



University of Essex



A literature review for The Wildlife Trusts:
By the University of Essex

Wellbeing benefits from natural environments rich in wildlife



Protecting **Wildlife** for the Future



University of Essex

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Acknowledgements

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Contents

	Page
List of Abbreviations	4
Acknowledgements	4
Executive Summary	5
1. Introduction	7
1.1. The Wildlife Trusts	7
1.2. Green Exercise Research Team	7
1.3. Background to research	8
1.4. Methodology	8
2. Wellbeing in the UK	9
2.1.1. What is wellbeing?	9
2.1.2. Five Ways to Wellbeing	9
2.2. Current challenges to wellbeing	10
2.2.1. Physical inactivity and obesity	10
2.2.2. Mental ill health, dementia and isolation	10
2.2.3. Health inequalities	11
3. Nature and wellbeing	13
3.1. Health and wellbeing benefits of contact with nature: The evidence	13
3.1.1. Benefits of natural views	14
3.1.2. Benefits of nearby nature	14
3.1.3. Benefits of exercise in nature – Green exercise	15
3.1.4. Nature-based interventions for vulnerable groups	16
3.1.5. The status of the current nature and health evidence base	17
3.1.6. Key findings: Nature and wellbeing evidence	17
3.2. Health and wellbeing benefits for natural environments rich in wildlife	17
3.2.1. Definition of biodiversity in this report	17
3.2.2. Ecosystem services and health and wellbeing	17
3.2.3. The importance of natural environments rich in wildlife and biodiversity	17
3.2.4. The status of the current biodiversity and health evidence base	18
3.2.5. Key findings: Biodiverse natural environments and wellbeing evidence	18
3.3. How nature contributes to the five ways to wellbeing	19
3.3.1. <i>Connect</i> - Nature, social interaction and connection to nature	19
3.3.2. <i>Be active</i> - Nature and physical activity	19
3.3.3. <i>Take notice</i> - Nature and mindfulness	20
3.3.4. <i>Keep Learning</i> - Learning through nature	20
3.3.5. <i>Give</i> - Nature, volunteering and giving to others	21
3.3.6. <i>Key findings</i> : Nature and the Five Ways to Wellbeing	21
4. Nature and wellbeing: Implications for policy and practice	22
4.1. Growing recognition of the influence of nature on wellbeing	22
4.2. Implications for Public Health and health and social care	22
4.2.1. Nature and current wellbeing challenges	22
4.2.2. Nature and health inequalities	23
4.2.3. Policy background	23
4.2.4. Opportunities for Local Authorities	24
4.2.5. Recommendations	25
4.3. Implications for Environmental conservation, land management and urban planning	26
4.3.1. Policy background	27
4.3.2. Recommendations	27
5. Conclusions	29
6. References	31
7. Appendix A	38

List of Abbreviations

AAI	Animal Assisted Interventions
ASD	Autistic Spectrum Disorder
CBD	Convention on Biological Diversity
CCG	Clinical Commissioning Group
Defra	Department for Farming and Rural Affairs
DoH	Department of Health
HT	Horticultural Therapy
HWB	Health and Wellbeing Board
LNP	Local Nature Partnership
MENE	Monitor of Engagement with the Natural Environment
NEA	National Ecosystem Assessment
Nef	New Economics Foundation
NHS	National Health Service
NICE	National Institute for Clinical Excellence
PHE	Public Health England
RCT	Randomised Controlled Trial
RSPB	Royal Society for the Protection of Birds
RSWT	Royal Society of Wildlife Trusts
STH	Social and Therapeutic Horticulture
TCV	The Conservation Volunteers
UCL	University College London
WHO	World Health Organisation

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Executive Summary

Background

There is an emerging body of evidence to indicate that contact with nature provides benefits for health and wellbeing. However, literature regarding the health and wellbeing benefits of natural environments rich in nature has been given less attention, particularly in relation to its outcomes for local communities. The Wildlife Trusts commissioned the University of Essex to conduct a literature review to identify existing work that assesses the health and wellbeing benefits of natural environments, with emphasis on those environments rich in wildlife.

