). Even the knowledge that there is nature nearby (e.g. parks) has proven to have important effects on residents' satisfaction with their neighbourhood, despite the fact that

they may not make use of it regularly (Kaplan & Kaplan, 1989). Kaplan and Kaplan (1989) refer to this as 'conceptual' involvement in nature, and it stems 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 that higher neighbourhood and life satisfaction was found among individuals who more regularly pursued gardening and other nature-related activities (such as birdwatching) than those who did not have such interests (Frey, 1981 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 & Kaplan, 1989).

Indoor plants are known to improve office air quality, and have been found to improve productivity and enhance the overall mood in the office environment (Larsen et al., 1998; Randall et al., 1992). Along similar lines, Kuo and Sullivan (2001) examined the effect of nearby trees and grassy areas on residents of public housing. By comparing neighbourhoods with vegetation close by to those without vegetation, they found that residents living in greener areas experienced lower levels of fear, fewer incivilities, less aggressive and violent behaviour, and lower crime rates (Kuo & Sullivan, 2001).

At the University of Washington in the US, researchers have been studying the attitudes of consumers and retailers to urban trees and the effects they have on consumer behaviour. They found streetscapes that make plants and trees a feature have a positive effect on consumer behaviour and actually attract consumers and tourists (Wolf, 1999; 1998a; 1998b; 1998c). Trees seem to promote quality, and increase the appeal of a district. For example, consumers claimed they would be willing to pay more for parking in a well-landscaped business district (Wolf, 1998c). Tree-lined sidewalks had higher ratings of amenity and comfort compared to non-shaded streets, and shops in these areas were seen to have better quality products than those in streets barren of vegetation (Wolf, 1998c).

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, 1995; 1992b; Kaplan & Kaplan, 1990).

Failure to recognise, and to maximise, the benefits available from nearby plants, parks, and other natural settings could have serious consequences (Kaplan & 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 optional amenities rather than as essential components of urban design (Kaplan & Kaplan, 1989).

Plants and nearby vegetation can have profound effects on individuals, small groups, or even entire neighbourhoods. Some of the health benefits of interacting with plants include the ability to facilitate healing in the elderly and mentally disadvantaged, improving mental capacity and productivity of people working in offices, improving job and life satisfaction of residents, attracting consumers and tourists to shopping districts, and aiding community cohesion and identity. Some of these benefits in a park context are summarised in Table 2. Environment groups, such as Friends of Parks, are likely to receive a number of health benefits from working with the natural environment, including: a sense of achievement

and ownership; the opportunity to learn from, and socialise with, other members of the community (enhancing social capital); multiple physical health benefits; and the opportunity to work with plants and animals. Yet, no research has investigated the potential health benefits of membership of an environment group. Finally, it has also been suggested that via their effects on mental health, plants and nearby vegetation can indirectly improve physical health (e.g. by reducing the frequency of headaches and improving health and wellbeing overall). This too, requires further investigation.

Contact with Animals

Companion Animals

Although pets are common in hunter-gatherer societies, pet-keeping as a phenomenon has grown exponentially with the increasing urbanisation of Western society (National Institutes of Health, 1987). In Australia, 60% of households own a pet (Beck & Katcher, 1996; McHarg et al., 1995), with similar figures reported in the US (National Institutes of Health, 1987; Beck, 1983). Although overlooked by the scientific community for many years, people's relationship with companion animals has generated much research, particularly in the last two decades. Numerous health benefits from keeping pets have been discovered, particularly in the elderly whose social groups often slowly breakdown as age increases. It has been suggested that companion animals satisfy the need for intimacy, nurturance, and contact with nature that is excluded by urban living (Bustad, 1996; National Institutes of Health, 1987; Katcher & Beck, 1987; Beck, 1983). The following is a discussion of some of the main studies investigating the health benefits of companion animals.

Apart from owning or caring for a pet, studies have demonstrated that the sight of a pet alone can lower stress (Katcher et al., 1983; Friedmann et al., 1983b). Research using aquariums has shown that watching fish significantly lowered blood pressure and heart rate, and produced a greater state of relaxation (in groups of subjects with normal and high blood pressure) than watching an empty tank, or staring at a blank wall (Katcher et al., 1983). Watching the fish also increased the subjects' ability to cope with subsequent stress. Looking at or stroking a pet can also lower blood pressure and make people feel more relaxed (Friedmann et al., 1983b). Friedmann et al (1983b) examined the effect of an unknown, but friendly dog on children's blood pressure and heart rate while resting compared to the same measures taken while the children were reading aloud (a measure used to elevate stress levels). They hypothesised that the presence of the animal could make the situation and/or the experimenter appear less threatening thereby reducing physiological responses. During the experiment, the dog was present in the room but not interacting with the children. Their findings showed the presence of a pet was associated with lower blood pressure and heart rate both while the children were resting and while reading aloud (Friedmann et al., 1983b).

Serpell (1991) studied the health of new pet owners over ten months. He found that pet owners reported a highly significant reduction in minor health problems during the first month following pet acquisition and this effect was sustained in

dog owners for the ten months of the study. The reduction of minor health problems in dog owners indicates that the health benefits of pets may be long-term, although this has yet to be investigated (Serpell, 1991). The reason for the extended health benefits observed in dog owners is most likely due to the greater level of companionship dogs provide compared to other types of pet (Serpell, 1991; 1990).

The companionship provided by pets may partly explain the finding that pet owners have increased likelihood of survival after surgery (Friedmann & Thomas, 1995; Friedmann et al., 1980). Friedmann and Thomas (1995) found that both pet ownership and social support are significant predictors of survival, independent of the effect of other psychosocial factors and physiologic status, one year after acute myocardial infarction (coronary artery disease). They found that the beneficial effects of pet ownership on survival were independent of marital status or living situation. Interestingly, again dog owners had a higher survival rate than owners of other types of pet (Friedmann & Thomas, 1995).

As mentioned, one of the main reasons for increased survival rate of post-operative elderly patients who have pets is the companionship provided by their animals (Friedmann & Thomas, 1995). Elderly people, whether recovering from surgery or not, often become isolated as their social relationships and activity levels breakdown, resulting in depression. Depression is a complex state that can affect recovery rates as well as survival (Friedmann et al., 1980). Companionship and social affiliation, however, have been shown to have positive health effects and are reliable predictors of survival after coronary surgery (Friedmann & Thomas, 1995; Friedmann et al., 1980).

Anderson et al (1992) examined the risk factors for cardiovascular disease, and compared pet owners to non-owners at the Baker Institute, part of the Alfred Hospital in Melbourne. They looked at blood pressure, plasma cholesterol, and triglyceride values in approximately 5000 patients. They found that pet owners had significantly lower systolic blood pressure, plasma cholesterol and plasma triglycerides than non-owners; that is, pet owners had lower levels of accepted risk factors for cardiovascular disease (Anderson et al., 1992). These findings could not be explained by lifestyle and health factors such as cigarette smoking, diet, body mass index, or socio-economic status (Anderson et al., 1992).

