



## Review

## Linking landscape and health: The recurring theme

Catharine Ward Thompson\*

OPENspace Research Centre, Edinburgh College of Art, Lauriston Place, Edinburgh EH3 9DF, UK

## ARTICLE INFO

## Article history:

Received 19 April 2010  
 Received in revised form  
 23 September 2010  
 Accepted 8 October 2010  
 Available online 10 December 2010

## Keywords:

History  
 Health and wellbeing  
 Landscape  
 Nature  
 Green space

## ABSTRACT

This paper traces evidence of the influence of the landscape on people's health, from ancient times to the present day, noting how access to nature and attractive green spaces has been a recurring theme in descriptions of therapeutic environments and associated healthy lifestyles. It describes how the theme of health in the picturesque debates of eighteenth century England (including such concepts as 'active curiosity') was taken up and developed in arguments for the nineteenth century urban park movement in England and North America. Recent theories on the mechanisms behind health benefits of nature and access to landscape are compared with claims made in the nineteenth century and earlier. The importance of access to the landscape appears to be as relevant as ever in the context of modern urban lifestyles but the need for better evidence and understanding remains.

© 2010 Elsevier B.V. All rights reserved.

## Contents

|  |     |
|--|-----|
| 1. Introduction .....  | 187 |
| 2. Early landscapes of health .....                          | 188 |
| 3. Healthy landscapes in ancient Greece and Rome .....       | 188 |
| 4. Mediaeval landscapes of health .....                      | 188 |
| 5. The English Landscape Garden and 'active curiosity' ..... | 189 |
| 6. The urban parks movement .....                            | 189 |
| 7. North American parks and health .....                     | 191 |
| 8. Health, nature and the landscape in modern society .....  | 192 |
| 9. The health challenge in the 21st century .....            | 193 |
| 10. Conclusion .....   | 194 |
| References .....   | 194 |

## 1. Introduction

The current burgeoning of research interest in links between landscape and health, between engagement with the natural world and people's physical and mental wellbeing (Bird, 2004, 2007; Hartig, 2007; Maas et al., 2009; Ward Thompson et al., 2010), reflects a renewal of policy interest in salutogenic environments. Concerns in the developed world over increasing levels of obesity, type II diabetes and poor cardiovascular health have led to an interest in landscapes that might encourage people to be more physically active (Bull et al., 2010). Added to this is a concern over poor mental health, particularly in young people (Collishaw et al.,

2004), and interest in environments that might relieve depression or stress (Hartig, 2008). As the relationship between physical and mental health is complex and interrelated, so the interest in environments spans those that appear to encourage physically healthy behaviour and those that appear to mitigate or prevent mental ill-health (Sugiyama et al., 2008). This paper takes such themes and looks back in history to understand how links between landscape and health have been described, conceptualised and explained in the past. The focus is on positive associations between health and landscape, rather than on environmental hazards and pollutants or on negative experiences of wilderness and nature, and it explores the role of the landscape as a salutogenic context, not simply as a therapeutic place for those who are ill. Thus, the aims go beyond the important and often well-documented benefits of therapeutic gardens in hospital contexts (Cooper Marcus and Barnes, 1999)

\* Tel.: +44 131 221 6176; fax: +44 131 221 6157.  
 E-mail address: [c.ward-thompson@eca.ac.uk](mailto:c.ward-thompson@eca.ac.uk)

to explore engagement with the natural environment in garden, park and wider landscape as a means to support healthy behaviours and responses. The interest is as much in how experience within the landscape can act as a prophylactic against illness as in how it may moderate causes or mitigate effects of ill-health, mental or physical.

While standards of evidence demanded for public policy and practice today are different from those of previous centuries, people have identified connections between the landscape and health throughout history, and attempted to understand the mechanisms and reasons behind this relationship. In some instances, there is a surprisingly close resonance between theories articulated centuries ago and those of current researchers in environment, landscape and health. This paper traces a history of enquiry into the relationship between landscape and health from a Western perspective. It takes the ancient and classical world as its starting point for exploring links between gardens and landscape design, the nineteenth century urban park movement in Europe and North America, and current notions of wellbeing through engagement with nature and the landscape.

## 2. Early landscapes of health

The old Persian word for enclosed park or orchard, *pairi-daeza*, provides the derivation of the word 'paradise', a heavenly garden (the Biblical garden of Eden), intimately associated with the ideal landscape, the landscape of life, in numerous cultures and religions from the earliest of records (Hobhouse, 2004). A cuneiform tablet from ancient Sumer described the "paradise peace" that reigns in Dilmun, where "human beings are untouched by illness" (Delumeau, 1995, p. 5) and, once water supply is assured, Dilmun is transformed into a garden of fruit trees, edible plants, and flowers. The epic of Gilgamesh similarly describes a paradise garden of the gods to which Gilgamesh eventually gains access: a mountain covered with cedars, a fruitful garden of the gods, the source of rivers, and the plant that gives life. It is a reflection of the symbolic as well as practical importance of such notions that Mesopotamian temples had, at the top of their ziggurats, a sanctuary grove of trees (Delumeau, 1995). The hanging gardens of Babylon, one of the Wonders of the Ancient World, were a supreme example of such a 'paradise'. Biblical and Koranic descriptions reiterate the theme: a garden containing the four rivers of life and abundant vegetation. A recurring characteristic in these descriptions of paradise is the healthful nature of the garden, supporting human beings in every way, providing delight to every sense. They go beyond descriptions of landscapes that merely provide physical sustenance – food and water – to places important for all aspects of human wellbeing and that appear to resonate throughout history as an ideal kind of landscape for living.

## 3. Healthy landscapes in ancient Greece and Rome

A Greek version of the ideal garden of afterlife was described as the Happy Isles or the Elysian Fields. The *Aeneid* gives a Greco-Roman picture of the Elysian Fields – an earthly paradise in the lower world:

"They came to the pleasant places, the delightful grassy turf of the Fortunate Groves, and the homes of the blessed. Here freer air and radiant light clothe the plain, and these have their own sun, and their own stars. Some exercise their bodies in a grassy gymnasium, compete in sports and wrestle on the yellow sand: others tread out the steps of a dance, and sing songs. . . . among the fragrant groves of laurel, out of which the Eridanus's broad river

flows through the woodlands to the world above". (Kline, 2002, Book VI: 628–678).