Key findings

- Overall there is a large body of evidence from published peer-reviewed and grey literature to suggest that contact with a wide range of natural environments can provide multiple benefits for health and wellbeing.
- These benefits from nature include improvements to physical health (through increased physical activity); and improvements to psychological and social wellbeing, in a number of ways, including: reductions in stress and anxiety, increased positive mood, self-esteem and resilience, improvements in social functioning and in social inclusion.
- There is currently only limited reference to the 'quality' or to the level of biodiversity of the natural environment in the nature and health evidence base.
- Environments rich in wildlife are also associated with improved wellbeing, through emotional, social and psychological benefits. A recent systematic review (Lovell et al., 2014) also found evidence to suggest that biodiverse natural environments may be associated with good health and well-being with improvements ranging from better mental health outcomes, to associations with increased healthy behaviours.

Implications and recommendations

Several health and wellbeing issues face the UK (both at an individual and population level) creating real challenges for public health and for the statutory, voluntary and private sector organisations responsible for health and social care commissioning. These challenges include physical inactivity; the increase in obesity; growing mental ill health, dementia and social isolation; and continuing health inequalities.

In current times where there are real concerns about the burgeoning costs of maintaining good public health and tackling health inequalities, combined with the drive for integration in health and social care services, the multiple outcomes gained from nature-based initiatives

present a possible solution. The need for access to good quality nature has important policy implications for a wide range of sectors, including: public health, mental health and social care, social inclusion, the management of natural places and urban planning. The following recommendations are made:



Public Health - initiatives for the general population

- Increasing access to a wide range of nature based activities within society will provide benefits to public health and provide savings to the UK economy.
- Agencies responsible for providing health and social care services would benefit from recognising the importance of nature-based activities for increasing health and wellbeing within communities.
- Encouraging people to incorporate more green exercise and nature contact into daily routines has the potential to increase wellbeing for health promotion at the population level.
- Public health bodies and Health and Wellbeing Boards (and the equivalent in devolved nations) are urged to focus on increasing the amount, quality and use of natural places in order to improve community health outcomes and reduce health inequalities.

Health and social care - interventions for the vulnerable:

- Commissioners of health and social care services need to be encouraged to take the idea of nature-based interventions more seriously and GPs and other clinicians should be encouraged to consider and recognise the importance of 'Green Prescriptions'.
- The National Institute of Clinical Excellence (NICE) should also be called upon to recommend the use of nature-based interventions alongside other treatment as they represent another treatment choice for GPs, social care commissioners and service users.
- Health and social commissioning services should consider that nature-based activities are an enjoyable, socially acceptable treatment option and that the observed effect adherence levels could prove to be effective in encouraging uptake of treatment.
- Clinical Commissioning Groups (and their equivalents in the devolved nations) need to ensure that nature-based interventions are incorporated into the regional lists of services available for commissioning.
- Managers of nature-based interventions should be proactive in: i) promoting how nature-based interventions have multiple outcomes and are so are particularly suited to integrated health and social care; ii) ensuring that their programmes are included in the lists of services available for commissioning; and iii) target their bids to commissioners with the issues and needs of the particular region in mind, in order to show where a natural intervention may be more effective and appropriate.

Environmental conservation and urban planning

- Directors of Public Health should therefore use their roles to work with departments across local authorities to ensure health considerations are at the heart of planning decisions, particularly those regarding natural spaces.
- LNPs should ensure that urban and rural green spaces are preserved for the benefit of the nation, with planners and developers working to enhance green infrastructure and to encourage public access.
- Providers of nature-based interventions for the vulnerable should recognise the need for targeted advertising of the benefits of their service to service users on personalised budgets.
- The Wildlife Trusts should be encouraged to promote the health and wellbeing benefits of contact with nature more widely to members and non-members alike, to help to raise awareness and to increase nature contact within the UK population.

Conclusion

The significant improvements to wellbeing found as a result of contact with nature in this review have implications for not only the wellbeing and resilience of individuals but also for public health of communities and the management of natural environments. Could one answer to improving both the nation's health and natural places simultaneously be to encourage people to become more active outdoors and interact with nature? It is hoped that this report will give individual Wildlife Trusts an easily accessible and up to date insight into the scientific evidence for nature's potential to improve wellbeing and use it to convince funders of public health and of health and social care that nature is a valuable health resource and so should be preserved.

1. Introduction

1.1 The Wildlife Trusts

There are 47 Wildlife Trusts, covering the whole of the UK, plus the Isle of Man and Alderney. Each Trust is an independent, autonomous charity that is governed locally and is accountable to the local places and communities where they work. They each have local strategies and plans, but work together towards a common vision and share a movement-wide Development Strategy and governance structures that enable joint action where there is benefit in acting together. There are 37 Wildlife Trusts across England, one in Scotland, six in Wales and also one for each of Ulster, the Isle of Man and Alderney. Between them, The Wildlife Trusts have more than 800,000 members and manage more than 2,300 nature reserves which are visited by more than 7,000,000 people each year. Between them, The Wildlife Trusts directly engage more than 386,000 people in events and activities that bring them closer to nature, including 40,000 active volunteers.