An important aspect of pet keeping is that it provides people with an opportunity to nurture, something that is becoming rare in human society. In fact, in no time during history have humans become so devoid of healthy interaction with each other, and with their environment (Bustad, 1996; Katcher & Beck, 1987). Some authors believe that this has serious, and perhaps unknown, effects on health (Bustad, 1996; Katcher & Beck, 1987). Bustad (1996) states that deprivation of nurturing opportunities has resulted in increased stress, depression, loneliness, as well as serious overall challenges to health and wellbeing. It is probable that there are distinct physiological and emotional changes that occur in the act of nurturing that have a positive effect on health (Katcher & Beck, 1987). To date, however, there is very little information on nurturing and the possible benefits to human health and wellbeing.

Against the background of the fast pace of modern living pets offer protection against stress and change by their constant nature and the positive feelings and actions they evoke in people (Beck & Katcher, 1996; Katcher & Beck, 1983). Human relationships with animals complement other human relationships (as they do many other aspects of people's lives), and are not a substitute for them, as has been suggested in the past (Katcher & Beck, 1987; Manning, 1983). In fact, most

pet owners have been found to live in intact families containing both children and pets, and are not single and childless as once assumed (Beck & Katcher, 1996; Katcher & Beck, 1987; Beck, 1983).

It is now widely recognised 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 wellbeing than non-pet owners (Rowan & Beck, 1994; Straede & Gates, 1993). On the strength of this evidence, Rowan & Beck (1994) and others (Frumkin, 2001; Fawcett & Gullone, 2001; Bustad, 1996; National Institutes of Health, 1987; Katcher & Beck, 1987) 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 (Rowan & Beck, 1994). 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 & 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 emphasise the opportunity that parks provide for observing or encountering wildlife, particularly in those protected area parks that preserve the habitat of native fauna.

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 organised 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 (Dolphin Research Institute Inc., 2002; Linnell, 2002).

Furthermore, in a recent national US survey on recreational interests (the National Survey on Recreation and the Environment conducted in 1995) birdwatching 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 like Hervey Bay, Queensland. The enormous increase in wildlife-based ecotourism is indicative of the desire humans have to interact with nature, particularly animals. In fact, Lonely Planet Publications (publishers of popular international travel guides) have just published a series of guidebooks specifically for watching wildlife in a number of countries, including Australia (Lonely Planet, 2000).

A recent phenomenon of urbanisation is the number of people who go to sometimes-extraordinary lengths to feed urban wildlife in their neighbourhood. Although there is limited research on this topic to date, preliminary studies suggest that people engage in wildlife feeding not only to benefit the animals involved, but also because they themselves derive considerable benefit from the interaction. One small investigative study by Howard & Jones (2000) found that the primary reasons respondents fed wildlife were to make up for human damage to the environment, that they wanted to be near nature, and that the animals improved their quality of life. Some unpublished data also suggests that up to 38% of households in Brisbane (Queensland) feed wildlife (Thomas & Jones, 1998 in Howard & Jones, 2000).

Wildlife carers have contact with wildlife on a daily basis. These people rescue, rehabilitate, and relocate native fauna, which is probably the most intimate, intensive, and expensive interaction that the majority of people have with wildlife (Tribe & Brown, 2000). Although wildlife rescue often encounters controversy (in that many rehabilitated wildlife released back into the wild do not survive (Tribe & Brown, 2000)), some recent work has begun investigating the potential benefits carers may gain from their experiences with wild animals (P. Brown personal communication.). It suggests that even though carers are aware that by attempting to care for native animals they may actually do more harm than good, many feel that they themselves benefit greatly from the interaction and it significantly enhances their quality of life.

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 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 parks 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.

The human affiliation for living nature is most obvious through people's relationships with animals, particularly pets. Yet, whether it is a close relationship experienced through pet ownership, or a profound encounter with an animal in the wild, there is little doubt that animals can positively influence human health and wellbeing.

Conclusion

Modern life is becoming more stressful each decade, reflected in the increasing rates of stress-related illnesses (e.g. depression, chronic fatigue), violence, and aggression. Many authors believe that this is partly because humans have severed connections with nature, in particular, those connections to other life forms. It begs the question, how much will human health, wellbeing, and quality of life deteriorate before current attitudes and lifestyles change?

Contact with the natural world (through active interaction or even passive contemplation) has the ability to affect human health and wellbeing in countless positive ways. As the evidence clearly demonstrates, there are immediate and

long-term favourable, emotional, and physiological changes proceeding from contact with nature through animals, gardens, natural landscapes, and wilderness. Much of this contact is made accessible through parks. Knowledge of the potential benefits is not complete, however, and this is coupled with a lack of awareness about the health and wellbeing benefits arising from contact with nature in governments and the general community.

Yet, some authors anticipate that allowing people to interact with nature (such as spending time in parks during working hours), to reduce tension as well as increasing competence and productivity, will eventually become socially accepted and actively encouraged as an effective way of promoting health and wellbeing, and a means of enhancing quality of life.

Health Benefit	Key References	Park Example
Interaction: Viewing Nature		
Improves concentration, remedies mental fatigue, improves psychological health (particularly emotional and cognitive aspects), and positively affects mood state	(Kaplan, 1995; Rohde & Kendle, 1994; Ulrich et al., 1991b; Kaplan & Kaplan, 1989)	Parks, such as Tarra Bulga National Park or Sugarloaf Reservoir, are ideal spots for picnicking as a way to view the natural environment to renew body and mind
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)	(Leather et al., 1998; Lewis, 1996; Rohde & Kendle, 1994; Kaplan, 1992a)	Apart from active exploration, many parks can be experienced from within a vehicle, particularly those with scenic drives such as Macedon Regional Park or Angahook-Lorne State Park
When exposed to scenes of natural environments subjects recover faster and are more resistant to subsequent stress, which also is likely to boost immunity	(Parsons et al., 1998)	All parks provide ready views of nature and parks like Albert Park and Yarra Bend Park are especially important in urban areas for stress release and wellbeing
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)	(Ulrich et al., 1991b)	Parks near places of high stress such as prisons, hospitals, and nursing homes most likely provide many more benefits beyond purely aesthetic ones
Viewing nature improves performance in attention demanding tasks	(Tennessen & Cimprich, 1995)	Natural views are provided in urban areas courtesy of local, neighbourhood, and regional parks (many of which are managed by local as well as State government)
Viewing nature aids recovery from mental fatigue (attention restoration) and encourages reflection by requiring involuntary attention	(Herzog et al., 1997; Kaplan, 1995; 1992b; Hartig et al., 1991; Kaplan & Kaplan 1989; Furnass, 1979)	Some parks can provide close up views of nature to aid in attention restoration, while others like Port Campbell provide views of wide, open spaces encouraging a fresh perspective on life
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	(Kaplan & Kaplan, 1989)	As well as providing a natural view, parks in urban areas are used by office workers to take a break from being indoors, to breath fresh air, view nature, and absorb sunshine