Such texts provide a description of the ideal landscape as a setting for a range of activities that might equally be prescribed for healthy living today, from running and sport to dance, singing and other artistic or spiritual activities. While these were descriptions of legendary and idealised landscapes, the important cultural sites in ancient Greece were also chosen with the landscape setting as a primary criterion. Sanctuaries were generally associated with a natural protection of hills, with a clear spring of water and a sacred grove of trees (Jost, 1994). Plutarch claimed that Asclepeian (healing) temples were to be found on "clean, elevated spots outside cities" (Burford, 1969, p. 178) and the author of *Airs, Waters, and Places*, part of the Hippocratic corpus, stressed the importance of climate, water quality, and a scenic environment (note the latter) for health (Burford, 1969). The Asclepeian sanctuary at Epidauros conformed to such criteria, located amidst the hollow of the hills in a setting "clearly important to the creation of physical and mental wellbeing" (Gesler, 1993, p. 184). Such healing temples were sacred sites away from the city but there is evidence that urban environments in ancient Greece were also chosen with nature and aesthetics in mind. The importance of the landscape, and sacred groves and springs within it, was recognised for the habitations of urban dwellers. According to Crouch (1993), the ancient Greeks chose urban location with five factors in mind, including a good water supply and "landscape beauty within the site and visible from it" (p. 59). Crouch goes on to say: "A modern person, inured to poverty and ugliness, might think that surplus wealth and beauty were optional extras, but in fact I have never come across a Greek site without them [she had visited c. 50 at the time of writing]. . . The beauty is [. . .] so striking a feature as to be unmistakable, and I postulate that the beauty contributed strongly to the initial selection of the site and to the longevity of the settlement." (p. 59).

The subsequent Roman-dominated era made important contributions to urban living and city development but retained links with the Persian and Greek traditions of paradise gardens and Elysian landscapes. Texts from ancient Rome recognise the health benefits of countryside and green places that sound remarkably familiar to modern ears. Pliny the Younger, writing in c. 100 C.E., had a villa in Laurentum, outside Rome, to which he liked to retire after a hard day's work in the city, but he describes in particularly glowing terms the pleasures and benefits of access to the countryside in Tuscany. "I prefer my Tuscan villa [. . .] I enjoy here a cosier, more profound and undisturbed retirement than anywhere else, as I am at a greater distance from the business of the town and the interruption of troublesome clients. All is calm and composed; which circumstances contribute no less than its clear air and unclouded sky to that health of body and mind I particularly enjoy in this place, both of which I keep in full swing by study and hunting" (Pliny the younger, LII To Domitius Apollinaris, in Cicero, c. 1909). It was Martial, a contemporary, who coined the phrase *rus in urbe* to denote the virtues of urban greenery, suggesting that the ideal town environment would offer the benefits of countryside within its walls (Bohn, 1897). As Pliny makes clear, it offers both physical and mental benefit.

## 4. Mediaeval landscapes of health

The most famous Greek physician of the Roman empire, Galen (c. 129–200 AD), identified the causes of health and disease under 'natural' (innate constitutional), 'non-natural' (environmental), and 'preternatural' (pathological) categories (Porter, 1999, p. 15). In mediaeval times, when Greco-Roman traditions were combined with biblical associations of Eden, there was considerable interest in the landscape as constituting part of the 'non-

natural' factors, understood to influence the course of health and sickness.

The monastic traditions of mediaeval Europe reflected these beliefs in the ordered patterns of cloisters, gardens and orchards and of daily life. Writing in the 13th century, Humbert (ex Master of the Dominican Order) instructed that some of the land surrounding the convent infirmary should include meadows and gardens for the recreation of the sick (Montford, 2004). The central place of the cloister garden in the hospitals for which religious houses were responsible is nicely evoked in the multi-sensory, 12th century description from Bernard of Clairvaux: green and fragrant lawns, shade trees and birds, where "... the invalid himself with eyes, ears and nostrils, drinks in the delights of colors, songs and perfumes" (Warner, quoted in Cooper Marcus and Barnes, 1999, p. 10). What is of particular interest for the themes of this paper, however, is the recognition of the restorative and preventative health benefits to be obtained from gardens and the wider landscape for the healthy as well as the sick.

In 1260 the Franciscan Minister General, Bonaventure, identified the value of the Order's large convent gardens for their important contribution to the spiritual and mental wellbeing of the friars:

"... a herb garden, not only for food but also for recreation in the open air to aid the recovery of the sick and to preserve health and improve those fatigued by their spiritual studies. Religious who are relegated to closed cells are unfit for their spiritual duties. If they have access to the open air they advance their internal devotion, their intellectual development, their virtuous example and the health of their doctrine." (Bonaventura, quoted in Montford, 2004, pp. 56–57)

The Augustinians in Cambridgeshire were recorded (c. 1295) as being permitted to walk in the vineyard, the garden, along the riverside, and in the fields, meadows and woods for their repose and comfort and Pope Clement V (1305–14) wrote "friars shall have gardens and places suitable for their recovery and where they can go to rest after their physical work" (Willis Clark, quoted in Montford, 2004, pp. 57–58).

More explicit mention of the salutogenic aspects of the landscape is made by Piero de' Crescenzi in his *Ruralium Commodorum* (written 1308–9) where he links the garden and physical and mental health: "above we have spoken of trees and herbs according to those that are profitable for the human body. But now we will speak of those that give pleasure to people and therefore preserve the health of the body as the state of the body affects the mind" (Calkins, 1986, p. 171). Crescenzi's work was known to the Dominican Order and, as Montford puts it, "the attention given by the friars to their physical environment suggests that its contribution to health was recognised by such mendicant Orders, as well as by physicians, authors and civic authorities in the thirteenth and fourteenth centuries" (Montford, 2004, p. 58).