The Royal Society of Wildlife Trusts (RSWT) is the central charity of The Wildlife Trust movement. It works to lead the development of The Wildlife Trusts, to make them more effective and efficient, and it provides the movement with a strong collective voice whenever one is needed. The Wildlife Trusts' shared vision is "an environment rich in wildlife for everyone", which they aim to achieve by creating a Living Landscape and securing Living Seas. The Wildlife Trusts collectively work to:

1. Demonstrate how nature works;
2. Inspire people and communities to value and take action for nature; and
3. Champion nature and their work.

Within these objectives, The Wildlife Trusts run a number of projects across the country intended to help improve physical and mental health and to contribute to a sense of wellbeing. The Trusts work in partnership with other organisations such as local NHS trusts, health charities and National Lottery funders for example, to offer access to nature as part of the therapeutic process. These projects take place in a wide variety of different places and landscapes and incorporate many different activities, all with the purpose of promoting health and wellbeing within communities. Much of the movement's other activity is also likely to produce health and wellbeing benefits (either incidentally or indirectly), though it is frequently not promoted in this light.

Collectively, The Wildlife Trusts believe that while a wildlife-rich, healthy natural environment is valuable in its own right and simply for the pleasure it brings to people, it is also valuable for the practically useful goods and services it provides to human beings – in particular its vital contribution to the health, wellbeing and prosperity of people and the local communities in which they live. Further information can be found on The Wildlife Trusts' website.

1.2 The Green Exercise Research Team

There is growing empirical evidence to show that exposure to nature brings substantial mental health benefits and at the same time, physical activity is known to result in positive physical and mental health outcomes. Over the last 11 years at the University of Essex, the Green Exercise Research Team has combined these ideas into a programme of research on 'green exercise' (activity in the presence of nature) and 'green care' (therapeutic applications of nature-based interventions). These address current concerns about the adverse health effects of modern diets, sedentary lifestyles and a disconnection with nature, along with growing evidence that stress and mental ill health have become substantial health problems for many people in industrialised societies.

This cross-disciplinary University of Essex project team is engaged in primary research on: i) the health benefits of green exercise- investigating the mental and physical health benefits of physical activities under exposure to different rural and urban environments; ii) measuring connection to nature; and iii) evaluating a wide variety of green care options in varying contexts (including care farming, facilitated green exercise, ecotherapy and wilderness therapy); and is currently leading research in this field. The Green Exercise Research Team were also involved in conducting the original research that supported Mind's Ecotherapy campaign in 2007 and the Ecominds programme from 2008-2013. More information on this research can be found on the Green Exercise website.

The Green Exercise Research Team is also a leading authority on the use of Participatory Appraisal and Action Research to assess the needs and opinions of communities. With over 25 years' experience of participatory assessment, we have worked with a wide variety of organisations and target groups both within the UK and internationally. The team has developed innovative participatory techniques that engage communities as active participants and this approach encourages community ownership of outcomes so that they are self-sustaining in the longer term.

1.3 Background to research

There is an emerging body of evidence to indicate that contact with nature provides benefits for health and wellbeing. However, literature regarding the health and wellbeing benefits of natural environments rich in nature has been given less attention, particularly in relation to its outcomes for local communities. As the UK's population is growing and ageing, and as economic activity and land-use patterns are changing, pressures on the natural environment are increasing. At the same time, the need for a healthy natural environment to help to address many of the UK's social and economic challenges is also increasing.

Many believe that the investment of time and resources in nature's recovery, and the engagement of people with nature where they live and work could bring mutually supportive benefits to both society and the natural world. As a result, there is an urgent need to demonstrate how natural environments, particularly those rich in biodiversity, can deliver these health and wellbeing benefits. The Wildlife Trusts have therefore commissioned the University of Essex to conduct a literature review to identify existing work that assesses the health and wellbeing benefits of natural environments, with emphasis on those environments rich in wildlife.

It is felt that this work will help to reinforce the case for the protections of the UK's natural environments. It is intended that the review will give individual Wildlife Trusts (and other interested parties) an easily accessible and up to date insight into the scientific evidence for nature's potential as a source of enhanced health and wellbeing. As the first stage in a three-stage project, the literature review will pull together known academic research and selected public policy documents, to investigate and indicate the role that high quality natural environments could play in improving the health and wellbeing of the British population.