Health Benefit	Key References	Park Example
Trees nearby: decrease levels of fear, incivilities, and violence amongst residents; decrease crime rates in public housing; and improve the life satisfaction of residents	(Kuo & Sullivan, 2001; Kuo, 2001)	The positive effects of vegetation on communities could have an impact on future park planning and park placement. Parks preserve and maintain essential habitat and ecosystems, (including trees and other vegetation)
Interaction: Being in Nature		
Natural play settings reduce the severity of symptoms of children diagnosed with Attention Deficit Disorder (ADD) and improve concentration	(Taylor et al., 2001)	Parks within urban areas such as Yarra Bend Park or Wattle Park are easily accessible to educational groups such as schools, and family or community organisations
Natural surroundings assist cognitive functioning in children	(Wells, 2000)	Parks have special significance to schools, kindergartens, and childcare centres with limited green space
Wilderness areas provide spiritual inspiration or enable people to gain a fresh perspective on life	(Cumes, 1998; Cordell et al., 1998; Martin, 1996; Kaplan & Kaplan, 1989)	Parks of intact wilderness, such as Grampians National Park or Bay of Islands Coastal Park, can provide spiritual inspiration for local, interstate, and international visitors
Therapy in a wilderness setting heals emotional and psychological conditions and can aid those recovering from substance abuse and violence	(Russell et al., 1999; Crisp & O'Donnell, 1998; Crisp & Aunger, 1998; Bennett et al., 1997; Byers, 1979)	Large, rugged National Parks such as Wilson's Promontory are ideal for wilderness therapy excursions and Outward Bound programs where there can be many physical and mental challenges to overcome, as well as much to inspire
Outward Bound and similar programs use wilderness challenges to boost self-confidence and self-esteem	(Cumes, 1998; Furnass, 1979)	Many National Parks have minimal visitor infrastructure which is ideal for wilderness challenges or for those seeking adventure
Interaction: Observing Plants and Gardens, or Gardening		
Community gardens increase community cohesion, reduce graffiti and violence and enhance self-image of residents	(Lewis, 1996; Reuter & Reuter, 1992; Lewis, 1992; 1990)	The most significant aspect of community gardens is the sense of ownership residents' gain. This could also apply to Friends of Parks groups who care for their local park
Gardening and gardens help people to feel tranquil and at peace	(Butterfield & Relf, 1992)	Sculptured gardens such as the National Rhododendron Gardens enable people of any mobility or ability access to plants and flowers
In habitat restoration people see a metaphor for their own personal transformation and growth, enhancing psychological wellbeing	(Shapiro, 1995)	Many of the Friends of Parks groups regularly carry out habitat restoration via planting and weeding workshops
Gardens improve psychological wellbeing, provide environmental stimulation, a means of self-expression, physical exercise, and social interaction for residents of retirement communities	(Browne, 1992)	Retirement communities without gardens can readily access urban parks and gardens whether highly manicured (e.g. National Rhododendron Gardens) or more natural parks (e.g. Yarra Bend Park)

Health Benefit	Key References	Park Example
Residents who have nature nearby or regularly pursue nature-related activities (e.g. gardening, birdwatching) have greater neighbourhood satisfaction, overall health and life satisfaction than residents who do not	(Frey, 1981 in Kaplan & Kaplan, 1989; Kaplan & Kaplan, 1989)	Many residents in urban areas are in close proximity to a park, yet as housing density increases, increased pressure will be placed on existing parklands
Interaction: Observing/Encountering animals (pets and wildlife)		
Pets provide companionship, and an opportunity to nurture and express intimacy, as well as facilitating social networks	(Newby, 1997; Bustad, 1996; Cusack, 1988; Katcher & Beck, 1987; Cusack & Smith, 1984; Messent, 1983; Bustad & Hines, 1983)	Parks that permit dogs such as Albert Park and Jells Park enable dog owners to interact with their pet (on and off the leash) and to socialise with people from all age groups (including owners and non-owners)
The sight of, or touching a pet can reduce stress, decrease blood pressure and heart rate	(Katcher et al., 1983; Friedmann et al., 1983b)	Even watching or patting a pet that does not belong to you, such as may be encountered in parks, can have beneficial effects on health
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)	(Straede & Gates, 1993; Serpell, 1991)	Parks are one of the few places outside the home that owners can freely interact with their pet and socialise with other pet owners
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	(Anderson et al., 1992)	The health of an ageing population is a pressing problem. Pet ownership may be responsible for motivating people to visit parks where they can reap many other health benefits and alleviate isolation
Observing native animals, having them nearby, or interacting with them improves quality of life	(Tribe & Brown, 2000; Howard & Jones, 2000)	Native animals are found in all parks, from urban ones like St Kilda Pier (Little Penguins and Native Water Rats), to wilderness parks like Mount Buffalo National Park (Swamp Wallabies, Gang Gang Cockatoos, etc.).

Table 2: Some Known Health Benefits of Contact with Nature in a Park Context

Health Benefits of Nature: In Practice

Introduction

Further evidence for the positive effects on health and wellbeing from contact with nature is found in some unique forms of therapy based on the human relationship with nature. These forms of treatment, discussed in the proceeding pages, 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. Is primarily concerned with the fundamental alienation of humans from nature and the effects on human health (Scull, 2001; Gullone, 2000; Burns, 1998). 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 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 (Burns, 1998; Martin, 1996; Knudtson & Suzuki, 1994; Orr, 1993; Rockefeller & Elder, 1992; Suzuki, 1990) (refer to earlier section on Spirituality and Religion).

As echoed by researchers in other fields, ecopsychologists believe that disconnection from nature has a heavy cost in impaired health and increased stress (Scull, 2001; Gullone, 2000; Burns, 1998; Glendinning, 1995; Katcher & Beck, 1987). 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 (Scull, 2001; Roszak et al., 1995; Levinson, 1969). 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, 1983; 1969).

