

Mindfulness Practice in Woods and Forests: An Evidence Review

Bianca Ambrose-Oji

Report to The Mersey Forest



Forest Research is the Research Agency of the Forestry Commission and is the leading UK organisation engaged in forestry and tree related research. The Agency aims to support and enhance forestry and its role in sustainable development by providing innovative, high quality scientific research, technical support and consultancy services.

This is a report produced by the:

Social and Economic Research Group, Centre for Ecosystems, Society and Biosecurity, Forest Research

www.forestresearch.gov.uk/peopleandtrees

This report was commissioned by:

The Mersey Forest

Risley Moss,
Ordnance Avenue,
Birchwood,
Warrington,
WA3 6QX



Tel: 01925 816217

<http://www.merseyforest.org.uk/>

The Mersey Forest is one of the leading environmental regeneration initiatives in the North West of England with a keen interest in delivering health and wellbeing project associated with urban greenspace. This report forms part of a Natural Health Service programme being coordinated by The Mersey Forest team.

<http://www.naturalhealthservice.org.uk/>

An appropriate citation for this report is: Ambrose-Oji, B., 2013. *Mindfulness Practice in Woods and Forests: An Evidence Review*. Research Report for The Mersey Forest, Forest Research. Alice Holt Lodge Farnham, Surrey.

Contents

1. Introduction	4
2. Objectives and Methods	5
3. Wellbeing links to nature: A significant evidence base	7
3.1. Wellbeing in urban greenspace.....	9
3.2. Wellbeing impacts of woodlands and forests	10
4. Mindfulness approaches in woods, forests and natural spaces	11
4.1. Defining mindfulness	11
4.1.1. Efficacy of different mindfulness approaches.....	12
4.2. Mindfulness in woods and forests	13
4.2.1. Forest Bathing – <i>Shinrin-yoku</i>	14
4.2.2. Forest Walking.....	17
4.2.3. Mindfulness and CBT approaches in forest and woodland contexts.....	18
4.2.4. Ecotherapy and Forest Therapy.....	18
4.2.5. Ecopsychology	20
5. Examples of mindfulness practice in woods and forests in Great Britain	21
6. Conclusions	25
7. References	26
Annex 1. Examples of mindfulness of projects/programmes/therapists working in natural/woodland contexts	36

Mindfulness Practice in Woods and Forests: An Evidence Review

1. Introduction

According to the World Health Organisation (WHO) we are now entering an era where health professionals are concentrating on chronic and non-communicable diseases rather than infectious diseases as the main causes of mortality and morbidity (Hägerhäll, 2010). Amongst these major non-communicable health problems are diabetes, cardiovascular disease, cancer and depression. Research and clinical practice have brought improvements in the treatment of the most prevalent physiological conditions, and more recently mental health and wellbeing are receiving equal attention.

This is due in part because of the marked increase in the numbers of people presenting with poor mental health and mental illness across developed countries over the last two decades. In the UK one in four British adults experience at least one diagnosable mental health problem in any one year, and one in six experiences this at any given time (The Office for National Statistics, 2001). Figures for England in 2007 showed that 7.2 per cent of people aged between 16 and 74 had two or more disorders. The largest increase in rate of common mental disorders between 1993 and 2007 was observed in women aged 45-64, among whom the rate rose by about a fifth (The Office for National Statistics, 2009). Psychiatric drug treatments are available for many of the most common mental health conditions and symptoms. However, there is a growing awareness of the limitations of drug-based treatments. Alternative approaches with proven impacts are now being recommended as suitable therapeutic interventions.

As well as recognising the increasing need for mental health treatments, clinicians and medical researchers are beginning to uncover the strong physiological links between mental wellbeing and physical health (see for example: Kemp and Quintana, Lindwall et al., 2012, Wright et al., 2009). The evidence suggests that improvements to mental health can have positive impacts on physical health, and vice versa.

Mindfulness has fast grown in popularity and credibility as one of the alternative approaches to alleviating and treating certain forms of mental illness and the symptoms of poor mental health associated with other diseases and conditions. A body of evidence

has been accumulating which shows the positive affects mindfulness can have on medical and psychological symptoms, including depression, anxiety, chronic pain and fibromyalgia, general and acute stress, high blood pressure, skin disorders, and sleep disorders. In addition, mindfulness is also recognised as being a positive approach to maintaining and safeguarding good mental health either with patients after specific treatment, or as a means of managing the day-to-day stresses of living and working with people who enjoy relatively good mental health.

In 2004 and again in 2009 ¹ NICE (the UK National Institute for Clinical Excellence) recognised the benefits of mindfulness approaches giving certain techniques and therapies approved medical status as a treatment for conditions such as depressive disorder (depression). In addition to this, mental health charities and organisations such as MIND, have been promoting mindfulness as well as ecotherapy as important methods with synergistic impacts on both mental and physical health, and which present viable and sustainable options to drug use (see the MIND 2007 strategy report ²).

The impacts and efficacy of mindfulness approaches in clinical practice have been the subject of study, but this is mostly confined to practice conducted in indoor settings (Keng et al., 2011, Khong, 2009, Thompson et al., 2012, Worsfold, 2013). Even though there is a good deal of evidence demonstrating the positive influence of the natural environment on health and mental wellbeing, research into mindfulness approaches in the outdoors, in natural and green spaces is only just beginning to emerge as practitioners begin to take mindfulness practice into green settings.

2. Objectives and Methods

The Mersey Forest is one of England's Community Forests. It is a leading environmental regeneration initiative in the North West. The Mersey Forest manages a number of projects and programmes related to health and wellbeing in urban greenspaces. The Mersey Forest also has an active partnership with the Mersey Care NHS Trust. It plays an important role in the "Take Notice" group that are part of the Decade of Health and Wellbeing across the Liverpool City Region ³ . The Mersey Forest are developing and coordinating the emerging "Natural Health Service ⁴ " as an approach to improving mental and physical health through links with the natural environment. "Taking notice" is described by New Economics Foundation as:

¹ See NICE Guideline CG90 for example:

<http://www.nice.org.uk/nicemedia/pdf/CG90NICEguideline.pdf>

² Find the report here: http://www.mind.org.uk/assets/0000/2138/ecotherapy_report.pdf

³ <http://2010healthandwellbeing.org.uk/index.php>

⁴ www.naturalhealthservice.org.uk

“Be curious. Catch sight of the beautiful. Remark on the unusual. Notice the changing seasons. Savour the moment, whether you are walking to work, eating lunch or talking to friends. Be aware of the world around you and what you are feeling. Reflecting on your experiences will help you appreciate what matters to you”⁵

In other words, the Take Notice group are promoting mindful ways of engaging with the world as an approach to wellbeing.

The Mersey Forest has an interest in finding ways to develop “Take Notice” within the natural environment, mindfulness in the outdoors, as part of what they offer within the Natural Health Service. They consequently have an interest in looking at evidence and examples of how mindfulness approaches have been applied in natural and outdoor settings, specifically woods and forests.

The aim of this evidence review is to support the Mersey Forest’s interest and intent by producing a summary of the available evidence relating to mindfulness in natural, and specifically forest settings.

The specific objectives were to:

- 1 Identify the range of mindfulness approaches practiced in natural and woodland/forest settings
- 2 Summarise the available evidence relating to the impacts of these approaches
- 3 Summarise any lessons learned about the design and implementation of practice and projects.

The research method followed the general guidelines for undertaking a Rapid Evidence Assessment (REA) developed to support policy in making best use of a mixture of evidence sources (Government Social Research, 2010).

Table 1. Keywords and search terms used in REA literature review

Mindfulness AND:	forest* OR wood*
mental health AND alternative therapy AND:	natur*
Ecotherapy AND:	outdoors
Forest* OR wood* AND:	greenspace
Forest Bathing OR Shinrin-yoku	therapy
	walking
	meditation

⁵ Find summary and report here <http://www.neweconomics.org/projects/entry/five-ways-to-well-being>

A literature search of academic and grey literature, was undertaken using both academic on-line databases (Scopus, Ingenta, Science Direct, Scirus) and internet search engines (Google scholar, Bing). The key search terms that were employed are shown in Table 1.

An initial set of 184 documents was generated. Of these 132 related to the links between mental health and physical health improvements and spending time or exercising in natural spaces and forests in a general sense. A total of 52 documents related specifically to mindfulness approaches and nature. Just 37 of these discussed the theoretical links between mindfulness and nature as well as practice and the evidence of impact within woodlands and forest settings.

All of the documents were collated in an ENDNOTE database. The key information in the 52 mindfulness documents was summarised through standard content analysis techniques identifying main trends and essential evidence. A selection of the other 132 general documents was used in this review to set the general context.

Network of contacts was built up through snowball sampling as the best means of finding examples of practice and projects dealing with mindfulness in woodlands and forests. A total of 46 people became part of this knowledge network and they provided information about sixteen different projects and counsellors using mindfulness in natural contexts.

3. Wellbeing links to nature: A significant evidence base

There is now a very large and growing literature evidencing the links between the natural environment and people's general health and wellbeing. Some of the key issues and research reviews are summarised in this section as a way of setting the context into which mindfulness approaches to wellbeing are situated.

Chalquist (2009) draws our attention to some startling facts. He points out that "as of the 1980s, we who live in highly industrialized nations began spending more than 90% of our lives indoors" and that by "various estimates our time outside has since shrunk to 1%–5%". Environmental psychologists in particular have insisted that the physical and psychological problems of modern society are associated with this disconnection between human beings and their natural environment. Wilson (1984) put forward the "biophilia" to explain the observed effects. His hypothesis postulated that humans are "hard-wired" through evolution to hold an emotional and psychological attachment to nature. Placing people apart from nature disrupts our connection with nature and can lead to negative impacts on wellbeing (Wilson and Kellert, 1993).

The most widely accepted studies hypothesising the mechanisms behind came from Kaplan and Kaplan (Kaplan and Kaplan, 1989, Kaplan, 1995), and Ulrich and colleagues

(Ulrich et al., 1991, Ulrich, 1984). They promoted the idea of the “restorative” effects of natural environments which eased “mental fatigue” and acute physical symptoms of stress brought about by modern living and working conditions. These ideas were quickly taken up and promoted by a number of health programmes and research institutions.

In the UK the NICE guidance on Physical Activity and the Environment published in 2008 ⁶ highlighted the need for more research uncover how the environment influenced behaviour and attitudes that had an impact on physical activity and associated health benefits. Since then several comprehensive reviews of the links between physical and mental wellbeing and the impact of a broad range of natural contexts including woods, gardens, parks and areas of wild greenery have been undertaken (see for example: Natural England, n.d, Natural England, n.d., Wilson et al., 2008, De Vries, 2001, Giles-Cort and Donovan, 2003, Cooper et al., 2008, Natural England, 2009a, Natural England, 2009b, Barton and Pretty, 2010, Faculty of Public Health and Natural England, 2010, Logan and Selhub, 2012). This and subsequent research provides evidence showing that the effects of green spaces on human mental and physical are very wide ranging and significant.