The aims of this literature review are therefore to:

- Highlight the health and wellbeing benefits of natural environments rich in nature and wildlife;
- Summarise why nature matters to the health and wellbeing of people in local communities in the UK.

1.4 Methodology

A literature search was conducted in May and June 2014, to identify references on the health and wellbeing benefits of: i) natural environments and ii) more precisely of natural environments rich in nature and wildlife. The following search engines were used to generate references:

- Web of Knowledge
- Web of Science
- Google Scholar

The key words used to search for references included: nature and wellbeing, natural environments, biodiversity, environments rich in nature and health benefits of natural environments.

There was a focus on obtaining published papers which have been peer reviewed as they have more credence, however books, book chapters, published reports, policy documents and conference proceedings were also included, where appropriate.

2. Wellbeing in the UK

2.1 Definitions of wellbeing

2.1.1 What is wellbeing?

The health and wellbeing of an individual is considered to be multifaceted. The World Health Organisation (WHO) defines health as “a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity” (WHO, 1948). Similarly the term ‘wellbeing’ (despite the lack of a universal definition) is also considered to be multi-dimensional, described by Defra (2007) as “a positive physical, social and mental state; it is not just the absence of pain, discomfort and incapacity. It requires that basic needs are met, that individuals have a sense of purpose, and that they feel able to achieve important personal goals and participate in society. It is enhanced by conditions that include supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment, and a healthy and attractive environment”.

Following on from this Defra definition, in 2008 the UK Government’s Foresight Project on ‘Mental Capital and Wellbeing’ commissioned the New Economics Foundation (Nef) to examine the construction of wellbeing in more detail by reviewing the inter-disciplinary work of over 400 scientists from across the world.

2.1.2 Five Ways to Wellbeing

The New Economics Foundation subsequently identified five evidenced-based actions to improve wellbeing: i) Connect; ii) Be Active; iii) Take Notice; iv) Keep Learning; and v) Give (Nef, 2008). Nef suggested that if each of these Five Ways to Wellbeing were built into daily routines, health and wellbeing would be enhanced.

Connect

Social interaction and connecting with other people can provide important benefits for health and wellbeing. Social relationships, a sense of ‘belongingness’, interaction and the support of family and friends are important for wellbeing and can also protect against becoming ill, whilst social isolation and exclusion are associated with poorer health (Tones and Green, 2010).

Be Active

The health benefits of engaging in physical activity are well documented. Regular exercise can reduce the risk of cardiovascular disease and associated risk factors such as high blood pressure, high blood cholesterol and diabetes (Department of Health, 2009a). Physical activity can also promote mental wellbeing, leading to improvements in self-esteem, mood and quality of life and a reduction in anxiety and depression (Department of Health, 2009a, 2011; Reed et al., 2013).

Take Notice

People today have busy lives and often fail to ‘take notice’ of their surroundings and the things going on around them. Studies have shown that being aware of what is taking place in the present directly enhances wellbeing and that ‘savouring the moment’ can help to reaffirm life priorities (Brown and Ryan, 2003). Increased awareness and paying attention this particular way is referred to as ‘mindfulness’ (Kabat-Zinn, 1994; Bishop et al., 2004); and defined as “paying attention in the present moment to yourself, others and the world around you” (Mindfulness in Action, 2014). Mindfulness enhances self-understanding and also reduces stress and improves mental health (Feldman et al., 2007; Nef, 2008; Williams, 2010; Chu, 2010; Keng et al., 2011; Howell et al., 2011).

Keep Learning

Learning, whether it is trying something new or learning new skills, has been shown to play an important role in health and wellbeing. For children and young people learning contributes to social and cognitive development, increases self-esteem and social interaction and encourages participation in physical activity (Hall-Lande et al., 2007). In adults learning is associated with: wellbeing; life satisfaction, optimism and self-efficacy; self-esteem and resilience (Feinzen and Hammond, 2004; Hammond, 2004); a sense of purpose and hope; encouraging social interaction and making people feel competent (Tanako et al., 2002). Learning is also protective against depression and in older people in particular, work and educational opportunities can lift them out of a depressive state (Feinzen et al., 2008; Steptoe et al., 2013).