Many western psychologists are now readily adopting ecopsychology as a form of treatment or are subscribing to its views (Burns, 1998; Roszak et al., 1995; Hillman, 1995; Durning, 1995). 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). Australian psychologist George Burns (1998) reviewed a selection of nature-based interventions. The work cited by Burns (1998) 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 recognised that any exposure to nature, such as spending time with plants and animals, or going to a park, can have positive benefits (Scull, 2001; Cohen, 2000). 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, or are likely to in the future, assist the patient with achieving a therapeutic goal. Burns (1998) 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 persists a lack of scientific research in this area, like wilderness therapy and outdoor adventure therapy, anecdotal evidence suggests that ecopsychology is particularly successful in treating stress-related illness. Unlike wilderness therapy and outdoor education, however, ecopsychological treatment is believed to have more lasting positive benefits than ordinary outdoor recreation (Scull, 2001).

Stainbrook (1973, in Lewis, 1996) states that an over-urbanised, dirty environment, and a lack of natural surroundings confirms the negative self-appraisal a person may have developed through other negative contacts with society. Since self-esteem is the keystone to emotional wellbeing, a poor self-appraisal, among other factors, determines how one treats his/her surroundings and how destructive he or she will be towards themselves and others (Stainbrook, 1973 in Lewis, 1996). If the self were expanded to include the natural world, behaviour 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' (Roszak, 1995; Orr, 1993). 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 (Gullone, 2000), the full impacts of which are yet to be realised.

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 Attention Deficit Disorder (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 were 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 (that 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 childcare centres, kindergartens, and schools.

Wilderness Experience & Wilderness Therapy

Challenges presented by wilderness are used in wilderness experience programs such as Outward Bound and other wilderness therapy programs 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, 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, emphasises 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 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 (Beringer, 1999; Crisp & O'Donnell, 1998). 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 participant's lives are long-term. One commonly reported outcome of wilderness therapy is that self perceptions and perceptions about one's relationship to the natural world change (Kaplan & Kaplan, 1989). This can assist people in finding meaning or higher purpose in life.

Some of the most important wilderness areas worldwide are contained in parks. Those parks that have minimum facilities or infrastructure are ideal settings for

wilderness therapy or wilderness adventure. For example, many National Parks and all of the Wilderness parks in Victoria (like Big Desert and Wabba Wilderness Park) although designed for conservation, are also ideal for self-reliant recreation and the use of wilderness for therapeutic purposes.

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 (Frumkin, 2001; Lewis, 1996; Relf, 1992). The restorative and therapeutic aspects of gardening are being used in a wide range of settings including hospitals, geriatric centres, drug rehabilitation centres, 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 wellbeing. Five benefits were identified: psychological wellbeing, environmental stimulation, self-expression and personalisation, motivators for physical exercise, social interaction and networking (Browne, 1992).

One study undertaken at a prison found that inmates regularly damaged buildings and/or were aggressive towards prison staff, but never destroyed plants that they themselves had grown (Lewis, 1996; 1990). Lewis (1996; 1990) reports that the plants seemed to have a calming effect on even the most hardened inmates, and were used for therapy, rehabilitation and job training. Kaplan and Kaplan (1989) noted that working with plants gave inmates responsibility, and they experienced a sense of accomplishment that notably enhanced self-esteem.

Horticultural therapy is based on our emotional responses to nature, in this case plants. 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). 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 the elderly. However, there are health benefits to be bestowed on all age and ability groups in the act of gardening. 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). It is likely that many of the benefits of horticultural therapy are experienced by members of Friends of Parks and other environment groups. Although, as mentioned, the health of these groups has not yet been investigated

Animal Assisted Therapy

Animal assisted therapy (AAT) is viewed as one of the most recent additions to holistic medicine, although it is not a new phenomenon (Beck & Katcher, 1996; National Institutes of Health, 1987). For example, animals were used as treatment in Ancient Greek times, and more recently in 1792 at the York Retreat in London, where they were used to 'enhance the humanity of the emotionally ill' (Beck & Katcher, 1996) and to reduce the use of drugs and restraints (National Institutes of Health, 1987).

Animals are effective tools in treatment situations as they help make the therapist and/or therapy appear less threatening (Beck et al., 1986). One study found that people pictured with animals are perceived as friendlier, happier, bolder, and less tense (Lockwood, 1983). In a study with psychiatric patients, Beck et al (1986) matched two groups of patients for group therapy but provided one group with four caged finches. The group with the caged birds had improved attendance rates for group meetings and greater participation of patients in group activities. In contact with animals patients have an immediate emotional reaction drawing them out of themselves and making them more receptive to therapy and the therapist (Beck & Katcher, 1996). Professional therapists have come to value animals as therapeutic aids in treating simple problems such as loneliness in the elderly, as well as more complex disorders such as severe autism in children. In fact, animals are being used in therapeutic ways in many human institutions, from nursing homes to prisons (Beck & Katcher, 1996).

At Purdue University in the US, researcher Nancy Edwards found that the presence of brightly coloured fish in aquariums improved the behaviour and eating habits of people with Alzheimer's disease (Gaidos, 1999). She found that after four weeks exposure to the fish tanks, disruptive behaviour by patients decreased and they appeared more relaxed. Dr Edwards felt the use of fish tanks in nursing homes may help reduce the need for nutritional supplements and medication required to calm disruptive patients (Gaidos, 1999). That animals may reduce the costs of caring for elderly people has also been suggested elsewhere (Bustad & Hines, 1983). Bustad and Hines (1983) state that companion animals could potentially permit the elderly to live independently in their homes longer, to experience better health, and reduce dependence on drugs.

Apart from this type of AAT, dogs and birds are being used to assist in the rehabilitation of prisoners (Adams, 2001; Roberts, 1999; Pfankuch, 1999; Washington State Correctional Center for Women, 1998). There are now several prison pet-placement programs operating both overseas (e.g. the 'Birdmen' of Pollsmoor Prison in South Africa) (Adams, 2001) and in Australia (e.g. Women inmates training guide dogs at the Northfield Prison Complex) (Beck & Katcher, 1996). It is thought that by caring for a living creature and assuming responsibility for its needs, inmates regain their compassion. This can aid in their recovery for release back into society.

In other AAT scenarios, animals can help patients who have become suddenly disabled through accident or injury in the transition to a different way of life (that is often more restrictive) and can provide a new meaning or focus for life (McCulloch, 1983). This is achieved by giving the patient a sense of dignity and self worth, as well as a source of unconditional love (McCulloch, 1983). As McCulloch (1983) states, if animal assisted therapy offers hope for relief of human suffering, it is our professional obligation to explore every possible avenue for its use.

Conclusion

The success of nature-based therapy in treating patients who are severely physically and/or mentally unwell is indicative of the powerful effect that nature can have on the psychological, spiritual, and physical aspects of human health and wellbeing. It implies that there are benefits to be gained from nature across the board, to all humans, regardless of their health status. Furthermore, the ability of these programs to encourage healing through a holistic approach and achieve success where other, more traditional, methods have failed should be enough to prompt further research in this area and encourage modern medicine to adopt a more holistic attitude towards human health and wellbeing.