With the decline of monasticism in much of Europe from the 15th century onwards, the role of the garden and wider landscape found new expression in secular life and post-enlightenment society, particularly in eighteenth century Britain. The monastic and mediaeval tradition, with its focus on humours and 'naturals' vs. 'non-naturals' as influences on health, made much of multi-sensory bodily engagement with the landscape as a means of restoration from physical and mental exertion, as well as from illness. Compared with Greco-Roman descriptions, there appears to have been less emphasis on physical activity and more on the mental and spiritual benefits of the natural environment. The therapeutic nature of landscape experience and the basis of responses to that experience were themes taken up even more avidly by humanist philosophy and the aesthetic debates of the eighteenth and nineteenth centuries.

## 5. The English Landscape Garden and 'active curiosity'

The English Landscape Garden movement, and discussions of the day on the underlying philosophical and aesthetic theories, have been described extensively elsewhere (e.g. Malins, 1966; Hunt and Willis, 1975). The designs of this movement contained countless allusions to classical origins in Greece and Rome, and in particular to their landscapes, and it is no coincidence that one of the great, grand designs of this period, Stowe, in Buckinghamshire, includes William Kent's Elysian Fields and 'Capability' Brown's masterly Grecian Valley (Figs. 1 and 2).

Of particular interest here is the link between aesthetics, emotions and behavioural response that was assumed to underlie any engagement with the landscape, much debated at the time. Ambivalent notions of the pleasurable (or otherwise) experience of the landscape were reflected in Burke's (1757) descriptions of delightful, gracefully modulated, 'beautiful' landscapes, by contrast with 'awful', vast and overwhelming landscapes of 'the sublime'. Those taken up with this debate adopted philosophies from Hume and his contemporaries, suggesting that the 'picturesque' might offer therapeutic benefits, not merely aesthetic ones. Challenging Burke's views on the beautiful and the sublime, in 1794 Uvedale Price suggested that picturesque landscapes would correct the "languor of beauty" and the "horror of sublimity", "learning from nature to make beauty more amusing, varied and playful" ... "it [the picturesque] excites the active curiosity which gives play to the mind". The picturesque was said to redeem the effects of the sublime by "loosening the iron bonds with which astonishment chains up its faculties" (Price 1794 in Hunt and Willis, 1975, p. 356). Price seems to be suggesting that the landscape can be designed so as to provide engagement with nature and mental relaxation that could offer relief from stress. Thus the English landscape garden was seen as offering health benefits: not only the pleasures of physical activity – walks or rides through an attractive landscape – but also an appropriately balanced mental activity, neither too demanding nor too dull or predictable. Such notions as the picturesque's 'active curiosity', giving 'play to the mind', prefigure theories in modern psychology, as discussed further below.

The preceding overview gives just some examples of the arguments that have been made repeatedly, throughout history, and in many different parts of the world, in support of the health benefits of access to the landscape. They demonstrate sophisticated attempts to understand and explain the mechanisms behind the therapeutic effects of landscape and, although couched in the language and conceptual frameworks of their time, are often surprisingly accurate in their prediction of what more recent empirical research has demonstrated. In the eighteenth century, the arguments tended to focus on the benefits to be obtained for the privileged few in society. More recent historical attitudes note how landscape and health are seen as inter-connected issues of concern for all levels of society.

## 6. The urban parks movement

London's parks were first labelled "the lungs of London" in the 18th century by (it is claimed) William Pitt the Elder (British Prime Minister, 1766–68). William Wyndham quoted the phrase in a House of Commons debate in 1808, and subsequent reference to it in the *Edinburgh Advertiser* (1821), the *Times of London* (1838), *Blackwood's Edinburgh Magazine* (Murray, 1839) and the *New York Mirror* (1842) suggests that it resonated with the sentiments of the time (Popik, 2004). At first the 'lungs of London' were seen as a happy relic of the past – the royal parks (e.g. Hyde Park) now open to the public and therefore available as a general resource. However, the idea that new parks might be developed to improve the





**Fig. 1.** William Kent's Elysian Fields (c.1734): the Temple of Ancient Virtue, viewed across the 'River Styx', part of a politically and aesthetically allusive landscape developed for Viscount Cobham at Stowe.



**Fig. 2.** The Grecian Valley at Stowe (mid-1740s), developed by Lancelot 'Capability' Brown with his employer, Viscount Cobham: a view of an 18th century landscape showing a masterly control of contour, planting and vista (the view continues over an unseen ha-ha).





**Fig. 3.** Birkenhead Park (1843–46), a picturesque urban park designed by Joseph Paxton with the assistance of architect Lewis Hornblower: a view of the lake and Roman Boathouse.

health of a rapidly urbanizing population, and located so that all parts of the population had ready access to them, was not long in following. In the aftermath of the first major cholera epidemic in England, in 1832, the 1833 Select Committee on Public Walks informed Parliament of the need for recreational spaces in urban areas and urged it to enact a law requiring every town to establish a public walk or park to improve healthy conditions (Schuyler, 1986).

In 1841 a Liverpool councillor raised the idea of constructing a public park for the overcrowded industrial workforce (then over 2500) rapidly expanding in Birkenhead, and in 1843 the land for the development of Birkenhead park was purchased by public money – a world first, it has been claimed (Wirral, 2004). Fortunately, the proceeds from the sale of the surrounding building plots was sufficient to recoup all the costs incurred by the purchase of the land and the construction of the park. The park, designed by Joseph Paxton, thus benefited not only those wealthy enough to afford a plot with a view of the park but also the general public, to whom the park was open (Fig. 3).

The construction of Victoria Park in London was a parallel story but serving a much larger working class population in the capital's East End. By the 1830s around 400,000 were living in the area, in cramped housing crowded against factories which polluted both air and the waterways. There were fears not only that epidemics of cholera, typhoid and tuberculosis might affect the workforce but also that the diseases would be spread into the 'better' parts of London. In 1839, a sanitary reformer said that: "A park in the East End would diminish the annual deaths by several thousands, and add several years to the lives of the entire population" (Mernick and Kendall, 1996). In 1841, funds from the sale of the late Duke of York's indebted property were dedicated to construct the new park. "The principal good [...] which the formation of the park has effected is in the inducement it holds out to the artisan and labourer to benefit their own health and that of their families by inhaling the fresh air at least once in the week, at a distance from their own confined and wretched habitations" (Alston, 1847).