Give

Giving to others by volunteering, joining a community group or helping a friend or stranger can provide substantial wellbeing benefits. Mutual cooperation and working with others can increase neuronal responses in the reward areas of the brain, indicating that social cooperation is intrinsically rewarding (New Economics Foundation, 2008; Rilling et al., 2007). Helping and giving to others contributes to improvements to cognitive and social functioning which is crucial to mental wellbeing (New Economics Foundation, 2008). Feelings of life satisfaction and happiness are also strongly associated with engagement in community activities (New Economics Foundation, 2008). In older people, volunteering is associated with more positive mood and a sense of purpose and supporting others is also associated with reduced mortality (Huppert, 2008; Greenfield and Marks, 2007).



Photo: Courtesy of Avon Wildlife Trust

In this review although these broad definitions of wellbeing are used, wealth and financial security are seen to be separate (although related) issues and beyond the remit of this particular study. Nef's 'Five ways to Wellbeing' offer a pragmatic explanation of how to promote wellbeing and as such are being widely used by the UK Government, the NHS, Local Authorities, many schools and by countless third sector organisations such as Mind and The Children's Society.

2.2 Current challenges to wellbeing in the UK

Several health and wellbeing issues face the UK (both at an individual and population level) creating real challenges for policy makers and for the Government, voluntary and private sector organisations responsible for health promotion and for providing health and social care services. These challenges include the fall in people's physical activity levels in everyday lives; the increase in obesity; growing mental ill health, dementia and social isolation; and continuing health inequalities.

2.2.1 Physical inactivity and obesity

Physical inactivity poses a significant threat to wellbeing and is the fourth leading cause of death globally, accounting for 6% of all deaths (Department of Health, 2004; Health and Social Care Information Centre, 2013) and the fourth highest cause of disease and disability in the UK (Murray et al., 2013). In the UK the costs of physical inactivity to the economy

are £20 billion per year including direct treatment costs and work days lost through sickness (All party commission on physical activity, 2014). Worldwide, physical inactivity accounts for 6% of the burden of cardiovascular disease, 7% of type II diabetes, 10% of breast and colon cancer and 9% of premature mortality (Lee et al., 2012; Health and Social Care Information Centre, 2013). People who are physically active reduce their risk of developing major chronic diseases by 50% and the risk of premature death by 20-30% (Department of Health, 2009a).

The Government has recommended that in order to stay healthy UK adults take part in at least 30 minutes of moderate intensity physical activity five times a week, with children and young people having at least 60 minutes each day (Department of Health, 2011, Health and Social Care Information Centre, 2013). However, despite the well-documented benefits of physical activity, a large proportion of individuals are failing to meet these recommendations. In adults, 33% of men and 45% of women; and in children 79% of boys and 84% of girls, fail to meet the daily recommendations and do not get enough physical activity (Health and Social Care Information Centre, 2013).

In the last 50 years, the diets of most people in the UK have also undergone enormous changes (Popkin, 1998, 1999; Pretty, 2002). On average, an individual will now consume more food calories than they burn, and increasingly will consume more processed, convenience foods that are high in sugar and salt. Obesity is often a consequence of dietary changes and physical inactivity and also poses a significant risk to wellbeing (Health and Social Care Information Centre, 2013). Obesity is a recognised risk factor for a range of conditions, including type II diabetes, cardiovascular disease, specific cancers and diminished life expectancy (NICE, 2006) and is also associated with poor mental health. The incidence in obesity is rising rapidly with 67% of adult men, 57% of adult women and 28% of children being overweight or obese in the UK (Health and Social care Information Centre, 2013). Obesity causes over 30,000 deaths a year in England (DoH, 2004; Foresight, 2007; Health & Social Care Information Centre, 2013b) and estimations concerning the costs of obesity suggest that it costs the NHS 2.3 billion a year¹, contributes to 18 million days of sickness per year and has an overall cost of up to £4.2 billion a year in England (Foresight, 2007). Physical inactivity and obesity therefore pose a significant risk to health and well-being and are a major health challenge for public health.

2.2.2 Mental ill health, dementia and social isolation

Mental ill health

Every year in the UK, one in four people experience a significant mental health problem (Mental Health Foundation, 2013). Anxiety and depression are commonplace and by 2020 it is predicted that depression will be the second most common cause of disability in the developed world (World Bank, 1993). For women in 'low and middle' and 'high' income countries in 2004, depression was the leading cause of

1 reported figure from 2007

the disease burden (WHO, 2008) and the World Mental Health Survey found that on average 1 in 20 people had an episode of depression in the previous year (Marcus et al., 2012).