Principal Health Outcomes

Benefits to Individual/Personal Health & Wellbeing

Below is a summary of the main benefits to the health and wellbeing of individuals that arise from contact with nature. (As the components of health are interrelated, there is some overlap).

Physical

- Contact with nature provides a sense of wellbeing and positively influences immunity and cardiovascular function;
- Contact with nature reduces the magnitude of the physiological response to stress and enhances the ability to cope with, and recover from, stressful episodes by inducing a state of relaxation;
- Some positive physiological effects of viewing nature include reduction of heart rate, muscle tension, blood pressure, and skin conductance;
- Viewing or touching a pet or animals is effective in reducing stress, decreasing blood pressure and heart rate;
- Pet ownership can reduce the risk factors for heart disease (systolic blood pressure, plasma cholesterol, plasma triglycerides) independently of lifestyle and other health factors;
- Views of nature reduce self-reports of illnesses, such as headaches and digestive disorders, in people who live or work in confined, indoor spaces (such as offices and prisons);
- Nurturing or caring for living organisms may have distinct beneficial physiological (and emotional) responses that improve overall health and wellbeing;
- Pet ownership and interacting with plants (i.e. via gardening) encourages individuals to undertake physical exercise;

Mental

- Contact with nature improves self-awareness, self-esteem, self-concept, and positively affects mood state, which have positive flow-on effects to physiological state (such as boosting immunity);
- Contact with nature reduces the incidence of negative feelings such as anger, fear, anxiety, and frustration, and induces peace of mind;
- Contact with nature reduces the magnitude of the psychological response to stress and enhances the ability to cope with and recover from stressful episodes, by inducing a state of relaxation;
- Contact with nature is effective in alleviating the symptoms of anxiety, depression, and psychosomatic illness (including irritability, restlessness, insomnia, tension, headaches, and indigestion);
- Pet-ownership can improve mental health by providing companionship (regardless of overall health, socio-economic status, or physical exercise);
- Caring for animals allows people to express intimacy and the opportunity to nurture other living organisms;
- Views of nature improve psychological health, particularly emotional and cognitive aspects, and natural surroundings have been demonstrated to assist cognitive functioning in children (including reducing the symptoms of ADD (attention deficit disorder));
- Contact with nature, or having nature nearby, improves quality of life, work satisfaction, and the coping ability of residents in urban areas;
- Contact with wilderness can develop leadership abilities, which translate positively into other areas of life;
- Natural environments foster a state of reflection and reverie, enabling one to gain perspective on life or provide new direction, and create an awareness of one's surroundings;
- Views of nature improve performance in attention demanding tasks and can restore the capacity for concentration/attention when it is lost.

Spiritual

- Nature provides spiritual inspiration, enabling people to gain a different or deeper perspective on life by the realisation that they are part of something larger and universal;
- Contact with nature can inspire feelings of peace, oneness, connectedness, and strength;
- Nature is important to all peoples/cultures across the globe, in 'developed' and 'undeveloped' nations, for providing spiritual inspiration;
- Contemplation of nature can inspire a sense of freedom, reverence, encourage humility, prompt introspection and reflection on personal values, and lead to spiritual growth or enlightenment;
- Spirituality arising from contact with nature can reduce psychosis, substance abuse, and heal those suffering from violence and/or injury.

Social

- Interacting with nature or participating in nature-based activities in one's local neighbourhood (such as Friends of Parks groups) can promote a sense of community, foster a sense of belonging or sense of place, and enhance social ties/relationships;
- Pet ownership can foster social relationships through contact with other pet owners (or park users), thereby expanding social networks;
- Enhancing the social relationships of individuals in a community increases social capital;
- Knowing that nature (particularly animals) is nearby improves quality of life and neighbourhood satisfaction of residents;
- Contact with nature reduces the stresses associated with urban living (such as crowding, noise, pollution, etc).

Benefits to Community Health & Wellbeing

Below is a summary of the main benefits to the health and wellbeing of communities that arise from contact with nature. (As the components of health are interrelated, there is some overlap).

Social

- Natural environments foster social capital within neighbourhoods by providing settings for groups and families to meet formally and informally for recreational or leisure pursuits;
- Spin-off benefits to social capital arise from civic environmentalism, such as Friends of Parks and other environment groups, including civic engagement and social connectedness;
- Residents who have nature nearby, or who regularly pursue nature related activities, have greater neighbourhood satisfaction, and have better overall health than residents who do not;
- Nature in high density urban living can reduce vandalism, violence, crime rates, ease racial tension or prejudices, and result in neighbourhood and personal transformation;
- Contact with nature can foster a sense of identity and ownership, and provide a sense of integration rather than isolation for newly arrived migrants, as well as enhance skills and knowledge in local communities;
- Horticultural therapy and animal-assisted therapy programs in prisons (via contact with plants or animals) can reduce aggression and vandalism in inmates, provide job training, and enhance self-esteem, facilitating re-entry into society.

Health Promotion

- Parks and nature are an affordable, non-elitist, highly accessible means of improving community health that can help people reach their full potential;
- Contact with nature via parks encourages social ties and enhances community cohesion, which have known benefits to health and wellbeing (particularly mental health);
- Interaction with nature encourages a holistic/ecological approach to health, giving people a sense of control over their own health and wellbeing which may lead to less reliance on health care services;
- Nature and parks promote healing in patients suffering from severe trauma, cancer, depression, anxiety, and other life-altering afflictions;

Savings/contribution to the Public Health System

- Views of nature from hospitals and other care facilities (such as nursing homes) have the potential to reduce recovery time (hence number of days spent in hospital), reduce the quantities of medication required to treat patients, and reduce incidences of post-operative surgery in patients;
- Views of nature from detention centres and prisons have the potential to reduce the incidence of illness (particularly stress related illness) in inmates, also reducing health care costs in prisons;
- Promoting contact with nature as a means of improving and maintaining health and wellbeing can potentially reduce the burden of disease on the current health care system (for example, for pet ownership alone preliminary estimates of savings to the health care system are between AU\$790 million to AU\$1.5 billion annually (Headey & Anderson, 1995)).

Other Economic Benefits

- Contact with nature improves job satisfaction, overall health, and reduces job stress in the workforce as well as reducing number of sick days and employee absences;
- Parks and natural features attract businesses to communities;
- Trees in urban streets attract consumers and tourists to business districts, and are seen as promoting quality and increasing appeal;
- Tourism is the third largest industry, and one of the fastest growing, worldwide, with growth occurring particularly in wilderness or nature-based tourism;
- Parks and nature tourism generate employment in regional areas;
- Significant natural features, parks, and gardens increase real estate values;

Policy Outcomes

Parks, Nature, & 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 organisations to pursue the triple bottom line, before it was popularised as such. As it has become established in the business community, however, park organisations 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 wellbeing.