We see, in the parks movement, less emphasis on the psychological and emotional benefits of landscape and more on physical health and prevention of disease as the primary aim of access to parks and green spaces. Nonetheless, the public park was also seen as playing a role in the spiritual renewal of the urban working classes (Hunt, 2004) and contributing to character formation and citizenship as much as physical wellbeing (Worpole, 2007). There was a recognition that good landscape was essential for people's health, rich and poor alike and that public parks might be the only places where "the pale mechanic and the exhausted factory operative might inhale the freshening breeze and some portion of recovered health" (Smith, 1852, in Schuyler, 1986, p. 60). Over the next few decades, the term "lungs of the city" was cited repeatedly in the service of arguments to develop public parks, whether in Berlin, Paris or New York city.

## 7. North American parks and health

The virtues of *rus in urbe* were recognised in America as early as 1682, when William Penn produced his plan for the "Greene Countrie Towne" of Philadelphia, with its four, green squares structuring the urban form, and they were promoted in the early nineteenth century through the creation of "rural" cemeteries such as Mount Auburn Cemetery in Cambridge. But the development of the larger urban park was inspired by the example of European cities, whose parks were universally acknowledged as a means of improving the health, as well as the social welfare and moral refinement of their citizens (Ward Thompson, 1998).

The concept of the park relied on its having a character that provided an escape from the city and the design for parks such as New York's Central Park were inspired by Paxton's Birkenhead Park in England. Frederick Law Olmsted and Calvert Vaux described their Greensward Plan for Central Park as "the antithesis of the confined spaces of the town" (Olmsted, 1858, in Schuyler, 1986, p. 93) and argued that pastoral scenery provided the antidote for urban dwellers, "affording the most agreeable contrast to the confine-



**Fig. 4.** The Long Meadow, Prospect Park (c.1866), by F.L. Olmsted and Calvert Vaux, a beautifully modulated landscape of grassy sward bounded by trees to mask views of the surrounding urban fabric, a landscape developed to enhance the wellbeing of city inhabitants.

ment, bustle and monotonous street-division of the city” (Olmsted, 1858, in Schuyler, 1986, p. 85). What is interesting about the arguments put forward by Olmsted and his contemporaries for the health benefits of parks is that they bring together the earlier, eighteenth century ideas about mental relief with the more pragmatic desire to counter disease and physical ill-health. “A man’s eyes cannot be as much occupied as they are in large cities by artificial things or by natural things seen under obviously artificial conditions, without a harmful effect, first on his entire mental and nervous system and ultimately on his entire constitutional organisation” (Olmsted, 1886, p. 42). Olmsted considered it to be generally accepted that overexposure to the artificial sights of the city would lead to “excessive nervous tension, over-anxiety, hasteful disposition, impatience and irritability” (Olmsted, 1886, p. 42) and that the antidote was pleasing rural scenery, devoid of prominent buildings, ornamental plantings or “artificially contrived” scenes (Fig. 4).

Such analysis seems strikingly modern and accords with much more recent pronouncements on the value of urban parks (Ward Thompson, 2002). These themes were reiterated by Olmsted’s sons in the work of the Olmsted firm, as in their 1908 report to the Spokane Board of Park Commissioners: “Public parks, while ostensibly for the pleasure which their beauty affords the people, are also very important aids to the improvement and preservation of the health of the people [ . . . ] City life involves a continual strain of the nerves, through the needs of avoiding the dangers of the factory and the street and owing to the multitudinous harsh noises and the vivid and eye-tiring sights and through having to give attention to so many people. Even to the well, this is tiring to the nerves, but to those who are delicate, it often becomes a torture. After all, it is to those whose nerves are tired – and they are a large proportion of the dwellers in a city – that the parks are most immediately beneficial” (John Charles Olmsted, 1908, in NAOP, 2007, pp. 2–3). The Olmsted Brothers also articulate the benefits of parks for physical

activity: “. . . City life, with its confinement during long hours [ . . . ] has a decidedly depressing effect on the general health and stamina [ . . . ] This comes about mainly from lack of invigorating exercise in the fresh air” (J.C. Olmsted, 1908, in NAOP, 2007, p. 2). The Olmsteds go on to show how every age, from babies and their mothers, school children and young adults to older men and women, could find benefit from visiting parks.

## 8. Health, nature and the landscape in modern society

What is impressive about Frederick Law Olmsted’s mid-nineteenth century assertions on the benefits of the “natural” park is the degree to which they are confirmed by research over the last few decades. Olmsted both consciously echoes certain arguments of the eighteenth century picturesque movement and prefigures the work of Kaplan and Kaplan (1989) on the psychology of restorative environments when he states, for example, that pastoral scenery would induce in visitors an “unbending of the faculties” and “cause us to receive mental pleasure without conscious exertion” (Olmsted, 1866, in Schuyler, p. 93). Compare Olmsted’s assertion that parks could “provide for counteracting the special evils which result from the confinement of life in cities” and have a therapeutic effect by leading visitors “away from the mental contemplation of objects associated with conditions which have produced previous strain or fatigue” (Olmsted, 1871, in Schuyler, p. 107), with the Kaplans’ discussion of the “restorative environment”. “The struggle to pay attention in cluttered and confusing environments (such as crowded urban ones) turns out to be central to what is experienced as mental fatigue [ . . . ] The natural environment seems to have some special relationship to each of the four factors [ . . . ] that are important to a restorative environment” (Kaplan and Kaplan, 1989, p. 182). The Kaplans discuss “directed attention fatigue” and how it can be relieved by spending time in a natural environment which