In 2009-2010 the total cost of mental health problems in England was estimated at £105.2 billion (The Centre for Mental Health, 2010). The majority of these costs relate to those who experience mental health problems along with their families, but there are also sizeable costs for taxpayers and for business, estimated at £1,000 per employee, per year (NHS Choices, 2013). Mental ill health costs more to society than crime, and public spending on mental health services is continually rising alongside the cost of anti-depressants (Sainsbury Centre for Mental Health, 2003). In 2011 46.7 million anti-depressant prescriptions were dispensed in England, costing £270.2 million and increasing by 22.6% from 2010 (NHS Information Centre, 2012). Despite this increase, the share of the budget for mental ill health is far lower proportionally than the burden of mental ill health: poor mental health accounts for 23% of the burden of disease, whilst accounting for only 13% of the NHS budget in England (Centre for Economic Performance's Mental Health Policy Group, 2012). Mental ill health is therefore a major public health issue, having substantial effects on the country's wellbeing.

Dementia

With an ageing population, addressing dementia is also a growing challenge, with an increasing number of people living with this condition (Knapp et al., 2007). In the UK 800,000 people have dementia and projections suggest this is likely to rise to one million by 2012 (Alzheimer's Society, 2012). Dementia currently costs the UK between £17-23 billion per year, a figure which will reach £34.8 billion by 2026 (Knapp et al., 2007; Alzheimer's Society, 2012, 2013; The Kings Fund, 2008). There are also 670,000 people in the UK who are primary carers for people with dementia, saving health and social care providers £8 billion per year (Alzheimer's Society, 2012). The importance of providing care for the growing number of older people has been acknowledged by the UK Government, with the promotion of dementia care vital in order that people can 'live well' with dementia (Department of Health, 2009b).

Social isolation

Mental wellbeing is affected by how connected to other people we feel, with the links to, and support from our families, friends, local communities and the wider society. This connection and interaction has a positive effect on our health and happiness (Bird, 2007; Searle, 2008; Robitaille, 2010; Helliwell et al., 2013). A large number of adults and young people in the UK are becoming disconnected from other people, experiencing loneliness and social isolation (Hall-Lande et al., 2007; Windle et al., 2011; Wood et al., 2012a) and this isolation is frequently associated with older people, the mentally ill, and the disabled, impoverished and disaffected members of society (Mental Health

Foundation, 2010; Windle et al., 2011). Social isolation has been shown to result in a reduced quality of life, depression and low self-esteem and can also predict mortality and morbidity (Cornwell and Waite, 2009; Pearce and Pickard, 2012; Steptoe et al., 2013).

2.2.3 Health Inequalities

Health and mortality

The WHO defines health inequalities as "differences in health status or in the distribution of health determinants between different population groups" (WHO, 2014) and according to Allen and Balfour (2014), health inequalities are the result of widespread and systematic social and economic inequalities. Throughout the UK there are a number of health inequalities which pose a real challenge for wellbeing.

People in higher socioeconomic groups have better overall health and fewer disabling conditions than those in lower socioeconomic groups (Graham, 2004; House of Commons, 2009). Disadvantaged children have a higher prevalence of mental disorders, experience overcrowding in the home, stress and an increased likelihood of having a disrupted family life (Graham, 2004). Adults in lower socioeconomic groups suffer health inequalities, over and above the effects of childhood disadvantage, including being more vulnerable to multiple health difficulties and having a marked increase in premature mortality. Furthermore, women in the most deprived groups succumb to poor health 13.6 years earlier than those in the least deprived groups (Royal College of Nursing, 2012).

Although life expectancy has increased in the last three decades, this increase in life expectancy in the poorer groups has failed to match the improvements made by those in better off groups (Graham, 2004). In fact the risk of mortality for those in the lowest group is 2.9 times greater than for individuals in the highest socioeconomic group (Graham, 2004; House of Commons, 2009). In England alone, dying prematurely as a result of health inequalities costs 1.3-2.5 million extra lives per year (Allen, 2013).

Neighbourhoods

People in the lowest socioeconomic groups are also more likely to live in the most deprived neighbourhoods (Allen and Balfour, 2014). Disadvantaged neighbourhoods are more likely to have environmental characteristics displaying a risk to health, such as: poor housing, higher crime rates, poorer air quality, a lack of play spaces and high levels of traffic. On average, people in deprived areas have 17 years less disability-free life and die on average 7 years earlier, than those in the richest areas (Royal College of Nursing, 2012; Allen, 2013).