Human health and wellbeing 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 Professor Stephen Boyden (Boyden, 1999; 1996; 1992) 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 principles of an ecological theory of health put into practice. It entails enhancing individual and community health, wellbeing, 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 includes 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, it 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:

1 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 focussed on:

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

2 Encourage & Facilitate the Repositioning of Parks

- a) By **communicating** to governments and the wider community that:
 - Contact with nature is essential to human health and wellbeing;
 - Through providing access to nature, parks improve and maintain human health and wellbeing (both at an individual and community level);
 - By improving and maintaining human health and wellbeing, 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 wellbeing that is beneficial to individuals and society, as well as the environment;
 - 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 wellbeing.
- b) By **educating** government departments, health professionals, and the wider community:
 - As to how the above can be applied for improved health and wellbeing;
 - 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.
- c) 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;
 - By continued exploration of the benefits to individuals and communities to gained from contact with, and preservation of, nature through parks and other reserves;
 - By fostering park management practices which support community engagement with nature.

3 Develop Ways of Integrating Parks & Nature into Public Health

- a) 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;
- b) Health promotion agencies have already recognised the need for innovative, 'upstream' approaches to health and wellbeing, and are seeking potential alliances/opportunities to this end;

- c) 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;
- d) The use of parks and nature to improve health and wellbeing is supported by The Ottawa Charter for Health Promotion (World Health Organization, 1986) which calls 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.

Appendix A – Key Assertions

The following is a summary of some key assertions about the health benefits of interacting with nature based on current knowledge, as a guide for further research.

Evidence Key A = Anecdotal, T = Theoretical, E = Empirical

What the Research Demonstrates With Certainty

assertion	Evidence A T E	Key Reference/s
There are some known beneficial physiological effects that occur when humans encounter, observe or otherwise positively interact with animals, plants, landscapes, or wilderness	• • •	(Frumkin, 2001; Beck & Katcher, 1996; Rohde & Kendle, 1994; Ulrich et al., 1991b; Parsons, 1991; Friedmann et al., 1983b; Friedmann et al., 1983a;)
Natural environments, such as parks, foster recovery from mental fatigue and are restorative	• • •	(Kaplan, 1995; Hartig et al., 1991; Kaplan & Kaplan, 1990; Kaplan & Kaplan, 1989; Furnass, 1979)
There are established methods of nature-based therapy (including wilderness, horticultural, and animal-assisted therapy among others) that have success healing patients who previously had not responded to treatment	• • •	(Fawcett & Gullone, 2001; Crisp & O'Donnell, 1998; Lewis, 1996; Russell et al., 1996; Beck et al., 1986; Katcher & Beck, 1983; Levinson, 1969)
When given a choice people prefer natural environments (particularly those with water features, large old trees, intact vegetation or minimal human influence) to urban ones, regardless of nationality or culture	• •	(Herzog et al, 2000; Newell, 1997; Parsons, 1991)
The majority of places that people consider favourite or restorative are natural places, and being in these places is recuperative	• • •	(Herzog et al, 2000; Herzog et al, 1997; Korpela & Hartig, 1996; Rohde & Kendle, 1994; Kaplan & Kaplan, 1989)

assertion	Evidence A T E	Key Reference/s
People have a more positive outlook on life and higher life satisfaction when in proximity to nature (particularly in urban areas)	• • •	(Kuo, 2001; Kuo & Sullivan, 2001; Kaplan, 1992a; Leather et al., 1998; Lewis, 1996; Kaplan & Kaplan, 1989)
The majority of health problems society will face, now and in the future, are likely to be stress-related illnesses, mental health problems, and cardiovascular health problems	• • •	(Commonwealth Dept of Health & Aged Care & Australian Institute of Health & Welfare, 1999; Australian Institute of Health & Welfare, 1998)
Social capital is decreasing and is likely to continue to decline	• • •	(Putnam, 1995)
Exposure to natural environments, such as parks, enhances the ability to cope with and recover from stress, cope with subsequent stress, and recover from illness and injury	• • •	(Parsons, 1991; Ulrich et al., 1991b; Ulrich, 1984)
Observing nature can restore concentration and improve productivity	• • •	(Taylor, et al., 2001; Leather et al., 1998; Tennessen & Cimprich, 1995)
Having nature in close proximity (e.g. urban or National Parks), or just knowing it exists, is important to people regardless of whether they are regular 'users' of it	• • •	(Cordell et al., 1998; Kaplan & Kaplan, 1989)

What the Research Demonstrates With Promise

assertion	Evidence A T E	Key Reference/s
People have an innate affiliation with nature that enhances health, and humans rely on nature intellectually, emotionally, physically and spiritually	• •	(Fawcett & Gullone, 2001; Frumkin, 2001; Roszak et al., 1995; Kellert & Wilson, 1993; Katcher & Beck, 1987; Wilson, 1984)
There may be a genetic basis to human affiliation with, and attraction for, nature	• •	(Kellert, 1997; Newell, 1997; Kellert & Wilson, 1993)
Separation from nature via modern living is detrimental to human development, health, and wellbeing	• •	(Frumkin, 2001; Scull, 2001; Stilgoe, 2001; Kellert, 1997; Katcher & Beck, 1987)
Regular contact with nature, such as provided by parks, is required for mental health	•	(Roszak, 1995; Levinson, 1983; Levinson, 1969)
There are psychological and physiological benefits to health from the act of nurturing living things (including plants, animals, and humans)	• •	(Kellert, 1997; Bustad, 1996; Wilson, 1993; Lewis, 1992; Katcher & Beck, 1987)
Nurturing is an essential part of human development, and lack of opportunities to nurture may be detrimental to health and wellbeing	• •	(Kellert, 1997; Bustad, 1996; Wilson, 1993; Lewis, 1992; Katcher & Beck, 1987)
Too much artificial stimulation and lack of exposure to natural environments, such as parks, can cause exhaustion and reduce vitality	•	(Stilgoe, 2001; Parsons, 1991; Katcher & Beck, 1987; Furnass, 1979; Stainbrook, 1973, in Lewis, 1996)