The pattern of findings is well summarised by a study undertaken by the University of Glasgow (Mitchell and Popham, 2008). This research found, that for England as a whole, people living closer to green space had lower death rates and less heart disease. A follow-on piece of research used self reported wellbeing and mental health scores from national surveys to test whether physical activity in a natural environment might produce greater mental health benefits than physical activity elsewhere. The results showed an independent association between regular use of natural environments and a lower risk of poor mental health, but not for activity in other types of environment (Mitchell, 2012). A large sample survey dataset including more than 10,000 respondents was interrogated by White et al (2013b), showed that was little evidence of different activities (e.g. walking, exercising) impacting “restoration”, different kinds of natural settings had a positive impact on surveys respondent’s recalled feelings of “being refreshed”. Additional data from a panel survey confirmed that greenspace in people’s environment increased self reported happiness and wellbeing (White et al., 2013a).

The quality of greenspace appears to have an impact on people’s willingness to access the outdoors: De Jong et al (2012) researching in Sweden, show an association between levels of physical activity and better quality greenspace; In the USA the loss of trees across the landscape due to a significant pest, the emerald ash borer, was associated with an increase in human mortality related to cardiovascular and lower-respiratory-tract illness (Donovan et al., 2013) supporting the hypothesised connection between tree-rich environments and people’s willingness to get out and exercise.

⁶ Available from: <http://www.nice.org.uk/guidance/index.jsp?action=byID&o=11917>

The cost effectiveness implications of access to greenspace have also been assessed in terms of the economic value of parameters such as treatments averted. Although figures vary and are subject to sensitivity analysis acceptable to key stakeholders, the provision of greenspace, particularly in urban environments has a significant economic value as it relates to health benefits (Harnan et al., 2011, Health Council of the Netherlands, 2004, Sarajev, 2012).

The evidence base may be impressive, but gaps in knowledge remain. For example, Bell et al (2007) pointed out the patchy coverage of differential impact by social group, the effects of different kinds of environment including bluespace (e.g. watery features, rivers, coasts) as well as greenspace, and a major shortfall in the collection of consistent longitudinal indicators of change against baseline measures.

3.1. Wellbeing in urban greenspace

Most of the more recent research into the effects of nature on health and wellbeing looks at impacts in urban locations and on urban populations as significant policy and public health concerns. As early as (1996) Tanaka et al showed a positive benefit to the elderly in and around Tokyo, who appeared to live longer if they were resident close to areas with greenspace. De Vries (2001) calculated that in the Netherlands every 10% increase in urban green space represented a reduction in health complaints equivalent to making the population five years younger. Most recently in the UK White et al (2013a) show that levels of wellbeing are greater, and mental stress lower, in urban landscapes with larger areas of greenspace.

The distribution of greenspace in urban areas is not homogenous. In most developed countries the pattern of variation in provision of all types of green areas, including trees and woodland, reflects the socio-economic status of particular neighbourhoods. Areas of lower economic status generally tend to have less good quality greenspace (Crawford et al., 2008, SNIFFER, 2005, Boone et al., 2009, Perkins et al., 2004, Barbosa et al., 2007). This variation has been found to have a profound effect on the frequency and duration of visits made into the outdoors by local residents, which has associated impacts on health issues such as obesity and diabetes (Hillsdon et al., 2010, Crawford et al., 2008). Improving the quality of physical environments has consequently been identified as an important factor in reducing urban socio-economic health inequalities (Mitchell and Popham, 2008, Mitchell, 2012, Milbourne, 2012).

Research in Swedish urban areas (Peschardt and Stigsdotter, 2013, Stigsdotter and Grahn, 2011) found that nature, in whatever form, has a measurable effect on people's wellbeing, although the degree of benefit is greatest for the most stressed individuals. Similarly, access to any kind of greenspace in the urban work environment has also been shown to reduce stress (Lottrup et al., 2013), as can access to urban and community gardens (Adevi and Mårtensson, 2013, Milbourne, 2012). A recent study using

qualitative and quantitative markers of stress showed significant relationships between self-reported stress and patterns of cortisol secretion, and the quantity of green space in the living environment (Ward Thompson et al., 2012). Exercises performed in urban green environments have also been shown to lead to a significant improvement in self-esteem and moderation of mood disturbance (Hägerhäll, 2010, Health Council of the Netherlands, 2004).

However, other research has shown that variations in the types and locations of urban greenspace seem to have a differential effect on the degree of wellbeing impacts and outcomes. White et al (2013b) suggest that urban parks and urban playing fields have the least impact on wellbeing indicators compared to the impacts felt in coastal settings. Payne (2013) finds that urban parks have less of a restorative soundscape than rural areas but are more soothing than the soundscapes of purely built environments. Personal preferences, psychosocial motivation, age and other socio-economic variables and features such as vegetation colour and density have been shown to influence qualitative and quantitative health measures (e.g. Heart Rate Variability (HRV)) of urban populations (Qin et al., 2013, Wilkie and Stavridou, 2013, Peschardt and Stigsdotter, 2013, Grahn and Stigsdotter, 2010, Home et al., 2012).

3.2. Wellbeing impacts of woodlands and forests

In amongst this general greenspace literature and research, the wellbeing values of forests and woodlands has been investigated and reviewed in some depth (see for example: Tabbush and O'Brien, 2002, O'Brien, 2006, O'Brien et al., 2012, Snowdon, 2006, Weldon et al., 2007, Ward Thompson et al., 2010, Ward Thompson et al., 2013, O'Brien and Murray, 2007, O'Brien and Morris, 2013).

The qualitative studies and evidence reviews all show that the full range of beneficial restorative effects reported for other kinds of natural spaces and urban greenspace are present within urban forests and woodlands (Park et al., 2011). It is not uncommon too for there to be a greater inequality in the provision of wooded urban greenspace (Heynen, 2006) and the social distribution of beneficial impacts from woodlands (O'Brien and Morris, 2013).

In some contexts the degree of impact associated with woodlands may be greater than that in other environments. Fuller et al (2007) suggest that this may be because the restoration values of nature increase with increasing levels of biodiversity and woodlands or forests tend to be the most diverse kinds of habitats, particularly in urban contexts. White et al (2013b) confirm that within their large sample study, only two specific environmental types woodlands/forests and hills/moorland/mountains were associated with levels of restoration comparable to coastal locations. This included woodlands and forests in, and close to, urban areas.

However, some research does investigate the negative associations between wellbeing and forests. Despite the generally positive affect of nature on human wellbeing, woodlands tend to be one of the natural settings which can be “non-restorative”. Woodlands and forests might be associated with negative cultural connections, they may be particularly unfamiliar landscapes to urban people and can instil feelings of fear and anxiety. This is particularly true where the woodland is poorly maintained or densely planted, if they are dark, and restrict visibility and people perceive them to provide hiding spaces for unknown threats such as muggers and thieves (Gatersleben and Andrews, 2013, Jorgensen and Anthopoulou, 2007, Jansson et al., 2013, Logan and Selhub, 2012). However, it is worth noting that design guides are now being developed which provide advice and key principles in designing greenspace that encourages access and promotes wellbeing (see for example Schakell and Walter, 2012).

4. Mindfulness approaches in woods, forests and natural spaces

Having set the general context of health and wellbeing connections with the environment and with woods and forests, this section turns to the place of mindfulness within this spectrum of research and practice. The section begins with the general definition of mindfulness used to guide which evidence has been included. A series of sub-sections follows: these examine and summarise the detailed research of specific practice approaches within woodlands, including the impacts and outcomes where these are documented.

4.1. Defining mindfulness

The term “mindfulness” does not refer to a single practice, but to a range of practice-based approaches seeking to focus an individual’s mind and attention on breathing and patterns of thought as a means to managing emotions, feelings, habitual patterns of behaviour and unregulated critical reactions to events (Leary and Tate, 2007).

Running through all these approaches and therapies is practice to increase ‘awareness’ of the self and the environment, ‘taking notice’ of the present thoughts and conditions, including one’s surroundings and how these impact on the body. Worsfold (2013) describes mindfulness as:

“denot[ing] a certain quality of awareness of present experience including habitual reactions to that experience to discover a mode of body awareness based on the direct experiencing of body sensations”

Germer (2005), adds some detail to this description and suggests that mindfulness can be used:

“to describe a theoretical construct (mindfulness), the practice of cultivating mindfulness (such as meditation) or a psychological process (being mindful)”.

In a clinical and medical context mindfulness is most commonly practised as Mindfulness Based Stress Reduction (MBSR), Mindfulness Based Cognitive Behavioural Therapy (MBCBT), Acceptance-Based Stress Therapy (ABST) and Acceptance Commitment Therapy (ACT). These techniques are largely psychotherapeutic approaches aimed at tackling specific physiological, psychological and wellbeing issues (Melbourne Academic Mindfulness Interest Group, Bishop et al., 2004, Leary and Tate, 2007). However, with roots in Taoist, Buddhist and other Eastern contemplative philosophies, mindfulness is often practised in more meditative and spiritual forms. Mindfulness may also be practiced through very informal and loose routes of self reflection, contemplation and simply taking time to stop and notice the self or place “in the moment”.

4.1.1. Efficacy of different mindfulness approaches

Research and reviews of the effects and clinical efficacy of mindfulness show excellent results in terms of stress reduction and the treatment of a range of different physiological and psychosocial conditions, including: depression and anxiety; mood and personality disorders; aggression and interpersonal communication; immune system functioning; response to cancer treatments; heart rate variability; blood pressure; and substance dependency (see for example: Grossman et al., 2004, Davidson et al., 2003, Dunn et al., 2007, Selby and Joiner, 2009, Chiesaa and Serrettia, 2010, Hofmann et al., 2010, Nykcek et al., 2010, Keng et al., 2011, Cramer et al., 2012, Klainin-Yobas et al., 2012, Thompson et al., 2012, Worsfold, 2013). There is a strong correspondence between the parameters and measures used to evaluate mindfulness approaches and those employed in the general studies of physical and mental health reviewed in the introductory sections of this review. These parameters include both qualitative measures of psychological factors, for example, SF-36, SF-12 ⁷, self perceived stress, significant event histories, and quantitative measures of physiological factors, for example, blood pressure, heart rate and heart rate variability (HRV) ⁸, and salivary cortisol levels ⁹.