Photo: Courtesy of London Wildlife Trust

Deprived neighbourhoods are also characterised by a lack of green, natural spaces. Regular use of good quality natural environments brings health and wellbeing benefits, but there are clear differences in the access and use of natural environments between different groups of people in the UK (Allen and Balfour, 2014). Those living in the most deprived areas are ten times less likely to live in the greenest areas. The most affluent 20% of wards in England have five times the amount of parks or general green space than the most deprived 10% of wards. Given that the evidence shows that health and nature are closely linked, the quality of both natural and built environments therefore has a significant impact on the nation's health and wellbeing (Allen and Balfour, 2014).

3. Nature and Wellbeing

This chapter: i) gives an overview of the published evidence relating to the health and wellbeing benefits of contact with nature; ii) specifically examines the effect of being in natural environments rich in nature and wildlife; and iii) highlights the way in which contact with natural environments can facilitate each of the Five Ways to Wellbeing.

3.1 Health and wellbeing benefits of contact with nature - The evidence

There is currently an increasing (and convincing) evidence base to show that exposure to the natural environment positively affects physical health and mental wellbeing. Originating from the much-quoted and widely cited studies of Moore (1982) and Ulrich (1984) on 'viewing' nature, later studies have demonstrated significant corroborative findings from: i) a variety of 'natural' settings (including open countryside, fields, remote wilderness, parks, urban green spaces, allotments and gardens) and ii) different levels of engagement with nature (Maller et al., 2002; Morris, 2003; St Leger, 2003; Tabbush and O'Brien, 2003; Pretty, 2004; Pretty et al., 2004; Pretty et al., 2005; Louv, 2005; Driver et al., 2006; Pretty et al., 2007; Van den Berg et al., 2007; Barton et al., 2009; Hansen-Ketchum et al., 2009; Thompson Coon et al., 2011; Ward-Thompson et al., 2012; White et al., 2013; Brown, Barton and Gladwell, 2013; Gladwell et al., 2013; White et al., 2013; Wood et al., 2014; Bragg, 2014).

There have also been a number of comprehensive reviews of the published literature concerning nature, health and wellbeing (see for example - Rohde & Kendle, 1994; Seymour, 2003; Frumkin, 2003; De Vries et al., 2003; Health Council of the Netherlands, 2004; Maas et al., 2006; Pretty et al., 2005; Pretty et al., 2006; Bird, 2007; Barton and Pretty, 2010; Bowler et al., 2010; Pretty et al., 2011; O'Brien and Morris, 2013; Allen and Balfour, 2014). Interest in this field of research has come from a cross-section of disciplines, including psychology, environmental health, environmental conservation, ecology, horticulture, landscape planning, urban design, leisure and recreation, public health policy and medicine. The key physical and mental health benefits of contact with nature and the corresponding studies are outlined in Table 1.

Table 1: Evidence for the health and wellbeing benefits of contact with nature

Benefit	Key Studies (By author)
■ Reduction in anxiety and stress	Parsons, 1991; Ulrich et al., 1991; Lohr et al., 1996; Rubinstein, 1997; Parsons et al., 1998; Gullone, 2000; Hartig et al., 2003; Laumann et al., 2003; Grahn and Stigsdotter, 2003; Fredrickson and Branigan, 2005; Plante et al., 2006; Maas et al., 2006; Van den Berg et al., 2007; Velarde, Fry and Veit, 2007, 2010; Ward-Thomson et al., 2012; White et al., 2013; Roe et al., 2013b.
■ Improvement of mood	Hartig et al., 1991; Ulrich et al., 1991; Hartig et al., 1996; Rubinstein, 1997; Hartig et al., 2003; Van den Berg et al., 2003; Pretty et al., 2005, 2006, 2007; Barton and Pretty, 2010; Barton et al., 2009, 2011; Roe and Aspinall, 2011a.
■ Improvement of self-esteem	Pretty et al., 2005, 2006, 2007; Barton and Pretty, 2010; Barton et al., 2009, 2011
■ Improvement of psychological wellbeing	Browne, 1992; Kaplan and Kaplan, 1989; Hartig et al., 1991; Kaplan, 1992, 1995; Chalfont, 2006; Joye, 2007; Nisbet and Zelenski, 2011; White et al., 2013; Wolsko and Lindberg, 2013
■ Improvement in attention and concentration	Hartig et al., 1991; Tennessen and Cimprich, 1995; Lohr et al., 1996; Wells, 2000; Kuo, 2011; Taylor et al., 2001, 2002; Hartig et al., 2003; Laumann et al., 2003; Van den Berg et al., 2003; Ottosson and Grahn, 2005; Aspinall et al., 2013; Wolsko and Lindberg, 2013
■ Reduction in symptoms of ADHD in children	Roe and Aspinall, 2011b
■ Increase in cognitive restoration	Faber Taylor et al., 2002; Kuo, 2001; Aspinall et al., 2013
■ Improvements to physical health	Humpel et al., 2002; Maas et al., 2008; Park et al., 2007, 2010; Coombes et al., 2010; Lee et al., 2010; Gladwell et al., 2013
■ Promotion of physical activity	Bowler et al., 2010; Thompson Coon et al., 2011; Wood et al., 2012; Gladwell et al., 2013; Wood et al., 2014
■ Reduction of crime rates	Kuo et al., 1998a; Kuo and Sullivan, 2001a,b
■ Increased immunity	Rohde and Kendle, 1994; Parsons et al., 1998; Li et al., 2007; Park et al., 2010; Lee et al., 2011
■ Improved perceptions of general health	De Vries et al., 2003; Mass et al., 2006
■ Increased social contact	Coley et al., 1997; Kuo et al., 1998b; Kweon et al., 1998; Ward Thompson, 2002; Heinrichs et al., 2003; Kim and Kaplan, 2004; Sullivan et al., 2004; Maas et al., 2009; Park et al., 2007, 2010; de Vries, 2010; Pretty et al., 2011.