What Research is Required

assertion	Evidence A T E	Key Reference/s
Theoretical and/or empirical evidence on whether human health is affected by lack of opportunities to experience nature	•	(Frumkin, 2001; Stilgoe, 2001; Kellert, 1997; Katcher & Beck, 1987)
Theoretical and/or empirical evidence on whether the destruction of the natural environment directly affects human health and wellbeing and is linked to the prevalence of mental disorders in modern society	•	(Roszak et al., 1995)
Anecdotal and/or empirical evidence on the importance of parks to the community in terms of health and the actual health benefits people derive from parks	•	(Kickbusch, 1989b)
Theoretical and/or empirical evidence on the role that natural environments (natural capital) play in facilitating social and human capital, and the outcome/s in terms of health	•	(Frumkin, 2001; Putnam, 1995)
Empirical evidence on the role of nature in wilderness and adventure therapy	• •	(Crisp & O'Donnell, 1998; Crisp & Auger, 1998)
Evidence on whether the health and life satisfaction of some population groups (e.g. Friends of Parks groups, park volunteers, wildlife feeders and carers, or birdwatchers) is greater than others, where those groups have regular contact with nature/wilderness via parks		No information discovered at this time
Evidence on the extent, nature and process of the impact of nature and parks in maintaining psychological health		No information discovered at this time
Evidence on the extent, nature and process of the impact of nature and parks on quality of life (and happiness)		No information discovered at this time
Evidence on whether exercise carried out in natural settings (parks) has greater health benefits than indoor exercise		No information discovered at this time

Appendix B - Potential Research & Funding Opportunities

A Potential Research Projects

Broad scale investigations

- Obtain evidence on the extent, nature, and process of the impact of nature and parks in maintaining/enhancing psychological health and quality of life of urban and rural residents;
- Obtain evidence of whether the health and life satisfaction of some population groups is greater than others where those groups have regular contact with nature/wilderness via parks (for example, Friends of Parks groups, parks volunteers, wildlife feeders/carers, wildlife watchers, etc.);
- Obtain evidence on whether specific nature based intervention programs can improve health and wellbeing of target groups (for example, exercise programs carried outside in natural environments for individuals suffering from depression; wilderness or nature based-therapy for young people suffering from substance misuse, or at risk of substance misuse) and/or be used to address existing and emerging health problems;
- Explore opportunities for using the health and wellbeing benefits of contact with nature as a preventive health measure;
- Investigate how parks and nature can be better utilised to value-add to public health in rural and urban communities; and determine what strategies are needed to optimise the human health and wellbeing benefits of contact with parks and nature.

Specific studies — Developed

1 Living High But Healthy: Impacts of Access to Nature on Health, Wellbeing, & Effective Functioning of Inner City High-rise Residents

This project will be based on the administration of psychometrically validated self-report measures, with a sample of residents in a selection of high-rise housing

developments in inner Melbourne and inner Sydney. The sample will include four distinct groups in each city: (i) owner-occupiers/private renters of high-rise apartments with good access to 'green spaces'; (ii) owner-occupiers/private renters of high-rise apartments with poor access to 'green spaces'; (iii) public housing tenants in high-rise apartments with good access to 'green spaces'; and (iv) public housing tenants in high-rise apartments with poor access to 'green spaces'. It is hypothesised that the two groups with good access to 'green spaces' will report better effectiveness regarding everyday functioning and higher levels of wellbeing (e.g. higher self-reported quality of life, higher levels of self-efficacy). Qualitative data will be collected through face-to-face semi-structured interviews with a sub-sample of residents, randomly selected within each sample group.

Objectives:

- To describe and measure access to natural environments (green spaces) for a sample of residents in inner city high-rise developments in Melbourne and Sydney;
- To measure the health, wellbeing and effective functioning of a sample of residents in inner high-rise developments in Melbourne and Sydney;
- To identify any associations between differing levels of access to natural environments and the health, wellbeing and effective functioning within the sample group;
- To describe and measure those associations;
- To contribute to the growth of knowledge in Australia in relation to the links between access to nature and health, wellbeing and effective functioning;
- To build on an enable comparison with previous research of a similar nature conducted overseas;
- To contribute to the development of an overall theoretical framework for explaining and exploring the impacts of access to nature and natural environments on human health, wellbeing and effective functioning.

Potential Funding Source: Linkage-Project Application (APAI PhD Scholarship) (submitted application to Round One, May, 2002)

Research Partners:

- Parks Victoria
- Lort Smith Animal Hospital, Victoria
- Centennial Parks, Sydney
- Parramatta Park Trust, New South Wales
- City of Melbourne, Victoria

2 Healthy Parks, Healthy People: Exploring the Role of Friends Groups in Fostering Health & Wellbeing through Social Capital and Contact with Nature

The project will use a large scale mailed questionnaire and follow-up focus groups to compare the health and wellbeing of four distinct samples: people who have contact with nature in a park setting through their involvement in formal 'Friends of Parks' groups; people who have no contact with nature through parks and do not belong to any community groups; people who have contact with nature through parks but do not belong to any community groups; and people who have no contact with nature through parks but who do belong to community groups other than 'Friends' groups. By generating empirical data on links between social

capital, contact with nature in a park setting, and the combination of the two, this project will provide governments, park managers, and health service providers with information which will enable future planning, policymaking and service delivery to maximise human health and wellbeing.

Objectives:

- To identify, describe and measure any correlations between contact with nature in a park setting, and health and wellbeing;
- To identify, describe and measure any correlations between participation in community groups, and health and wellbeing;
- To identify, describe and measure any correlations between civic environmentalism through 'friends of parks' groups, and health and wellbeing; and
- To identify and describe ways in which the lessons learned about the health benefits arising from contact with nature in a park setting and/or participation in community groups can be applied to 'upstream' measures to maximise public health and wellbeing.

Potential Funding Source: Vic Health PhD Scholarship or Linkage-Project Application

Potential Research Partners:

- Parks Victoria
- Local City Council such as City of Greater Geelong
- Local Health Service such as Barwon Southwest Health

3 Wilderness/Nature Based Therapy for Kids Involved in/or at Risk of Substance Misuse (Chroming)

This project will comprise undertaking an intervention study, working with young people who either are involved in chroming or are at risk of involvement in chroming (to commence after an initial pilot investigation). Potentially, a comparative study could be undertaken: one stream involving contact with nature through companion animals, and the other involving contact with nature in a park/wilderness environment. There appears to be little, if any, empirical work of this nature being undertaken in Australia, but such programs are more common (but still not common) overseas. Programs such as Outward Bound tend to be one-off events, and one of the criticisms of such programs has been that they tend to lack any ongoing monitoring for long-term effects.

Potential Funding Source: The Alcohol Education and Rehabilitation Foundation, via Berry Street Inc. (in progress at time of publication)

Potential Research Partners:

- Berry Street Inc.
- Parks Victoria
- Lort Smith Animal Hospital
- Children's Protection Society
- Monash University

Specific studies — Under Development

1 Wildlife Watching

Investigate the global phenomenon of wildlife watching. In the US, 63 million people involved, and US\$27 billion spent per annum on wildlife watching. Investigate why people are attracted to wildlife viewing. This study could investigate the potential benefits of wildlife watching, determine if there are any positive effects on health and wellbeing, and examine social benefits/outcomes (if any).