However, despite these positive results there is a growing view from practitioners and researchers that sounds a warning against the mainstream acceptance of mindfulness which leads to a reductionist clinical application of mindfulness as another form of “cure”

⁷ These are international Quality of Life standard health surveys, more information can be found here: <http://www.iqola.org/instruments.aspx>

⁸ High Frequency HRV is lowered in association with increased anxiety, stress, and mood disturbance, and low HRV is also predictive of aging and risk of cardiac failure

⁹ Cortisol is a hormone produced in response to stress

to ailments: Greater potential remains in the promotion of mindfulness as a way of being or mode of living (see for example Khong, 2009).

4.2. Mindfulness in woods and forests

The majority of the research into mindfulness examines impacts on patients and practitioners who undertake shorter or longer mindfulness therapies in indoor settings such as hospital and care centres, training venues, retreats and on a one-to-one basis with individual counsellors, psychotherapists and psychologists.

This is not all together surprising because working with mindfulness in the outdoors does present challenges to both practitioner and client whatever mindfulness-based approach is being used. There is a successful example of nature being used as part of psychotherapy practice conducted in an urban park (Greenleaf et al., 2013) and evidence that mindful (engaged) walking can enhance the benefits gained from outdoor exercise (Duvall, 2011). But careful attention needs to be paid to the therapeutic frame of reference, and to assessing the impacts of how this might be altered by moving outside (Owens et al., 2012). Jordan and Marshall (2010) and Greenleaf et al (2013) provide a detailed discussion of how taking mindfulness-based therapies into the outdoors not only changes the relationship between therapist and client, but can have an impact on the associated ethical, confidentiality and organisational difficulties. Implementing this kind of practice in outdoor settings requires sensitive and careful resolution and planning.

Though not examining mindfulness in outdoor contexts, there are some general theoretical studies of mindfulness and nature exploring “nature connectedness” and making links to the early work of Kaplan and other environmental psychologists. Kaplan (2001) for example, provided a comparison of his nature centred Attention Restoration Therapy (ART) approach and mindfulness as meditation, and concluded a synthesis of both approaches would provide a most powerful tool for improving wellbeing. The theoretical discussion centres on “nature connectedness” being built through mindfulness practice, internal awareness, and attention to self and place (Horesh, 1998, Cloke and Jones, 2003, Mayer and Frantz, 2005, Nisbet et al., 2009, Leary and Tate, 2007, Howell et al., 2011, Wilson, 2011, Richardson and Hallam, 2013). This research does not however, provide a consensus over any connection or causal relationships between mindfulness, health and wellbeing and nature. A greater feeling of connection with nature may strengthen the effects of both mindfulness and well-being impacts, but by the same token, a greater sense of connection with nature might come about as a result of mindfulness practice or feelings of enhanced well-being (Cloke and Jones, 2003, Richardson and Hallam, 2013). In some cases the research goes so far as to consider the need for nature to be brought into the clinical setting, rather than the therapeutic practice to be taken outdoors (see for example Chalquist, 2009).

This review has uncovered five broad practice-based approaches involving mindfulness in nature with examples that document experience and evaluative evidence. These are:

- Forest bathing or *Shinrin-yoku*
- Forest Walking
- Mindfulness and CBT approaches in woodland contexts
- Forest Therapy and Ecotherapy
- Ecopsychology

The following sections summarise the evidence associated with each of these approaches.

4.2.1. Forest Bathing – *Shinrin-yoku*

Some commentators believe that the idea of “forest bathing” can be traced back to Kneipp Therapy which was developed by Sebastian Kneipp in Germany during the mid 19th century. Kneipp is famous for hydrotherapy cures, but he also recommended walking in forests, barefoot and through streams as a route to mental and physical health (Morita et al., 2008). However, forest bathing is now a term more likely applied to *Shinrin-yoku*, an approach developed in Japan. The Forest Agency of the Japanese government launched the “*Shinrin-yoku* Plan” in 1982, with the aim of encouraging people to use forests as therapeutic relaxation and a means to manage their stress.

As the Plan established itself an increasing number of research studies through the 1990s began to measure and assess the impact of *Shinrin-yoku*, and investigate the physiological mechanisms responsible. Since 2004, a well known research team at the Chiba University and Forestry and Forest Products Research Institute have done some of the most detailed quantitative and longitudinal studies which now cover over 20 forest sites and several thousand participants.

This review found a total of 18 papers covering the practice and impacts of forest bathing.

Shinrin-yoku varies in the way it is undertaken. It may be practiced by walking through a forest mindfully, taking in the forest air, working with the breath, sitting and observing, and making an emotional connection with the forest environment (Miyazaki and Motohashi, 1995). It might also be more about simply spending time in, and gaining a therapeutic effect from a forest visit. Depending on the forest and the programme, *Shinrin-yoku* may therefore encompass explicit mindfulness practice and techniques or be a more informal experience involving “being mindful” implicitly.

A significant body of research work demonstrates how *Shinrin-yoku* facilitates an holistic mind-body therapy (Ohtsuka et al., 1998b, Yamaguchi et al., 2006, Morita et al., 2007, Park et al., 2007, Tsunetsugu et al., 2010, Lee et al., 2011b, Lee et al., 2011a, Mao et al., 2012b, Tsunetsugu et al., 2013). The Japanese and Korean research organises itself around the five senses to show that forest bathing has positive affects on:

- **Stress levels**

When *Shinrin-yoku* was compared to walking in alternative settings such as urban areas, the forest walks were found to reduce stress levels measured using blood pressure, pulse rate, heart rate variability (HRV) and salivary cortisol (Park et al., 2007). HRV heart rate variability read alongside with pulse rate and cerebral activity in the pre-frontal area showed the positive impact of forest bathing by increasing parasympathetic measures and decreasing sympathetic parameters (Tsunetsugu et al., 2007, Park et al., 2010). Alternative measures using salivary amalyse and immunoglobulin as bio-markers (Yamaguchi et al., 2006), near-infrared spectroscopy (NIRS) to measure changes in oxygenated and deoxygenated haemoglobin associated with brain activity, and an index of central nervous activity (Tsunetsugu et al., 2010), all provide similar demonstrations of the ability of forest bathing to reduce stress and increase relaxation. Qualitative assessments of feeling refreshed, relaxed, and more comfortable have all been shown to improve after periods in the forest (Tsunetsugu et al., 2011), whilst feelings of hostility and depression have been shown to decrease (Morita et al., 2007).

- **Diabetes**

Eighty-seven (29 male and 58 female) non-insulin-dependent diabetic patients took part in this study (Ohtsuka et al., 1998a). *Shinrin-yoku* was performed nine times over a period of 6 years. On each occasion after forest walking mean blood glucose levels were shown to decrease from 179 (SEM 4) mg.100 ml⁻¹ to 108 (SEM 2) mg.100 ml⁻¹ (P < 0.0001). The level of glycated haemoglobin A1c also decreased from 6.9 (SEM 0.2). The researchers believed that these positive impacts were brought about because the forest environment caused changes in hormonal secretion and autonomic nervous functions. In addition increased calorie consumption prompted by the physical exercise improved insulin sensitivity. Their conclusion was that forest bathing has significant beneficial effects on those suffering with diabetes.

- **Sight**

Photos of culturally significant *Sakuri* (cherry blossom) were compared with images of *Shinrin-yoku* (people walking in the forest) to track visual stimulation. The cherry blossom was described by participants as “awakening” and showed a measurable increase in pulse rate and blood pressure. In contrast forest bathing was described as refreshing and relaxing and prompted decreased blood pressure levels (Suda et al., 2001). Similarly, showing people images of walking and meditating in forest environments compared with similar activities non-forest locations had positive affects

on the mood of participants (Oishi et al., 2003). Tsunetsugu et al (2013) showed the same sort of reactions when testing the responses of young male urban residents to the sight of different urban forest landscapes.

- **Smell**

Work in both the laboratory and the forest has demonstrated that forest smells contribute to the effects of forest bathing. Qualitative assessments suggest that forest scents induce various biological effects and may cause changes in physiological functioning. Investigation in the laboratory has shown how phytoncides (the volatile and non-volatile substances) produced by forest trees and other plants and inhaled by humans, have an influence on physiological parameters. Research has demonstrated reduced levels of stress, anxiety and depression, and positive effects on the immune system induced by phytoncides (Tsunetsugu et al., 2010).

- **Sound**

Katsumata et al (2003) and Yamada (2003) examined the psychological and physiological effects of hearing the sound of wind blowing through coniferous and broadleaf trees, and the murmuring of forest streams. Both were found to have stress relieving properties measured as the reduction of systolic blood pressure and reduced levels of brain activity.

- **Touch**

Tsunetsugu et al. (2010) report on previous work which shows how interior wood and wooden objects elicit favourable emotional responses compared to other natural or man-made materials. Mao et al (2012b) also investigated the qualitative properties of wood experienced by participants and found positive reactions. Researchers therefore hypothesise that the touch and feel of wood within the forest environment is also likely to contribute to the overall impact of forest bathing.

The most recent reviews of the research into forest bathing in Japan (for example Tsunetsugu et al., 2010) recognise that more research outside of the lab would be beneficial to furthering understanding of the longer term outcomes of forest bathing. Additional research could also identify more closely the differential benefits of forest bathing for different segments of the population in terms of socio-demographic characteristics. For example, the evidence relating to the positive effects of *Shinrin-yoku* on managing hypertension and stress in the elderly was not conclusive (Mao et al., 2012a, Morita et al., 2011). Increasing the variety of forest settings in which *Shinrin-yoku* is carried out and researched would also be helpful in identifying which forest settings are the most appropriate for certain therapeutic effects. Researchers mention too the need for the development of novel systems of assessment that can capture the holistic benefits of *Shinrin-yoku* in a less reductionist way than has been the case to date.

4.2.2. Forest Walking

Walking is an essential part of *Shinrin-yoku* programmes, and mindful movement such as meditative or mindful walking is recognised as part of mindfulness practice.

A total of seven papers were found relating to forest walking.

The effects of walking under forest environments on cardiovascular and metabolic parameters has been the subject of study for a number of researchers, who have shown that habitual walking in forest environments may lower blood pressure and blood hormone levels (see for example, Li et al., 2011). Programmes such as “Walking the Way to Health” demonstrated significant cost benefits against conventional approaches of tackling obesity and depression which ever economic model was employed (Natural England, 2009a).

Differences between meditative and athletic walking were tested in forest environments compared with indoors in Korea (Shin et al., 2013). The State-Trait Anxiety Inventory-X, Rosenberg Self-Esteem Scale, and Happiness Index for Koreans were measured before and after walking. Meditative walking (defined as walking using mindfulness practice focusing on breathing and the sensations of walking) had greater effects than athletic walking, whether in the forest or in the gym. Overall the meditative walking in the forest showed the greatest level of benefits. Shin et al (2011) also tested the impacts of meditative walking on cognitive function. Using a sample of 60 university students, they showed that cognitive function and mood both improved as a consequence of walking in a forest compared with an urban environment. Students were able to perform intellectual tests more quickly and effectively, felt more relaxed and at ease after forest walking. Changing mood state as a consequence of forest walking has been recorded by other researchers too (see for example, Osaki et al., 2005).