offers restoration through four factors: being away, extent (of conceptual exploration), fascination, and compatibility (with the need or desire of the moment). Kaplan (1995) notes that people suffering from mental fatigue who spent time in natural environments tend to perform better on tasks afterwards, under experimental conditions. This research not only confirms the nineteenth century belief that access to parks could improve the productivity of workers but also suggests that eighteenth century ideas about the landscape providing for mental curiosity – the picturesque’s ‘active curiosity’, giving ‘play to the mind’ – has a basis in modern psychology. The Kaplans describe this as the “soft fascination” of natural environments: an aesthetic experience that invites attention but leaves room for reflection (Kaplan and Kaplan, 1989). The work of Appleton (1975), Wilson (1984) and Bourassa (1991) has been important in suggesting a biological basis for human preference for certain types of environments and the psychological benefits they bestow. Wilson’s Biophilia hypothesis (Kellert and Wilson, 1993) suggests that people’s desire for contact with nature has an underlying cause based on genetic fitness and competitive advantage: the natural environment is a resource vital to human wellbeing, physical and mental. While some studies have focused on the importance of savannah or parkland settings as the supposed evolutionary habitat of preference (e.g. Orians and Heerwagen, 1992), others (e.g. Kaplan and Kaplan, 1989) have demonstrated that everyday green or natural settings, often just small green spaces in urban contexts, can have benefits for mental wellbeing and relief from stress. It has been suggested that people’s preference for greens and blues is because of the prevalence of these colours in environments conducive to survival for us historically as a species, and it has been demonstrated that “unlike reds or yellows, blue and green are long wavelength “low arousal” colours known to relieve muscle tension and produce pleasurable moods” (Nicholson-Lord, 2003, pp. 18–19). Work by Ulrich and others (e.g. Ulrich et al., 1991; Kaplan, 2001a,b; Kuo and Sullivan, 2001) show that simply viewing nature, through a window or even in a painting, can have a therapeutic effect. Ulrich (1999) considers that the healing effects of nature are a matter of unconscious processes and affects located in the oldest, emotion-driven parts of the brain. His work has shown that views of nature can have emotional, physiological and behavioural effects in stress reduction, and that such benefits can be experienced very rapidly: certain types of natural scenes evoke positive affect and hold attention, displacing or restricting negative thoughts and allowing autonomic arousal heightened by stress to sink to a more moderate level. This process has evolutionary underpinnings, according to Ulrich, manifest in biological responses to environmental features that signal possibilities for survival and reflected in physiological parameters such as blood pressure, heart rate, and muscle tension (Hartig, 2007, p. 166).

Pretty et al. (2005) have summarised a growing body of evidence that engagement with green spaces and nature affects health, categorised according to three levels of engagement: viewing natural environments; being in the presence of nearby green space or nature; and active participation and involvement in nature, e.g. through gardening, farming, walking, etc. Research by Hartig (2007) and Grahn et al. (2010) has attempted to understand better the mechanisms behind the beneficial effects of engagement with the landscape, whether through energetic physical activity or more passive uses. Hartig focuses on the restorative effect of landscape and the natural environment and recognises that F.L. Olmsted Sr’s theorising on the benefits of engagement with the natural landscape “. . . In broad outline [. . .] corresponds quite well with what today could be described as a biopsychosocial perspective on the determinants of health” (Hartig, 2007, p. 165). He defines restoration as “the process of recovering physiological, psychological and social resources that have become diminished in efforts to meet the demands of everyday life” (2007, p. 164). He

also refers to “instorative” benefits which involve “deepening or strengthening capabilities for meeting everyday demands” (p. 164); in other words, benefits which offer resilience against the negative effects of (mostly urban) life. He describes evidence to support both restoration and ‘instoration’ from engagement with the landscape or natural environment, while identifying many as yet unanswered questions about the mechanisms behind such observed associations.

Hartig’s findings support aspects of Ulrich’s psycho-evolutionary theory of stress reduction as well as many of the propositions in the Kaplans’ attention restoration theory (ART) (Kaplan and Kaplan, 1989; Kaplan, 1995). ART suggests that directed attention used in coping with complex patterns of daily life, including work, is a highly limited resource, easily exhausted if there are not opportunities for recovery. People recover best in environments where this system can rest and where they can use another type of attention – involuntary attention or fascination – which the natural environment is particularly well-suited to supporting. Grahn and colleagues describe cases of people recovering from extreme stress and life crisis through the benefits of a therapeutic garden. They also build on Kaplan’s ART and Ulrich’s theories of evolutionary aesthetics, as well as on the evidence of horticultural therapy, to propose a “Scope of Meaning/Scope of Action” theory. This suggests that nature-assisted rehabilitation from stress-related mental diseases is a matter of *communication* as regards senses, emotions, and cognition. When people feel well, they can cope with and function in most kinds of environments but, when they are highly stressed, it appears that the psychological resonance of natural environments is the only one that may be tolerated. “People in crisis seem to be more dependent on the nonhuman environment, on what is communicated by the emotional tone of the nonhuman environment [. . .] here nature acts as a fundamental resource” (Grahn et al., 2010, p. 149).

De Vries and colleagues have recently reviewed the evidence for the broad mechanisms behind the relationship between health and ‘nearby nature’, as they put it, while recognising that it may well be a combination of mechanisms that render any therapeutic effect, as Hartig has suggested (2007, 2008). They explored improvement in air quality, restoration and reduction in stress, stimulation of physical activity, and facilitation of social contacts, as possible mechanisms. They conclude that “stress reduction and the facilitation of social cohesion are likely to be more important than improving air quality and stimulating physical activity” in explaining the relationship between the availability of green space and the health of local inhabitants (De Vries, 2010, p. 87). This suggests that psychosocial engagement with the landscape may be a key to understanding how health and the green or natural environment are linked, as earlier commentators such as F.L. Olmsted have suggested.

## 9. The health challenge in the 21st century

The relevance of such history for current policy lies in the fact that western countries are facing a health crisis of alarming proportions as physical inactivity, obesity and mental illness increase. Awareness that environment, and landscape in particular, might play a role in enhancing health, and perhaps prevent illness at a fraction of the cost of post hoc medical intervention, has been slow to influence government policy and spending but there are signs that this is changing (Bird, 2004, 2007).