Perhaps collect data via questionnaire; self-reports of wellbeing, life satisfaction, quality of life. Use Bird Observers Club or Victorian National Parks Association (VNPA) as a focus group/case study.

Address questions such as: what benefits to people feel they gain from the interaction; when do they watch wildlife; why do they choose to do so; how do they watch wildlife (travel, expense, in groups, or alone); where do they go (parks, own backyard); who are they (demographics).

2 Nature Based Intervention

A controlled study undertaken over a three year period to examine the effects on health and wellbeing of a selected target group of exposure to nature on a regular basis. This could involve not only an examination of the effects of exposure to parks and nature on social and human capital (and thereby the effects on health and wellbeing) but also the direct health benefits of that exposure. It may be appropriate to use older people as the target group since this is a growing sector of the population.

Potential Treatments:

- Viewing nature indoors/simulated nature – looking at prescribed images of nature (trees, landscapes, etc for a set period each day (e.g. 20 minutes). In own home i.e. indoors, non-park setting
- Being in nature – viewing elements of nature in a park setting (e.g. 20 minutes sitting in a park watching birds, trees, clouds, etc.)
- Control – doing a hobby never tried before (e.g. 20 minutes doing something that is non-physical, non-social and indoors?)

Potential variables to measure: blood pressure; heart rate; doctor visits (number over study period); self reports of health (daily diary?); start of study report on life satisfaction, quality of life, stress levels; end report on life satisfaction, quality of life, stress levels; measure affect (i.e. mood state) each day; other variables (see literature).

3 Effects on depression of exercising outdoors compared to exercise indoors, and medication

This study would be based on a similar US study which compared the effects of medication and exercise on patients diagnosed with major depression. Collect data from a range of treatments and compare results between treatments (e.g. treatment one: patients receive medication only; treatment two: patients receive outdoor exercise only; treatment three: patients receive indoor exercise only; treatment four patients receive a combination of exercise outdoors and medication; treatment five: patients receive a combination of indoor exercise and medication). Potential link in with Beyond Blue initiative established in Melbourne Victoria to address depression.

4 **Health and Wellbeing of Office Workers with Differing Access to Green Nature**

Compare health and wellbeing of those who work with natural environments (e.g. Parks Victoria staff), those who have some access to green nature (e.g. seek green nature during their lunch hour, and/or on weekends), and those with no access/interest in green nature.

B Funding – General Information

ARC Discovery Program

The Australian Research Council Discovery Program is one of two strands of the National Competitive Grants Scheme. The Discovery Program embraces large grants and fellowships from one to five years in duration, with costs from AU\$20,000 to \$500,000 per annum. Individual researchers or research teams are eligible to apply. The objectives of funding under the Discovery program include supporting excellent fundamental research, expanding Australia's knowledge base and research capabilities, and encouraging research training in high quality research environments. Discovery projects involve either a basic research grant for personnel and project costs (other than fellowship salaries) and/or provide funding for a number of fellowship types (for those holding a PhD or equivalent research doctorate). These include Australian Postdoctoral Fellowships (APD), Australian Research Fellowships (ARF), Queen Elizabeth II Fellowships (QEII), or an Australian Professorial Fellowship (APF). Funding for fellowships is provided on a full-time basis, with 50% to 100% of salary funded (according to ARC notional salary rates), depending on the applicant's tenure at a higher education institution. ARF, QEII, and APF awards are normally based on a five-year tenure, whereas APD awards have tenure of three years.

Round One due 10 May, 2002

Round Two due 6 December, 2002

ARC Linkage Program

The Australian Research Council Linkage Program is the second strand of the National Competitive Grants Scheme. The Linkage Program is concerned with encouraging long-collaborative research between academic institutions and industry partners (a feature of the previous SPIRT, IREX, and RIEFP schemes) and is available to individual researchers or research teams. Linkage funding is for research with direct relevance to industry, involving industry collaboration and investment throughout the project with the overall aim of acquiring new knowledge or pursuing projects that involve risk or innovation. The aim is to apply advanced knowledge to problems, or to provide opportunities to obtain national economic or social benefits. Funding is provided from one to five years, ranging from AU\$20,000 to \$500,000 per year.

The Linkage Program funds several different types of projects. These include larger collaborative research programs between individual researchers or a team of researchers where personnel and project costs are funded. Large research programs can be funded with or without one or more Australian Postgraduate Award Industry Scholarships (APAI) for PhD/Masters degree student/s, or an

Australian Postdoctoral Fellowships Industry (APDI) Award involving an industry fellow (early career researchers with recent PhD qualifications and less than three years postdoctoral experience). APAI's and APDI's are funded full-time for up to three years. Other projects funded include collaborative research programs between individual researchers (or teams of researchers) that provide funds solely for an APAI scholarship for a PhD/Masters degree student funded full-time for up to three years; or collaborative research programs between individual researchers (or teams of researchers) involving an APDI award for an industry fellow, funded full-time for three years.

For Linkage projects involving a PhD/Masters student, industry partners are required to contribute AU\$5000 in cash, plus AU\$5,000 in-kind contribution for each year of the scholarship.

Round One due 10 May, 2002

Round Two due 6 December, 2002

The Alcohol Education and Rehabilitation Foundation – Demonstration Grants

Through an alliance with Victoria's largest child welfare agency, Berry Street Inc., applications are sought from the Alcohol Education and Rehabilitation Foundation. This organisation offers funding up to four years, with no specific upper limit for individual projects.

Due 30th June, 2002

VicHealth — Victorian Health Promotion Agency

VicHealth offers funding for Public health PhD Research Scholarships. Funding is available for three years. The amount is set at the standard NHRMC (National Health and Medical Research Council) rate of AU\$17,267 pa tax exempt (plus \$1050 maintenance, \$525 conference travel, and \$860 thesis allowance). Preference is given to applicants proposing to work in the priority areas of tobacco control, mental health, physical activity, healthy eating, and substance misuse (alcohol and illicit drugs). Short-term and long-term project funding is also available by application.

Due 31st August, 2002

Deakin University Faculty Grants

This Faculty scheme aims to encourage grant participation and seed new projects. The scheme is competitive and gives priority to funding proposals that are likely to lead to the development of a research program with the capacity to generate external research income, from grants and/or research tenders.

From AU\$5,000 to \$20,000 for one year only.

Due April, 2003

HEEP — Higher Education Equity Program

Established to provide grants to institutions to pilot projects to increase participation in higher education by under-represented groups of students, and if successful, for those projects to be incorporated into on-going activities. HEEP is

aimed at increasing the access, participation, success, and retention of students in the following groups: people who have a disability; people from a non-English speaking background; women in non-traditional areas of study; people from rural and isolated areas; and people from a low socio-economic background. HEEP funding is allocated by Department of Education, Science and Training (DEST) to all universities.

Due May, 2003

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