In other studies there was a differential impact in physical stress and mental stress measures. In one survey of forest walkers (Toda et al., 2013), measured cortisol levels did not increase but chromogranin A (CgA) did increase. This indicated that physical stress increased whilst mental stress did not. Participants in this research reported corresponding feelings of being both uplifted and tired, and a subjective perception of significant stress reduction after the walk (Toda et al., 2013).

Comparisons of the differences in responses walking in wild compared with tended forests showed that there were more extreme positive and extreme negative reactions in the tended forests compared to the wilder settings (Martens et al., 2011). Yamada (2006) shows how it is possible to take these impacts into consideration when designing forest walks to take in landscape diversity as well as including soundscape diversity for increased therapeutic impact.

4.2.3. Mindfulness and CBT approaches in forest and woodland contexts

Although there are increasing numbers of practice-based projects and programmes undertaking MBCBT ¹⁰ and mindfulness approaches in forest and woodland contexts (see section 5 of this report), evidence within published literature found as a result of this review is very scanty. This review found three studies.

Kim et al (2009) describe the impacts of their programme using mindfulness in combination with Cognitive Behaviour Therapy (CBT). They included a mindful walk through forest before the CBT exercises, used the forest as a setting for that work, and included a mindfulness meditation. The mindfulness meditation concentrated on practice with the breath, awareness of wind in the forest, and other woodland sounds. Participants in this study who suffered from depression improved their depression rating scores, saw improved HRV and decreased salivary cortisol levels. Kim et al (2009) concluded that CBT-based psychotherapy applied in the forest environment was helpful in the achievement of depression remission. The effect was superior to that of psychotherapy performed in the more conventional indoor clinical setting. The remission rate of the forest group was 61% (14/23), significantly higher than both the hospital group undertaking similar CBT-based psychotherapy, (21%, 4/19) and the controls (5%, 1/21).

A small study involving 56 men and women on a programme of MBCBT undertaken within forest settings in Korea (Sung et al., 2012) measured changes to blood pressure (BP), salivary cortisol, and quality of life (QoL) scores in patients with hypertension. Although the programme did not induce prolonged systolic blood pressure (SBP) reduction, there was a significant decrease in cortisol level and improvement in QoL measures. The researchers concluded that this approach may be a useful model of community hypertension management amongst older participants.

The application of Acceptance-Based Stress Therapy (ABST) using mindfulness in a forest garden in Denmark was tested with a small pilot sample (Corazon et al., 2012). The early results showed that moving the psychotherapy outside, altered the relationship between the patient and the environment. The environment becomes important in the therapeutic process, and it also added a physical dimension to the therapy. Detailed studies of the qualitative and quantitative impacts of the therapeutic framework are expected late in 2013 as patients are brought into the programme.

4.2.4. Ecotherapy and Forest Therapy

The concept of “ecotherapy” was being debated as early as the late 1960’s as general environmental awareness spread through academic and populist consciousness (Rapaport, 1971). This review suggests that contemporary use of the term “ecotherapy”

¹⁰ Mindfulness Based Cognitive Behaviour Therapy

remains contentious amongst those involved in it's study. For some researchers "ecotherapy" represents an umbrella term encompassing all forms of clinical and therapeutic intervention with some reference to or use of nature (see for example Chalquist, 2009, Greenleaf et al., 2013). Following this generalised view Wilson, Ross, Lafferty, and Jones (2008) define ecotherapies slightly more narrowly as:

"the implementation of interventions aimed at improving psychological functioning through the use of green spaces".

In some ways this definition of ecotherapy does little more than encompass the general "green exercise" approaches that have weak connections with mindfulness. However, for others, ecotherapy represents applied ecopsychology, using a philosophy of "green care" where a range of different green settings including woods and forests allow self directed empowerment and healing through stewardship of nature (see for example Burls, 2008). For some researchers, it is "green care" which is the umbrella term, and ecotherapy is just one form of green care that sits alongside therapeutic horticulture, care farming, wilderness therapy, or adventure therapy (Hine et al., 2008, Parsons et al., 2010).

Mindfulness is included within these approaches in a very broad and often informal way, and tends to concentrate on self reflection, awareness of the environment and the effects on the body of being outdoors, with nature and in the landscape (Hickey, 2008).

A total of six papers dealing with ecotherapy or forest therapy approaches in woodlands were found.

Wilson et al (2008) reviewed the application and efficacy of ecotherapy as an approach used in conjunction with other interventions used by patients with mental health issues. Their review found that the holistic benefits of greenspace make ecotherapy particularly appropriate for clients who use secondary and tertiary mental health care services, and recommended broad application of this approach. Sackett (2010) describes the transformation of one individual after a summer involved in an ecotherapy-based programme. Mental health was promoted with improved levels of self awareness, self-worth and confidence. This was accompanied by a decrease in weight and lethargy. In another set of similar approaches, the aspect of ecotherapy that focuses on green exercise is closely aligned with the ideals of adventure therapy (Alvarez and Stauffer, 2001) which look for personal progression through stepping past comfort zones and opening the self to challenges (Burls, 2007; Mind, 2007a).

Forest therapies in particular use a mix of different activities that touch on mindfulness practice in different degrees in the same way as other types of ecotherapy. Depression and anxiety disorders have been treated with forest therapy in an urban fringe forest in Sweden (Nordha et al., 2009, Sonntag-Öström et al., 2011). In this context participants lived and worked in the forest for a period, undertaking educational activities and mentor led reflective practice. The qualitative and quantitative results both showed a majority of

the participants enjoyed general improvements to their physical health (better general functioning and fewer symptoms of illness) and mental state (improved self reported indicator scores). However, the quality of life benefits seemed to decline towards the end of the programme. Researchers suggested that this related to participants anticipating the end of the programme and their building worries about the future. Hickey (2008) reports on the working of a therapeutic community in Castle Douglas, Scotland. Run by the Buddhist Ropka Trust ecotherapies such as therapeutic gardening are employed along with mindfulness practice which is conducted indoors as well as outside and within the wooded grounds of the community. Impacts reported include improvements to mood and self reported mental health scores. The “Branching Out” programme supported by the Forestry Commission Scotland provides three hours a week for participants to take part in ecotherapy within the forest (Wilson et al., 2011). Mindfulness is implicit to the approach which concentrates on providing participants with useful work experience in the woods. The research of pre- and post attendance health scores using SF-12 and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS), did not show any improvement to mental health as a consequence of attendance even though physical activity levels were significantly improved (Wilson et al., 2011). In another example involving a partnership comprising Reforesting Scotland, the NHS, Argyll Green Woodworkers’ Association, the Scottish Association for Mental Health and Lochgilphead Community Council was formed to restore neglected woods next to the Argyll and Bute Hospital. This provided a natural space for the promotion of wellbeing activities including ‘mindfulness’ in patients – appreciating the present moment without anxiety about the past or future. For many patients in this hospital with mental health problems, cultivating mindfulness was an essential skill to learn. Clinicians describe how helpful the woodland setting was useful in cultivating this feeling of being in the present and represented an important forest therapy (Schakell and Walter, 2012).

4.2.5. Ecopsychology

The area of ecopsychology mirrors that of ecotherapy in so far as many of the papers found by this review concern the definition of ecopsychology and development of ontology, philosophy and heuristics connected with different ecopsychology perspectives and techniques (Kerr and Key, 2011, Key and Kerr, 2011). Conn (1998) says:

“Ecopsychology invites psychotherapy practice to expand its focus beyond the inner landscape, to explore and foster the development of community, contact with land and place, and ecological identity.”

Wilson (2011) makes a short statement of belief encapsulating the ecopsychology philosophy “We are in nature and nature is in us”. He says that this realisation should shift “preoccupation with our separateness and alienation from, and exploitation of nature” to an understanding that we are integrated with it. In essence ecopsychology looks to overcome the division between nature and culture, the original starting point for the current interest in the impacts of greenspace on wellbeing (Kaplan and Kaplan,

1989, Kaplan, 1995, Ulrich, 1984, Wilson, 1984, Wilson and Kellert, 1993). The manner in which ecopsychology is practised is very diverse is related to the practitioner's own affinity with nature as well as their exposure to and training in ecopsychology (Wolsko and Hoyt, 2012).

This review found three papers discussing ecopsychology in relation to woods and forests.

Ecopsychology looks to find therapies and therapeutic methods which can reunite people with natural phenomena (Davis, 1998, Horesh, 1998, Wolsko and Lindberg, 2013). Davis and Atkins (2009) and Clinebell (1996) consider ecopsychology to be the development of theory and technique which underpins ecotherapy as practice. The aim for Davis and Atkins (2009), is for psychotherapy to learn from non-Western, land based societies, about alternative forms of healing practice.

Davis and Atkins tested this alternative approach in their early development of a training course for students in the United States. They based the course around a weekend retreat in the woods in the Great Smoky Mountains National Park. (Davis and Atkins, 2012). Alternative approaches to counselling based on non-Western and traditional forms of healing, with an implicit integration of mindfulness techniques noticing the environment, and using the breath, were tested with students (Davis and Atkins, 2009, Davis and Atkins, 2012). The evaluation conducted at the end established a sense of rejuvenation in students, who were also able to use learning from their experiences to solve life problems. Wolsko and Lindberg (2013) confirmed the paucity of published data relating to mindfulness practice within ecopsychology approaches within natural settings, but "continue to hypothesize a positive association between mindfulness and connection with nature".

5. Examples of mindfulness practice in woods and forests in Great Britain

The review found a total of 16 different projects, programmes and counsellors using mindfulness practice in outdoor settings in Scotland, England and Wales. A list of contacts is included as Annex 1. The practice examples can be grouped into four main types:

1. Ecopsychologists and ecotherapists practising mindfulness (often more holistic and spiritual forms) with clients (individuals and groups) in natural settings including, mountains, woods and forests to improve natural connectedness and response to contemporary environments

2. Ecotherapists and ecopsychologists practising mindfulness (mainly MBSR and MBCBT) with clients (individuals and groups) in natural settings including, mountains, woods and forests to improve mental wellbeing and specific clinical conditions
3. Wellbeing projects working with clients (individuals and groups) where mindfulness is an implicit part of the therapeutic approach improving mental and physical wellbeing
4. Community-based projects using mindfulness in local woodlands to improve connection to place and local residents wellbeing.