Takano et al. (2002) published a pioneering study which attempted to correlate proximity to parks with older people’s mortality; they demonstrated the benefits of green space in dense urban areas (in this case, Tokyo), particularly where residents did not have access to private gardens. The five-year survival rate of

senior citizens was shown to increase with more space for taking a stroll near their residence and with nearby parks and tree lined streets near the residence. Similar studies from Australia (e.g. Giles-Corti et al., 2003; Humpel et al., 2004; Sugiyama et al., 2008) have suggested that the quality of parks and boulevards in people's everyday living environments may contribute to more active lifestyles in measurable ways. Mitchell and Popham (2007) have taken an epidemiological approach and shown that, in England, there are significant associations between morbidity and proximity to high levels of green space. In a Netherlands-based study, Maas and colleagues (Maas, 2008; Maas et al., 2009) have shown a relationship between green space near home and the impact of stress as well as other patterns of morbidity associated with nearby green space – an effect Maas has termed 'vitamin G'. However, they conclude that the health effects associated with green space cannot be attributed to greater levels of physical activity in the landscape (Maas et al., 2008). Some of the effects of nearby, attractive green space may be simply to encourage people to go outdoors; lack of access to good quality natural environments, conversely, may discourage people from outside activities, or even going outdoors at all, which can contribute to seasonal affective disorder (SAD), limit production of vitamin D through lack of sunlight, disrupt circadian rhythms and lead to insomnia (Czeisler et al., 1986; Lewy et al., 1998; Holick, 2004).

Studies on older adults' access to green and natural environments have shown associations with wellbeing and quality of life (Sugiyama and Ward Thompson, 2007; Sugiyama et al., 2009). De Vries and colleagues' work suggests that any benefits from nearby green space may have more to do with mental health and social contact than with levels of physical activity (De Vries, 2010). A recent study comparing research in Scotland and England has demonstrated correlations between childhood access to green spaces and adult behaviour and attitudes (Ward Thompson et al., 2008). This work on the "childhood factor" suggests that the attraction of natural spaces as places for physical activity and for mental, even spiritual, renewal may be influenced at important stages in childhood development and that failure to provide nearby access for children to appropriate green spaces within the urban environment may present irreversible challenges for the health of the adult population. There remains a need for good empirical research to explain the mechanisms behind the relationship between quality of outdoor environments, access to the landscape and health.

## 10. Conclusion

Throughout history and across cultures, people have considered access to some form of "nature" as a fundamental human need and attractive, green and well-watered landscapes as an essential constituent of the ideal, paradisaical, healthy environment. Writers from the earliest times have recognised that the landscape not only provides for our nutritional needs, it also supports us at every level in our wellbeing. The challenge we face in today's society is that we have often created environments for daily living and working which present more hazards to health than benefits. Global warming and natural environmental catastrophes remind us of the fragility of humankind's engineering and urban constructions at a world scale and we have seen how insensitive development and pollution can create problems which transgress regions or national boundaries. There is, nonetheless, a common thread that runs through centuries of societal development in Europe – a recurring recognition of the importance of landscape planning and design to provide therapeutic places for people. We are now beginning to have a better understanding of why we need to have good quality landscapes nearby, as well as a better appreciation of the likely nature and scale of beneficial effect, and what might moderate it.

After a century or so of focus on medical interventions, health professionals and policy makers are once again open to an ecological approach to public health (Morris et al., 2006). They are turning to landscape planners, designers and managers for answers to questions about how to create environments that will encourage healthy lifestyles. But they are also challenging researchers to deliver the highest standards of evidence achievable in our complex world of human/environment interactions. We need to relate to measures of human health that contemporary medical researchers will credit, while using our ingenuity to develop measures of the landscape that are robust and replicable while being sensitive to the diversity of human experience. In a variant on what Rodiek (2010) has advocated, this would draw on new practice to create new science.

A recent UK Royal Commission concluded that "... access to good quality green space provides an effective, population-wide strategy for the promotion of good health, wellbeing and quality of life[. . .] We are convinced that the evidence is sufficiently strong to warrant amending planning guidance to recognise the health benefits of green space" (Royal Commission on Environmental Pollution, 2007, p. 47). We know that lack of access to such green space removes an opportunity for people to readily recover from stress; that quality landscapes provide shelter and shade as well as sunlight and opportunities for a variety of uses and users; that landscapes can support social as well as physical needs and that these, in turn, can benefit people's wellbeing. But key questions remain. Do we have an adequate theoretical basis for understanding all dimensions of the links between landscape and health? What are the causal mechanisms behind observed associations between the two? What characteristics of the landscape – quantity, proximity, and configuration in terms of spatial planning; quality, accessibility and visibility, in experiential terms – are critical to health benefit, and how much does this vary for different segments in the population? These are important directions for future research if landscapes are to be properly valued as an integral part of urban planning and design, 180 years or so after the start of the public park movement that argued for very much the same thing. Today we need research that addresses 21st century demands and standards of evidence for policy and practice, so as to understand better how to take the health implications of landscape architecture seriously.

## References

- Alston, G., 1847. Letter to The Times of London. September 7, 1847. Available at <http://www.victorianlondon.org/entertainment/victoriapark.htm>.
- Appleton, J., 1975. *The Experience of Landscape*. Wiley, New York.
- Bird, W., 2004. Natural Fit: Can Green space and Biodiversity Increase Levels of Physical Activity? RSPB, Available at <http://www.rspb.org.uk/policy/health>, viewed 05/02/2010.
- Bird, W., 2007. Natural Thinking: Investigating the links between the Natural Environment, Biodiversity and Mental Health. RSPB, Available at <http://www.rspb.org.uk/policy/health>, viewed 05/02/2010.
- Bohn's Classical Library, 1897. *Martial, Epigrams*. Book 12, transcribed by R. Pearce, 2008, Available at [www.ccel.org/ccel/pearse/morefathers/files/martial.epigrams.book12.htm](http://www.ccel.org/ccel/pearse/morefathers/files/martial.epigrams.book12.htm), viewed 04/09/2010.
- Bourassa, S.C., 1991. *The Aesthetics of Landscape*. Belhaven Press, London and New York.
- Bull, F., Giles-Corti, B., Wood, L., 2010. Active landscapes: the methodological challenges in developing the evidence on urban environments and physical activity. In: WardThompson, C., Aspinall, P., Bell, S. (Eds.), *Open Space: People Space 2, Innovative Approaches to Researching Landscape and Health*. Abingdon, Routledge, pp. 96–116.
- Burford, A., 1969. *The Greek Temple Builders at Epidauros*. University of Toronto Press, Toronto.
- Burke, E., 1757. In: Phillips, A. (Ed.), *A philosophical enquiry into the origin of our ideas of the sublime and the beautiful*, 1998 edition. Oxford University Press, Oxford.
- Calkins, R.G., 1986. Piero de' Crescenzi' and the mediaeval garden. In: Macdougall, E.B. (Ed.), *Mediaeval Gardens*. Dumbarton Oaks, Washington, DC, pp. 157–173.
- Cicero, M.T. c100. *Letters of Marcus Tullius Cicero, with his treatises on friendship and old age*, translated by E.S. Shuckburgh. And *Letters of Gaius Plinius Caecilius Secundus*, translated by William Melmoth, rev. by F.C.T. Bosanquet. With introductions and notes. New York, P.F. Collier c (1909), The Har-