The first approach fostering increased nature-connectedness is well illustrated by the [Eco-self project](#) based in the South West of England and Knoydart, Scotland ¹¹. The overall aim of the project is to encourage people to live within their ecological limits by developing individual ecological identities. The project runs “Wild Mindfulness” courses which run over the course of several days and take participants into wild and natural settings (including woodlands and forests) to “explore experiences of elemental nature” as a route to reconnect with the natural world, rejuvenate, and “inform the way we respond to current ecological crises”.

the ecoSelf project



About

The purpose of the ecoSelf project is to encourage people to live within ecological limits – motivated through an embodied sense of ecological identity.

This ‘ecological identity’, or sense of the ecological Self, is conscious that we are each part of the Earth’s wider ecology. We are ecological beings – totally dependant on, and interdependent with, the rest of nature.

Realising the ecological Self brings personal and ecological healing simultaneously. When the self is lived as nature, both are healed.

Wild nature seems to provide a powerful context for processes of ecological Self realisation to unfold naturally, so ‘wilderness work’ forms the core of my programmes and projects.

Currently I design and facilitation the [Natural Change Project](#) for WWF, and provide

Upcoming courses:

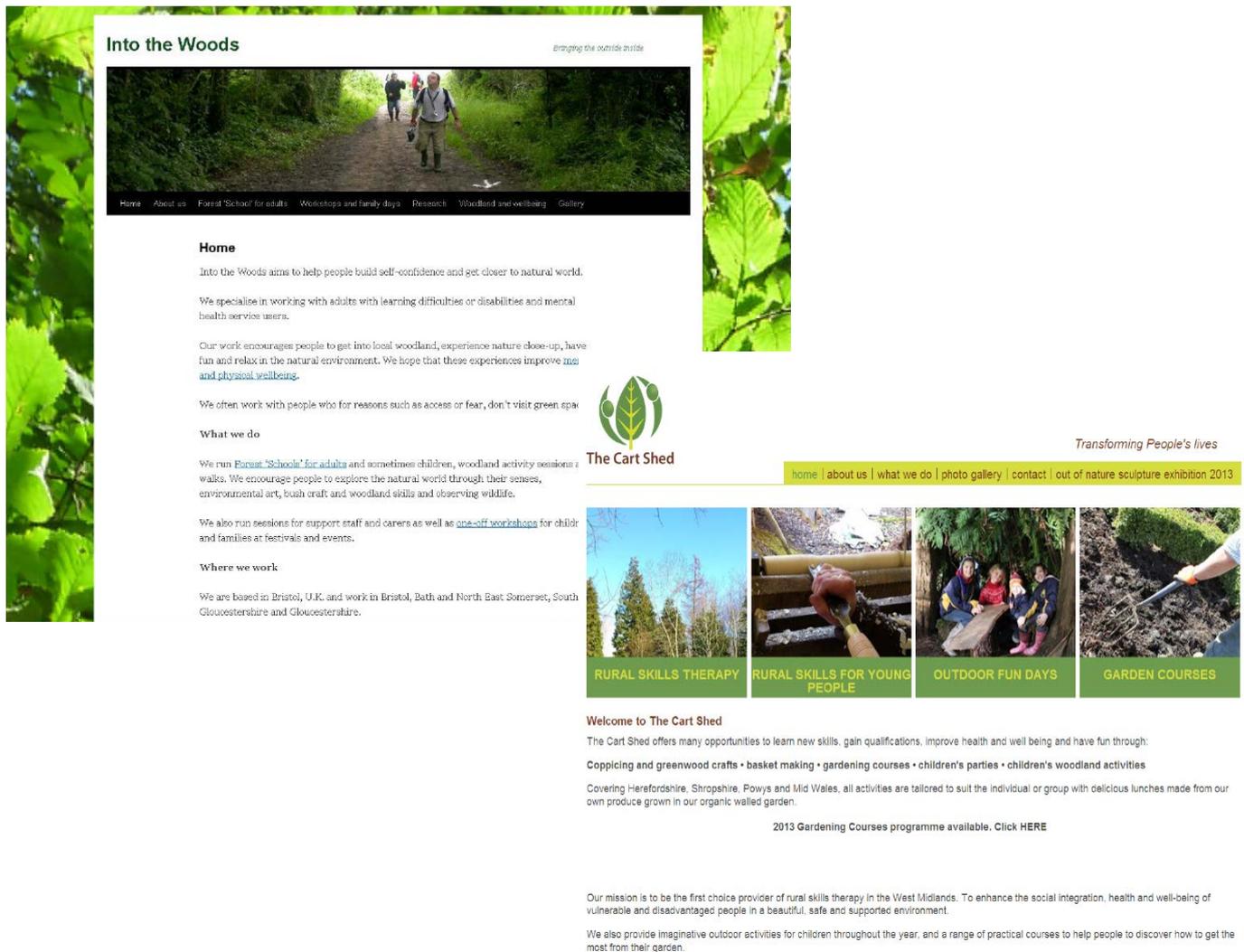
- [Introduction to Ecopsychology](#)
- [Online Distance Learning](#)
- [Wild Mindfulness](#)
- [Natural Change Courses](#)

Subscribe:

Email Address

¹¹ <http://www.ecoself.net/wildmindfulness/>

Examples of counsellors and ecotherapists working to improve the mental wellbeing of clients include [Wilderness Minds](#) based in North Wales, [Tao Mountain](#) based in Cumbria, and [Culture Probe](#) in Manchester. Mindfulness practitioners in each of these initiatives seek to employ MBSR and similar techniques within wild mountain, moorland and wooded settings, with the general aim of using the outdoors as a challenging and contemplative environment from which to draw “restoration” and experiences which help model behaviours that move forward from dwelling in the past or within unwanted responses. In the case of Tao Mountain there are examples of ecotherapeutic interventions using a more structured MBCBT approach within natural settings to help clients with specific mental health conditions. In the case of Culture Probe there is also a strong element of introducing mindfulness and ecopsychology as a route to sustainable working practice and bringing nature in to the working environment, improving working relationships and reducing work associated stress.



Into the Woods bringing the outside inside

Home | About us | Forest 'School' for adults | Workshops and family days | Research | Woodland and wellbeing | Gallery

Home

Into the Woods aims to help people build self-confidence and get closer to natural world.

We specialise in working with adults with learning difficulties or disabilities and mental health services users.

Our work encourages people to get into local woodland, experience nature close-up, have fun and relax in the natural environment. We hope that these experiences improve [minds](#) and [physical wellbeing](#).

We often work with people who for reasons such as access or fear, don't visit green space.

What we do

We run Forest "Schools" for adults and sometimes children, woodland activity sessions and walks. We encourage people to explore the natural world through their senses, environmental art, bush craft and woodland skills and observing wildlife.

We also run sessions for support staff and carers as well as [one-off workshops](#) for children and families at festivals and events.

Where we work

We are based in Bristol, U.K. and work in Bristol, Bath and North East Somerset, South Gloucestershire and Gloucestershire.


The Cart Shed Transforming People's lives

home | about us | what we do | photo gallery | contact | out of nature sculpture exhibition 2013


RURAL SKILLS THERAPY


RURAL SKILLS FOR YOUNG PEOPLE


OUTDOOR FUN DAYS


GARDEN COURSES

Welcome to The Cart Shed

The Cart Shed offers many opportunities to learn new skills, gain qualifications, improve health and well being and have fun through:

Coppicing and greenwood crafts • basket making • gardening courses • children's parties • children's woodland activities

Covering Herefordshire, Shropshire, Powys and Mid Wales, all activities are tailored to suit the individual or group with delicious lunches made from our own produce grown in our organic walled garden.

[2013 Gardening Courses programme available, Click HERE](#)

Our mission is to be the first choice provider of rural skills therapy in the West Midlands. To enhance the social integration, health and well-being of vulnerable and disadvantaged people in a beautiful, safe and supported environment.

We also provide imaginative outdoor activities for children throughout the year, and a range of practical courses to help people to discover how to get the most from their garden.

[Into the Woods](#) and [The Cart Shed](#) are examples of the third type of project integrating mindfulness in woodland settings. Both these initiatives are set up to provide woodland skills sessions which aim to deliver positive physical and mental health benefits to people from vulnerable backgrounds. This includes people with learning difficulties and those living with significant mental health conditions. Many of the participants are supported by local referrals and local health service funding through public service contracts or individual health budgets. In each of these two examples, working in the woodlands incorporates mindfulness in an implicit way. The Cart Shed enables participants to “just be” in the woodland, and draws people into a social setting where being aware of the moment in the woodland, the passing seasons, the sounds and smells is encouraged. Guided by the Five Ways to Health framework, Into the Woods aims to integrate mindfulness as “Taking notice” and uses a variety of educational and other techniques to encourage and help people to develop their awareness of the woodland environment and their connection with it as a way to broaden horizons and increase confidence and skills. It is interesting to note that both of these initiatives have had experiences where clients have not reacted very well to the woodland environment. Both projects stress that introducing people into environments which are very different from their every day experience takes skill and patience, and not all clients will necessarily respond positively to ecotherapeutic interventions (Into the Woods and The Cart Shed *pers comm*. September 2013).

[The Parish of St Michael and All Angels project](#) near Durham is an interesting example of a community based initiative to use mindfulness as one of a suite of activities following the Five Ways to Health framework in local woodland to improve wellbeing amongst the local community. Partly funded by the church and partly through health service funding streams, mindfulness practice is undertaken in the small woodland nature reserve, and is practiced in a variety of different ways including monthly “Mindfulness Walks”, incorporating contemplative meditation.



The Parish of St Michael and All Angels, Witton Gilbert

A project to help people find health and wellbeing

Encouraging community use of St Michael's Church and Witton Dene, a small local nature reserve which runs alongside.

At St Michael & All Angels Church

We seek to address issues of emotional health and wellbeing in fresh and imaginative ways.

We offer a church building in a delightful location, as a base for activities and courses.

We want to challenge the social inequalities and lifestyles that create social dis-ease

As the Parish Church in Witton Gilbert we are tackling issues of emotional health and wellbeing in our local communities by working with professionals and others to offer a variety of events and activities.

See below for upcoming activities.

- Nature a Larder: forage for brambles, elderberry, wild mushrooms etc and learn new recipes
- Walks of Awareness e.g. birds/insects/history
- Craft activities sourced from the local environment
- Silence soaked in 800 years of prayer and worship
- Creative Writing, Photography, Painting
- Working Parties in beautiful surroundings
- Celtic Spirituality that helps us to reconnect with the powerful

6. Conclusions

In conclusion this review has summarised a good deal of the most accessible evidence relating to mindfulness practice in woodland and forest settings. There are five broad approaches to mindfulness in natural contexts which have been researched or debated in the scientific literature. These are forest bathing, forest walking, MBSR and MBCT practiced in woodlands, ecotherapy/forest therapy and ecopsychology. There is a variety of evidence relating the impacts of these particular approaches. Clinical and neurological studies demonstrate quantitative physiological benefits, and assessments of less tangible mental states and attitudes have tracked improvements using qualitative self reporting scoring systems.

However, for evidence of the outcomes of mindfulness practice in outdoor settings is very limited. Only two of the found studies explicitly discuss remission rates from depression compared with other talking therapy treatments or medical interventions. This is a significant barrier to those wanting to demonstrate the value of mindfulness practice in natural settings to health professionals. Of the evidence in the found scientific literature, much of the evidence comes from a few country regions and from specially established scientific studies / clinical assessments rather than documenting effects and impacts from practice case studies. Assessments are mostly clinical in approach and tend not to assess and evaluate outcomes at a more holistic level.

Similarly studies of the non-restorative impacts of working in nature and in woodlands particularly are limited to two examples, even though this is a particularly problematic issue for urban populations, and vulnerable people, not comfortable with “wild” and wooded environments. On a related point, there is a distinct lack of elaboration within the mindfulness and nature literature of which kinds of people are likely to benefit most from this kind of therapy. Again this is a particular barrier to providing evaluation of client’s suitability to such ecotherapeutic approaches to wellbeing.

Finally, there is very little in the way of grey literature documenting practice examples or developing design guidelines, practice guidelines or case studies to share experiences amongst practitioners and those who may wish to commission mindfulness programmes in outdoor settings. There are a number of social networks for practitioners, so exchange is happening, but these avenues do not necessarily reach all interested audiences, and may not generate research and evidence of significant interest to health care commissioners and policy makers.

Hopefully, the limitations outlined here will be overcome as the range of mindfulness practices in woodlands and forests develop, collect more learning and evaluative evidence. The many new mindfulness and nature initiatives emerging are extending the value of woods and forests, and represent creative ways of following policy instruments such as the Five Ways to Health framework in England, as well as the central tenets of mindfulness practice.

7. References

- Adevi, A A & Mårtensson, F** 2013 Stress rehabilitation through garden therapy: The garden as a place in the recovery from stress. *Urban Forestry & Urban Greening* 12 230-37.
- Barbosa, O, Tratalos, J A, Armsworth, P R, Davies, R G, Fuller, R A, Johnson, P & Gaston, K J** 2007 Who benefits from access to green space? A case study from Sheffield, UK. *Landscape and Urban Planning* 83 187-95.
- Barton, J & Pretty, J** 2010 What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science and Technology* 44 3947-55.
- Bell, S, Montarzino, A & Travlou, P** 2007 Mapping research priorities for green and public urban space in the UK. *Urban Forestry & Urban Greening* 6 103-15.
- Bishop, S R, Lau, M, Shapiro, S, Carlson, L, Anderson, N D, Carmody, J, Segal, Z V, Abbey, S, Speca, M, Velting, D & Devins, G** 2004 Mindfulness: A Proposed Operational Definition. *Clinical Psychology: Science and Practice* 11 230-41.
- Boone, C G, Buckley, G L, Grove, J M & Sister, C** 2009 Parks and People: An Environmental Justice Inquiry in Baltimore, Maryland. *Annals of the Association of American Geographers* 99 767-87.
- Burls, A P** 2008 Seeking Nature: A Contemporary Therapeutic Environment. *International Journal of Therapeutic Communities: Special Edition "Green Care"* 29 228-44.
- Chalquist, C** 2009 A look at the ecotherapy research evidence. *Ecopsychology* 1 64-74.
- Chiesaa, A & Serrettia, A** 2010 A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine* 40 1239-52.
- Clinebell, H** 1996 *Ecotherapy: Healing ourselves, healing the earth* Fortress Press, Minneapolis, MN.
- Cloke, P & Jones, O** 2003 Grounding Ethical Mindfulness for/in Nature: Trees in Their Places. *Ethics, Place & Environment* 6 195-213.
- Conn, S A** 1998 Living in the earth: Ecopsychology, health and psychotherapy. *The Humanistic Psychologist* 26 179-98.
- Cooper, R, Boyko, C & Codinhoto, R** 2008 State-of-Science Review: SR-DR2. The Effect of the Physical Environment on Mental Wellbeing. Government Office for Science, London.
- Corazon, S S, Stigsdotter, U K, Moeller, M S & Rasmussen, S M** 2012 Nature as therapist: Integrating permaculture with mindfulness- and acceptance-based therapy in the Danish Healing Forest Garden Nacadia. *European Journal of Psychotherapy & Counselling* 14 335-47.
- Cramer, H, Lauche, R, Paul, A & Dobos, G** 2012 Mindfulness-based stress reduction for breast cancer-a systematic review and meta-analysis. *Current Oncology* 19 e343-52.

- Crawford, D, Timperio, A, Giles-Corti, B, Ball, K, Hume, C, Roberts, R, Andrianopoulos, N & Salmon, J** 2008 Do features of public open spaces vary according to neighbourhood socio-economic status? *Health Place* 14 889-93.
- Davidson, R J, Kabat-Zinn, J, Schumacher, J, Rosenkranz, M, Muller, D, Santorelli, S F, Urbanowski, F, Harrington, A, Bonus, K & Sheridan, J F** 2003 Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic Medicine* 564-70.
- Davis, J** 1998 The transpersonal dimensions of ecopsychology: Nature, nonduality, and spiritual practice. *The Humanistic Psychologist* 26 69-100.
- Davis, K M & Atkins, S S** 2009 Ecotherapy: Tribalism in the mountains and forest. *Journal of Creativity in Mental Health* 4 273-82.
- Davis, K M & Atkins, S S** 2012 Creating and Teaching a Course in Ecotherapy: We Went to the Woods *The Journal of Humanistic Counseling, Education and Development* 43 211-18.
- de Jong, K, Albin, M, Skarback, E, Grahn, P & Bjork, J** 2012 Perceived green qualities were associated with neighborhood satisfaction, physical activity, and general health: results from a cross-sectional study in suburban and rural Scania, southern Sweden. *Health Place* 18 1374-80.
- De Vries, S** 2001 Nature and health; the importance of green space in the urban living environment. *Proceedings of the symposium 'Open space functions under urban pressure'*. Ghent: 19-21 September 2001.
- Donovan, G H, Butry, D T, Michael, Y L, Prestemon, J P, Liebhold, A M, Gatzolis, D & Mao, M Y** 2013 The relationship between trees and human health: evidence from the spread of the emerald ash borer. *Am J Prev Med* 44 139-45.
- Dunn, E W, Brackett, M A, Ashton-James, C, Schneiderman, E & Salovey, P** 2007 On emotionally intelligent time travel: Individual differences in affective forecasting ability. *Personality and Social Psychology Bulletin* 85-93.
- Duvall, J** 2011 Enhancing the benefits of outdoor walking with cognitive engagement strategies. *Journal of Environmental Psychology* 31 27-35.
- Faculty of Public Health & Natural England** 2010 Great Outdoors: How Our Natural Health Service Uses Green Space To Improve Wellbeing. Faculty of Public Health, London.
- Fuller, R A, Irvine, K N, Devine-Wright, P, Warren, P H & Gaston, K J** 2007 Psychological benefits of green space increase with biodiversity. *Biological Letters* 3 390-94.
- Gatersleben, B & Andrews, M** 2013 When walking in nature is not restorative-the role of prospect and refuge. *Health Place* 20 91-101.
- Giles-Corti, i B & Donovan, R J** 2003 Relative influence of individual, social environmental, and physical environmental correlates of walking. *American Journal of Public Health* 93 1583-89.

- Government Social Research** 2010 Rapid Evidence Assessment Toolkit index (<http://www.civilservice.gov.uk/my-civil-service/networks/professional/gsr/resources/gsr-rapid-evidence-assessment-toolkit.aspx>) Accessed.
- Grahn, P & Stigsdotter, U K** 2010 The relation between perceived sensory dimensions of urban green space and stress restoration. *Landscape and Urban Planning* 94 264-75.
- Greenleaf, A T, Bryant, R M & Pollock, J B** 2013 Nature-Based Counseling: Integrating the Healing Benefits of Nature Into Practice. *International Journal for the Advancement of Counselling* 1-13.
- Grossman, P, Niemann, L, Schmidt, S & Walach, H** 2004 Mindfulness-based stress reduction and health benefits. *Journal of Psychosomatic Research* 57 35-43.
- Hägerhäll, C M** 2010 Forests, Human Health and Well-Being in Light of Climate Change and Urbanisation. *Forests And Society – Responding To Global Drivers Of Change*. IUFRO.
- Harnan, S E, Jorgensen, A, Tsuchiya, A, Goyder, L & Woods, H B** 2011 PHP58 Towards Cost-Effectiveness Analysis of the Health and Wellbeing Benefits of Urban Green Space: A Mapping Review. *Value in Health* 14 A343.
- Health Council of the Netherlands** 2004 Nature and Health: The influence of nature on social, psychological and physical well-being. Health Council of the Netherlands and Dutch Advisory Council for Research on Spatial Planning Nature and the Environment,, The Hague.
- Heynen, N** 2006 The Political Ecology of Uneven Urban Green Space: The Impact of Political Economy on Race and Ethnicity in Producing Environmental Inequality in Milwaukee. *Urban Affairs Review* 42 3-25.
- Hickey, B** 2008 Lothlorien Community: A Holistic Approach to Recovery from Mental Health Problems. *Therapeutic Communities* 29 261-72.
- Hillsdon, M, Jones, A & Coombes, E** 2010 Green space access, green space use, physical activity and overweight.
- Hine, R, Peacock, J & Pretty, J** 2008 Care Farming in the UK: Contexts, Benefits and Links with Therapeutic Communities. *International Journal of Therapeutic Communities: Special Edition "Green Care"* 29 245-60.
- Hofmann, S G, Sawyer, A T, Witt, A A & Oh, D** 2010 The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology* 78 169-83.
- Home, R, Hunziker, M & Bauer, N** 2012 Psychosocial outcomes as motivations for visiting nearby urban green spaces. *Leisure Sciences* 34 350-65.
- Horesh, T** 1998 Discovering and providing for the experience of nature. *The Humanistic Psychologist* 26 301-11.