- vard classics v.9. <http://www.fordham.edu/halsall/ancient/pliny-letters.html>, viewed 26/01/2010.
- Collishaw, S., Maughan, B., Goodman, R., Pickles, A., 2004. Time trends in adolescent mental health. *J. Child Psychol. Psychiatry* 45 (8), 1350–1362.
- Cooper Marcus, C., Barnes, M., 1999. *Healing Gardens: Therapeutic Benefits and design recommendations*. John Wiley & Sons, New York.
- Crouch, D.P., 1993. *Water Management in Ancient Greek Cities*. Oxford University Press, New York, NY.
- Czeisler, C.A., Allan, J.S., Strogatz, S.H., Ronda, J.M., Sanchez, R., Rios, C.D., Freitag, W.O., Richardson, G.S., Kronauer, R.E., 1986. Bright light resets the human circadian pacemaker independent of the timing of the sleep–wake cycle. *Science* 233 (4764), 667–671.
- Delumeau, J., 1995. *History of Paradise, the Garden of Eden in Myth and Tradition*. Continuum, New York, translated from the French by O'Connell, M.
- De Vries, S., 2010. Nearby nature and human health: looking at the mechanisms and their implications. In: WardThompson, C., Aspinall, P., Bell, S. (Eds.), *Open Space: People Space 2, Innovative Approaches to Researching Landscape and Health*. Abingdon, Routledge, pp. 75–94.
- Gesler, W.M., 1993. Therapeutic landscapes: theory and a case study of Epidauros, Greece. *Environ. Plann. D* 11 (2), 171–189.
- Giles-Corti, B., Macintyre, S., Clarkson, J.P., Pikora, T., Donovan, R.J., 2003. Environmental and life-style factors associated with overweight and obesity in Perth, Australia. *Am. J. Health Promot.* 18, 93–102.
- Grahn, P., Tenngrat Ivarsson, C., Stigsdotter, U., Bengtsson, I., 2010. Using affordances as a health promoting tool in a therapeutic garden: the development of horticultural therapy in Alnarp, Sweden. In: WardThompson, C., Aspinall, P., Bell, S. (Eds.), *Innovative Approaches to Researching Landscape and Health*. Open Space: People. Abingdon, Routledge, pp. 120–159.
- Hartig, T., 2007. Three steps to understanding restorative environments as health resources. In: WardThompson, C., Travlou, P. (Eds.), *Open Space: People Space*. Taylor and Francis, Abingdon, UK, pp. 163–179.
- Hartig, T., 2008. Green space, psychological restoration, and health inequality. *Lancet* 372 (9650), 1614–1615.
- Hobhouse, P., 2004. *Gardens of Persia*. Kales Press, Hong Kong.
- Holick, M.F., 2004. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *Am. J. Clin. Nutr.* 80 (6 Suppl.), 1678S–1688S.
- Humpel, N., Owen, N., Iverson, D., Leslie, E., Bauman, A., 2004. Perceived environment attributes, residential location, and walking for particular purposes. *Am. J. Prev. Med.* 26 (2), 119–125.
- Hunt, J.D., Willis, P. (Eds.), 1975. *The Genius of the Place: The English Landscape Garden, 1620–1820*. Paul Elek, London.
- Hunt, T., 2004. *Building Jerusalem: The Rise and Fall of the Victorian City*. Weidenfeld & Nicolson, London.
- Jost, M., 1994. The distribution of sanctuaries in civic space in Arkadia. In: Alcock, S.E., Osborne, R. (Eds.), *Placing the Gods: Sanctuaries and Sacred Space in Ancient Greece*. Oxford University Press, New York, NY, pp. 217–230.
- Kaplan, R., 2001a. The nature of the view from home: psychological benefits. *Environ. Behav.* 33, 507–542.
- Kaplan, R., Kaplan, S., 1989. *The Experience of Nature: A Psychological Perspective*. Cambridge University Press, Cambridge.
- Kaplan, S., 1995. The restorative benefits of nature: toward an integrative framework. *J. Environ. Psychol.* 15, 169–182.
- Kaplan, S., 2001b. Meditation, restoration, and the management of mental fatigue. *Environ. Behav.* 33 (4), 480–506.
- Kellert, S.R., Wilson, E.O. (Eds.), 1993. *The Biophilia Hypothesis*. Island Press, Washington DC.
- Kline, A.S., 2002. *Virgil: The Aeneid*, Available online at <http://www.poetryintranslation.com/PITBR/Latin/Virgilhome.htm>, viewed 26/01/2010.
- Kuo, F.E., Sullivan, W.C., 2001. Aggression and violence in the inner city: effects of environment via mental fatigue. *Environ. Behav.* 33, 543–571.
- Lewy, A.J., Bauer, V.K., Cutler, N.L., Sack, R.L., Ahmed, S., Thomas, K.H., Blood, M.L., Jackson, J.M.L., 1998. Morning vs evening light treatment of patients with winter depression. *Arch. Gen. Psychiatr.* 55, 890–896.
- Maas, J., 2008. 'Vitamin G, green environments – healthy environments', doctoral dissertation, Utrecht University. NIVEL, Utrecht.
- Maas, J., Verheij, R.A., Spreeuwenberg, P., Groenewegen, P.P., 2008. 'Physical activity as a possible mechanism behind the relationship between green space and health: a multilevel analysis'. *BMC Public Health* 8, 206.
- Maas, J., Verheij, R.A., De Vries, S., Spreeuwenberg, P., Schellevis, P.G., Groenewegen, P.P., 2009. Morbidity is related to a green living environment. *J. Epidemiol. Commun. H* 63, 967–973.
- Malins, E.G., 1966. *English Landscaping and Literature, 1660–1840*. Oxford University Press, Oxford.
- Mernick, P., Kendall, D., 1996. *A Pictorial History of Victoria Park*. In: London E3. East London History Society, London.
- Mitchell, R., Popham, F., 2007. Greenspace, urbanity and health: relationships in England. *J. Epidemiol. Commun. H* 61, 681–683.
- Montford, A., 2004. *Health, Sickness, Medicine and the Friars in the Thirteenth and Fourteenth Centuries*. Ashgate, Aldershot, UK.
- Morris, G.P., Beck, S.A., Hanlon, P., Robertson, R., 2006. Getting strategic about the environment and health. *Public Health* 120, 889–907.
- Murray, J.F., 1839. *The Lungs of London*, vol. 46. Blackwood's Edinburgh Magazine, p. 214.
- NAOP (National Association for Olmsted Parks), 2007. *From the 1908 Olmsted Brothers Report to the Spokane Board of Park Commissioners*. John Charles Olmsted, author. National Association for Olmsted Parks Reprints Fall 2007, 9 (2): 2–4, NAOP, Washington DC.
- Nicholson-Lord, D., 2003. *Green Cities – and Why we Need Them*. New Economics Foundation, London.
- Olmsted, Frederick Law. 1886 *Notes on the Plan of Franklin Park and Related Matters*. Boston: Printed as a supplement to the City of Boston Eleventh Annual Report of the Board of Commissioners of the Department of Parks for the Year 1885.
- Orians, G.H., Heerwagen, J.H., 1992. Evolved responses to landscapes. In: Barkow, J.H., Cosmides, L., Tooby, J. (Eds.), *The Adapted Mind*. Oxford University Press, Oxford, pp. 555–579.
- Popik, B., 2004. *The Big Apple*, web site. <http://www.barrypopik.com/article/1129/lungs-of-the-city-central-park>, visited 26/8/2005.
- Porter, D., 1999. *Health, Civilization, and the State: A History of Public Health from Ancient to Modern Times*. Routledge, London.
- Pretty, J., Griffin, M., Peacock, J., Hine, R., Sellens, M., South, N., 2005. *A Countryside for Health and Wellbeing: The Physical and Mental Health Benefits of Green Exercise*. CRN Countryside Recreation Network, Sheffield.
- Rodiek, J., 2010. Editorial. *Landscape Urban Plan* 94, 3–8.
- Royal Commission on Environmental Pollution, 2007. *The Urban Environment*, Royal Commission on Environmental Pollution Twenty-sixth Report, presented to Parliament March 2007. The Stationery Office, London.
- Schuyler, D., 1986. *The New Urban Landscape: the Redefinition of City Form in Nineteenth-Century America*. John Hopkins University Press, Baltimore.
- Sugiyama, T., Ward Thompson, C., 2007. Older people's health, outdoor activity and supportiveness of neighbourhood environments. *Landscape Urban Plan* 83, 168–175.
- Sugiyama, T., Ward Thompson, C., Alves, S., 2009. Associations between neighborhood open space attributes and quality of life for older people in Britain. *Environ. Behav.* 41 (1), 3–21.
- Sugiyama, T., Leslie, E., Giles-Corti, B., Owen, N., 2008. Associations of neighborhood greenness with physical and mental health: do walking, social coherence and local social integration explain the relationships? *J. Epidemiol. Commun. H* 62 (e9).
- Takano, T., Nakamura, K., Watanabe, M., 2002. Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *J. Epidemiol. Commun. H* 56, 913–918.
- Ulrich, R.S., Simons, R., Losito, B.D., Fiorito, E., Miles, M.A., Zelson, M., 1991. 'Stress recovery during exposure to natural and urban environments'. *J. Environ. Psychol.* 11, 201–230.
- Ulrich, R.S., 1999. Effects of gardens on health outcomes: theory and research. In: Cooper Marcus, C., Barnes, M. (Eds.), *Healing Gardens. Therapeutic Benefits and Design Recommendations*. John Wiley & Sons, New York.
- Ward Thompson, C., 1998. *Historic American parks and contemporary needs*. *Landscape J.* 17 (1), 1–25.
- Ward Thompson, C., 2002. *Urban open space in the 21st century*. *Landscape Urban Plan* 60 (2), 59–72.
- Ward Thompson, C., Aspinall, P., Montarzino, A., 2008. The childhood factor: adult visits to green places and the significance of childhood experience. *Environ. Behav.* 40 (1), 111–143.
- Ward Thompson, C., Aspinall, P., Bell, S. (Eds.), 2010. *Open Space: People Space 2, Innovative Approaches to Researching Landscape and Health*. Abingdon, Routledge.
- Wilson, E.O., 1984. *Biophilia – the Human Bond with Other Species*. Harvard University Press, Cambridge, Mass.
- Wirral, Metropolitan Borough of. 2004. *Birkenhead's park history*. [http://www.wirral.gov.uk/er/birkenheadpark\\_history.htm](http://www.wirral.gov.uk/er/birkenheadpark_history.htm), visited 28/8/05.
- Worpole, K., 2007. 'The health of the people is the highest law'. Public health, public policy and green space. In: Ward Thompson, C., Travlou, P. (Eds.), *Open Space: People Space*. Taylor and Francis, Abingdon, UK, pp. 11–22.

**Catharine Ward Thompson** is Research Professor of Landscape Architecture at Edinburgh College of Art and the University of Edinburgh. Her work focuses on landscape perception, inclusive access to outdoor environments, landscapes for children and young people, environment–behaviour interactions, historic landscapes and contemporary needs, and salutogenic environments. Since 2001, Catharine has directed OPENspace, the research centre for inclusive access to outdoor environments.