- Howell, A J, Dopko, R L, Passmore, H-A & Buro, K** 2011 Nature connectedness: Associations with well-being and mindfulness. *Personality and Individual Differences* 51 166-71.
- Jansson, M, Fors, H, Lindgren, T & Wiström, B** 2013 Perceived personal safety in relation to urban woodland vegetation – A review. *Urban Forestry & Urban Greening* 12 127-33.
- Jordan, M & Marshall, H** 2010 Taking counselling and psychotherapy outside: Destruction or enrichment of the therapeutic frame? *European Journal of Psychotherapy & Counselling* 12 345-59.
- Jorgensen, A & Anthopoulou, A** 2007 Enjoyment and fear in urban woodlands – Does age make a difference? *Urban Forestry & Urban Greening* 6 267-78.
- Kaplan, R & Kaplan, S** 1989 *The experience of nature: A psychological perspective* Cambridge University Press, New York.
- Kaplan, S** 1995 The restorative benefits of nature: toward an integrative framework. *Journal of Environmental Psychology* 15 169-82.
- Kaplan, S** 2001 Meditation, Restoration and the Management of Mental Fatigue. *Environment and Behavior* 33 480-506.
- Katsumata, K, Kondo, M & Yamada, Y** 2003 Generating mechanisms for sound in forests. *Transactions of the Japanese Forestry Society* 114 152.
- Kemp, A H & Quintana, D S** The relationship between mental and physical health: Insights from the study of heart rate variability. *International Journal of Psychophysiology*.
- Keng, S-L, Smoski, M J & Robins, C J** 2011 Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review* 31 1041-56.
- Kerr, M H & Key, D H** 2011 The Ouroboros (Part 1): Towards an ontology of connectedness in ecopsychology research. *European Journal of Ecopsychology* 2 48-60.
- Key, D H & Kerr, M H** 2011 The Ouroboros (Part 2): Towards an Intersubjective-Heuristic Method for Ecopsychology Research. *European Journal of Ecopsychology* 1 2 61-75.
- Khong, B S L** 2009 Expanding the Understanding of Mindfulness: Seeing the Tree and the Forest. *The Humanistic Psychologist* 37 117-36.
- Kim, W, Lim, S K, Chung, E J & Woo, J M** 2009 The effect of cognitive behavior therapy-based psychotherapy applied in a forest environment on physiological changes and remission of major depressive disorder. *Psychiatry Investig* 6 245-54.
- Klainin-Yobas, P, Cho, M A & Creedy, D** 2012 Efficacy of mindfulness-based interventions on depressive symptoms among people with mental disorders: a meta-analysis. *International Journal of Nursing Studies* 49 109-21.
- Leary, M R & Tate, E B** 2007 The Multi-Faceted Nature of Mindfulness. *Psychological Inquiry* 18 251-55.

- Lee, J, Park, B J, Tsunetsugu, Y, Kagawa, T & Miyazaki, Y** 2011a [Physiological benefits of forest environment: based on field research at 4 sites]. *Nihon Eiseigaku Zasshi* 66 663-9.
- Lee, J, Park, B J, Tsunetsugu, Y, Ohira, T, Kagawa, T & Miyazaki, Y** 2011b Effect of forest bathing on physiological and psychological responses in young Japanese male subjects. *Public Health* 125 93-100.
- Li, Q, Otsuka, T, Kobayashi, M, Wakayama, Y, Inagaki, H, Katsumata, M, Hirata, Y, Li, Y, Hirata, K, Shimizu, T, Suzuki, H, Kawada, T & Kagawa, T** 2011 Acute effects of walking in forest environments on cardiovascular and metabolic parameters. *Eur J Appl Physiol* 111 2845-53.
- Lindwall, M, Ljung, T, Hadžibajramović, E & Jonsdottir, I H** 2012 Self-reported physical activity and aerobic fitness are differently related to mental health. *Mental Health and Physical Activity* 5 28-34.
- Logan, A C & Selhub, E M** 2012 Vis Medicatrix naturae: does nature “minister to the mind”? *BioPsychoSocial Medicine* 6.
- Lottrup, L, Grahn, P & Stigsdotter, U K** 2013 Workplace greenery and perceived level of stress: Benefits of access to a green outdoor environment at the workplace. *Landscape and Urban Planning* 110 5-11.
- Mao, G X, Cao, Y B, Lan, X G, He, Z H, Chen, Z M, Wang, Y Z, Hu, X L, Lv, Y D, Wang, G F & Yan, J** 2012a Therapeutic effect of forest bathing on human hypertension in the elderly. *J Cardiol* 60 495-502.
- Mao, G X, Lan, X G, Cao, Y B, Chen, Z M, He, Z H, Lv, Y D, Wang, Y Z, Hu, X L, Wang, G F & Yan, J** 2012b Effects of short-term forest bathing on human health in a broad-leaved evergreen forest in Zhejiang Province, China. *Biomed Environ Sci* 25 317-24.
- Martens, D, Gutscher, H & Bauer, N** 2011 Walking in “wild” and “tended” urban forests: The impact on psychological well-being. *Journal of Environmental Psychology* 31 36-44.
- Mayer, F & Frantz, C** 2005 The connectedness to nature scale: A measure of individuals feeling in community with nature. *Journal of Environmental Psychology* 24 503-15.
- Melbourne Academic Mindfulness Interest Group** Mindfulness-based psychotherapies: a review of conceptual foundations, empirical evidence and practical considerations. *Australian and New Zealand Journal of Psychiatry* 40 285-94.
- Milbourne, P** 2012 Everyday (in)justices and ordinary environmentalisms: community gardening in disadvantaged urban neighbourhoods. *Local Environment* 17 943-57.
- Mitchell, R** 2012 Is physical activity in natural environments better for mental health than physical activity in other environments? *Social Science & Medicine*.
- Mitchell, R & Popham, F** 2008 ‘Effect of exposure to natural environment on health inequalities: an observational population study. *The Lancet* 372 1655-60.

- Miyazaki, Y & Motohashi, Y** 1995 Forest environment and physical response. in **Agishi, Y & Ohtsuka, Y** eds *Recent progress in medical balneology and climatology*. Hokkaido University, Hokkaido.
- Morita, E, Fukuda, S, Nagano, J, Hamajima, N, Yamamoto, H, Iwai, Y, Nakashima, T, Ohira, H & Shirakawa, T** 2007 Psychological effects of forest environments on healthy adults: Shinrin-yoku (forest-air bathing, walking) as a possible method of stress reduction. *Public Health* 121 54-63.
- Morita, E, Iwai, Y & Agishi, Y** 2008 Forest use for health promotion in Germany. *Japanese Journal of Biometeorology* 45 165-72
- Morita, E, Naito, M, Hishida, A, Wakai, K, Mori, A, Asai, Y, Okada, R, Kawai, S & Hamajima, N** 2011 No association between the frequency of forest walking and blood pressure levels or the prevalence of hypertension in a cross-sectional study of a Japanese population. *Environmental Health and Preventative Medicine* 16 299-306.
- Natural England** 2009a An estimate of the economic and health value and cost effectiveness of the expanded WHI scheme. *Technical Information Note TIN055*. Natural England.
- Natural England** 2009b Our Natural Health Service.
- Natural England** n.d Health and Natural Environments - An evidence based information pack.
- Natural England** n.d. Our Natural Health Service The role of the natural environment in maintaining healthy lives. Natural England, London.
- Nisbet, E K L, Zelenski, J M & Murphy, S A** 2009 The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior* 41 715-40.
- Nordha, H, Grahn, P & Wahrborg, P** 2009 Meaningful activities in the forest, a way back from exhaustion and long-term sick leave. *Urban Forestry & Urban Greening* 8 207-19.
- Nykcek, I, van Son, J & Pouwer, F O** 2010 Two recently published meta-analyses on the effectiveness of mindfulness-based interventions: What should the reader make of it? *Journal of Psychosomatic Research* 69 613-14.
- O'Brien, E & Murray, R** 2007 Forest school and its impacts on young children: case studies in Britain. *Urban Forestry and Urban Greening* 6 249-65.
- O'Brien, L** 2006 "Strengthening heart and mind": using woodlands to improve mental and physical well-being. *Unasylva* 57.
- O'Brien, L & Morris, J** 2013 Well-being for all? The social distribution of benefits gained from woodlands and forests in Britain. *Local Environment: The International Journal of Justice and Sustainability*
<http://dx.doi.org/10.1080/13549839.2013.790354>.
- O'Brien, L, Morris, J & Stewart, A** 2012 The relationships between peri-urban woodlands and health and well-being. Forest Research, Farnham.

- Ohtsuka, Y, Yabunaka, N & Takayama, S** 1998a Shinrin-yoku (forest-air bathing and walking) effectively decreases blood glucose levels in diabetic patients. *Int J Biometeorol* 41 125-7.
- Ohtsuka, Y, Yabunaka, N & Takayama, S** 1998b Shinrin-yoku (forest-air bathing and walking): effectively decreases blood glucose levels in diabetic patients. *Int J Biometeorol.* 4 125-27.
- Oishi, Y, Kanazawa, S, Hiyane, A & Taguti, H** 2003 Comparison of forest image and mood: psychological examination in a forest environment using profile of mood states and semantic differential method. *Journal of the Japanese Forestry Society* 85 70-77.
- Osaki, K, Hirai, K, Tsuneto, S & Fujita, A** 2005 A few cases showing mood change caused by forest walking. *Transactions of the Japanese Forestry Society* 116.
- Owens, P, Springwood, B & Wilson, M** 2012 *Creative Ethical Practice in Counselling and Psychotherapy* Sage, London.
- Park, B-J, Furuya, K, Kasetani, T, Takayama, N, Kagawa, T & Miyazaki, Y** 2011 Relationship between psychological responses and physical environments in forest settings. *Landscape and Urban Planning* 102 24-32.
- Park, B J, Tsunetsugu, Y, Kasetani, T, Hirano, H, Kagawa, T, Sato, M & Miyazaki, Y** 2007 Physiological effects of Shinrin-yoku (taking in the atmosphere of the forest)--using salivary cortisol and cerebral activity as indicators. *J Physiol Anthropol* 26 123-8.
- Park, B J, Tsunetsugu, Y, Kasetani, T, Kagawa, T & Miyazaki, Y** 2010 The physiological effects of Shinrin-yoku (taking in the forest atmosphere or forest bathing): evidence from field experiments in 24 forests across Japan. *Environ Health Prev Med* 15 18-26.
- Parsons, S, Wilcox, D & Hine, R** 2010 What care farming is. *9th European IFSA Symposium, 7 July 2010*. Vienna (Austria).
- Payne, S R** 2013 The production of a Perceived Restorativeness Soundscape Scale. *Applied Acoustics* 74 255-63.
- Perkins, H A, Heynen, N & Wilson, J** 2004 Inequitable access to urban reforestation: the impact of urban political economy on housing tenure and urban forests. *Cities* 21 291-99.
- Peschardt, K K & Stigsdotter, U K** 2013 Associations between park characteristics and perceived restorativeness of small public urban green spaces. *Landscape and Urban Planning* 112 26-39.
- Qin, J, Zhou, X, Sun, C, Leng, H & Lian, Z** 2013 Influence of green spaces on environmental satisfaction and physiological status of urban residents. *Urban Forestry & Urban Greening*.
- Rapaport, H G** 1971 Ecotherapy. *Annals of Allergy* 29 101.

- Richardson, M & Hallam, J** 2013 Exploring the Psychological Rewards of a Familiar Semirural Landscape: Connecting to Local Nature through a Mindful Approach. *The Humanistic Psychologist* 41 35-53.
- Sackett, C** 2010 Ecotherapy: A Counter to Society's Unhealthy Trend? *Journal of Creativity in Mental Health* 5 134-41.
- Sarajev, V** 2012 Economic benefits of green space: A critical assessment of evidence of net economic benefits Forest Research, Edinburgh.
- Schakell, A & Walter, R** 2012 *Greenspace design for health and wellbeing* Forestry Commission, Edinburgh.
- Selby, E A & Joiner, T E** 2009 Cascades of emotion: The emergence of borderline personality disorder from emotional and behavioral dysregulation. *Review of General Psychology* 13 219-29.
- Shin, W S, Shin, C S, Yeoun, P S & Kim, J J** 2011 The influence of interaction with forest on cognitive function. *Scandinavian Journal of Forest Research* 26 595-98.
- Shin, Y-K, Kim, D J, Jung-Choi, K, Son, Y-j, Koo, J-W, Min, J-A & Chae, J-H** 2013 Differences of psychological effects between meditative and athletic walking in a forest and gymnasium. *Scandinavian Journal of Forest Research* 28 64-72.
- SNIFFER** 2005 Investigating environmental justice in Scotland: links between measures of environmental quality and social deprivation. SNIFFER, Edinburgh.
- Snowdon, H** 2006 Evaluation of the Chopwell wood health project. Report for Forest Research, Farnham.
- Sonntag-Öström, E, Nordin, M, Slunga Järholm, L, Lundell, Y, Brännström, R & Dolling, A** 2011 Can the boreal forest be used for rehabilitation and recovery from stress-related exhaustion? A pilot study. *Scandinavian Journal of Forest Research* 26 245-56.
- Stigsdotter, U K & Grahn, P** 2011 Stressed individuals' preferences for activities and environmental characteristics in green spaces. *Urban Forestry & Urban Greening* 10 295-304.
- Suda, R, Yamaguchi, M, Hatakeyama, E, Kikuchi, T, Miyazaki, Y & Sato, M** 2001 Effect of visual stimulation (I)-in the case of good correlation between sensory evaluation and physiological response. *Journal of Physiological Anthropology and Applied Human Science* 20 303.
- Sung, J, Woo, J M, Kim, W, Lim, S K & Chung, E J** 2012 The effect of cognitive behavior therapy-based "forest therapy" program on blood pressure, salivary cortisol level, and quality of life in elderly hypertensive patients. *Clin Exp Hypertens* 34 1-7.
- Tabbush, P & O'Brien, L** 2002 *Health and Well-being: Trees, Woodlands and Natural Spaces* Forestry Commission, Edinburgh.
- Tanaka, A, Takano, T & Nakamura, K** 1996 Health levels influence by urban residential conditions in a megacity — Tokyo. *Urban Studies* 33 8797-945.

- The Office for National Statistics** 2001 Psychiatric Morbidity. The Office for National Statistic, London.
- The Office for National Statistics** 2009 Adult Psychiatric Morbidity in England - 2007, Results of a household survey [NS]. The Office for National Statistic, London.
- Thompson, R J, Mata, J, Jaeggi, S M, Buschkuhl, M, Jonides, J & Gotlib, I H** 2012 The everyday emotional experience of adults with major depressive disorder: Examining emotional instability, inertia, and reactivity. *The Journal of Abnormal Psychology* 121 819-29.
- Toda, M, Den, R, Hasegawa-Ohira, M & Morimoto, K** 2013 Effects of woodland walking on salivary stress markers cortisol and chromogranin A. *Complementary Therapies in Medicine* 21 29-34.
- Tsunetsugu, Y, Lee, J, Park, B-J, Tyrväinen, L, Kagawa, T & Miyazaki, Y** 2013 Physiological and psychological effects of viewing urban forest landscapes assessed by multiple measurements. *Landscape and Urban Planning* 113 90-93.
- Tsunetsugu, Y, Park, B-J, Ishii, H, Hirano, H, Kagawa, T & Miyazaki, Y** 2007 Physiological Effects of Shinrin-yoku (Taking in the Atmosphere of the Forest) in an Old-Growth Broadleaf Forest in Yamagata Prefecture, Japan. *J Physiol Anthropol* 26 135-42.
- Tsunetsugu, Y, Park, B J, Lee, J, Kagawa, T & Miyazaki, Y** 2011 Psychological Relaxation Effect of Forest Therapy: Results of Field Experiments in 19 Forests in Japan Involving 228 Participants. *Jpn. J. Hyg.* 66 670-76.
- Tsunetsugu, Y, Park, B J & Miyazaki, Y** 2010 Trends in research related to "Shinrin-yoku" (taking in the forest atmosphere or forest bathing) in Japan. *Environ Health Prev Med* 15 27-37.
- Ulrich** 1984 View through a window may influence recovery from surgery. *Science as Culture* 224 420-21.
- Ulrich, R S, Simons, R F, Losito, B D, Fiorito, E, Miles, M A & Zelson, M** 1991 Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology* 11 201-30.
- Ward Thompson, C, Roe, J & Aspinall, S** 2010 Woodlands In and Around Towns (WIAT): a longitudinal study comparing perceptions and use of woodlands pre and post intervention (2006-2009). FINAL REPORT OpenSpace report for Forestry Commission Scotland, Edinburgh.
- Ward Thompson, C, Roe, J & Aspinall, P** 2013 Woodland improvements in deprived urban communities: What impact do they have on people's activities and quality of life? *Landscape and Urban Planning*.
- Ward Thompson, C, Roe, J, Aspinall, P, Mitchell, R, Clow, A & Miller, D** 2012 More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patterns. *Landscape and Urban Planning* 105 221-29.
- Weldon, S, Bailey, C & O'Brien, E** 2007 New pathways to health and well-being in Scotland: research to understand and overcome barriers to accessing woodlands. Report to Forestry Commission Scotland, Edinburgh.

- White, M P, Alcock, I, Wheeler, B W & Depledge, M H** 2013a Would You Be Happier Living in a Greener Urban Area? A Fixed-Effects Analysis of Panel Data. *Psychological Science*.
- White, M P, Pahl, S, Ashbullby, K, Herbert, S & Depledge, M H** 2013b Feelings of restoration from recent nature visits. *Journal of Environmental Psychology* 35 40-51.
- Wilkie, S & Stavridou, A** 2013 Influence of environmental preference and environment type congruence on judgments of restoration potential. *Urban Forestry & Urban Greening* 12 163-70.
- Wilson, E O** 1984 *Biophilia* Harvard University Press, Cambridge.
- Wilson, E O & Kellert, S (Eds.)** (1993) *Biophilia Hypothesis - A collection of invited papers supporting & refuting the biophilia hypothesis*, Washington DC, Island Press.
- Wilson, M** 2011 Encounters with nature as a path of self-realisation: A meaning-making framework. *Journal of Transpersonal Research* 3 11-29.
- Wilson, N W, Jones, R, Fleming, S, Lafferty, K, Knifton, L, Cathrine, K & McNish, H** 2011 Branching out: The impact of a mental health ecotherapy program. *Ecopsychology* 3 51-57.
- Wilson, N W, Ross, M K, Lafferty, K & Jones, R** 2008 A review of ecotherapy as an adjunct form of treatment for those who use mental health services. *Journal of Public Mental Health* 7 23-35.
- Wolsko, C & Hoyt, K** 2012 Employing the restorative capacity of nature: Pathways to practicing ecotherapy among mental health professionals. *Ecopsychology* 4 10-24.
- Wolsko, C & Lindberg, K** 2013 Experiencing connection with nature: The matrix of psychological well-being, mindfulness, and outdoor recreation. *Ecopsychology* 5 80-91.
- Worsfold, K E** 2013 Embodied Reflection in Mindfulness-Based Cognitive Therapy for Depression. *The Humanistic Psychologist* 41 54-69.
- Wright, K A, Everson-Hock, E S & Taylor, A H** 2009 The effects of physical activity on physical and mental health among individuals with bipolar disorder: A systematic review. *Mental Health and Physical Activity* 2 86-94.
- Yamada, Y** 2003 Subjective perception and physiological response in forest soundscape. *Transactions of the Japanese Forestry Society* 114 518.
- Yamada, Y** 2006 Soundscape-based forest planning for recreational and therapeutic activities. *Urban Forestry & Urban Greening* 5 131-39.
- Yamaguchi, M, Deguchi, M & Miyazaki, Y** 2006 The effects of exercise in forest and urban environments on sympathetic nervous activity of normal young adults. *J Int Med Res* 34 152-9.

Annex 1. Examples of mindfulness of projects/programmes/therapists working in natural/woodland contexts

	Name of project / programme / counsellor	Website
1	Ally Stott	http://www.allystott.co.uk/index.htm
2	Breathworks C.I.C	http://www.breathworks-mindfulness.org.uk/
3	Creeping Toad	www.creepingtoad.org.uk
4	Culture Probe	http://www.cultureprobe.co.uk/
5	Ecoself project	http://www.ecoself.net/wildmindfulness/
6	Grounds for Learning	http://www.ltl.org.uk/scotland/
7	Growing Action for Nature	http://www.davidhodd.co.uk
8	In to the Woods	http://intothewoodsuk.wordpress.com/
9	Kate Measures consulting	http://www.katemeasures.co.uk/
10	Micheal Wilson	http://www.michaelwilson.uk.com/
11	Psychospiritual Scotland	http://www.psychospiritual.co.uk/
12	Tao Mountain	http://www.taomountain.co.uk/
13	The Cart Shed	http://www.thecartshed.co.uk/
14	Trees in Mind - Reforesting Scotland	http://saveourwoods.co.uk/get-involved/national-campaigns/trees-in-mind-blarbuie-woodland-at-argyll-and-bute-hospital/
15	The Parish of St Michael and All Angels project	http://wittongilbert.durhamnorthteam.org/breathin gspace/
16	Wilderness Minds	http://wildernessminds.co.uk/contact-us/

All websites accessed between April-October 2013



The Mersey Forest
Risley Moss,
Ordnance Avenue,
Birchwood,
Warrington, [WA3 6QX](http://www.merseyforest.org.uk/)

Tel: 01925 816217

<http://www.merseyforest.org.uk/>

The Research Agency of the
Forestry Commission