Source: Adapted from Barton, 2008 and Bragg, 2014.

The health benefits of nature are addressed in this report under three levels of engagement: i) viewing nature; ii) contact with nearby nature and; iii) active participation in nature-based activities (Pretty et al., 2005).

3.1.1 Benefits of natural views

Viewing nature from a window in a range of contexts can lead to health and wellbeing benefits such as recovery from mental fatigue and improvements to mental wellbeing (Kaplan, 1992; Maller, 2006). Patients with natural views in hospitals recover from illness and surgery more quickly, spend less time in hospital, tend to have fewer complications and need less pain killers (Diette et al., 2003; Maller, 2006). In a prison environment a cell with a natural view can reduce stress, psychological symptoms (such as headaches and digestive illness); and can reduce the number of sick calls to inmates (Ulrich, 1982; Moore, 1982; West, 1985). In the workplace views of nature are associated with reduced stress and increased job satisfaction (Kaplan and Kaplan, 1989; Maller, 2006; Hine et al., 2007), whilst children with access to natural views from the home have enhanced cognition and concentration and better self-discipline than children without access to natural views (Kaplan, 2001; Taylor et al., 2002). Views of nature during a commute are also beneficial to wellbeing improving recovery from stress and reducing the likelihood of future stress (Parsons et al., 1998). The design of landscaped grounds in retirement homes also plays a role in resident wellbeing; natural elements increase residents' psychological, social and physical wellbeing (Browne, 1992; Pretty et al., 2003; Chalfont, 2007). Viewing natural scenes can result in short term recovery from stress, increased recovery from physical illness and long term increases in health and wellbeing (Velarde et al., 2007).

Pictures of nature can also be beneficial to wellbeing. Viewing pictures of nature, particularly those depicting water, have a more positive effect on emotional wellbeing than pictures of built environments which result in a reduction in attention and interest (Ulrich, 1981). Pretty et al. (2005) compared the effects of viewing four types of scenes whilst engaging in physical activity - a) blank screen; b) urban unpleasant scenes (cities lacking green space); c) urban pleasant scenes (buildings with surrounding nature); d) rural unpleasant scenes (spoilt natural landscapes). The unpleasant scenes reduced the positive effects of activity on self-esteem, whilst the pleasant scenes led to greater increases in mood and self-esteem than exercise alone (Pretty et al., 2005), emphasising the importance of both rural and urban nature for wellbeing. Roe et al. (2013a) examined brain reactions to urban and natural landscape and found that natural scenes consistently engendered more positive reaction than urban scenes. In addition, pictures of nature can reduce heart rate (Laumann et al., 2003), mean arterial blood pressure (Pretty et al., 2005) and systolic blood pressure (Duncan et al., 2014), indicating that viewing nature has a relaxing effect on the cardiovascular

system and autonomic function (Laumann et al., 2003; Pretty et al., 2005; Brown, Barton and Gladwell, 2013; Duncan et al., 2014).

Overall evidence therefore suggests that viewing nature and natural landscapes has a strong positive health effect and landscapes devoid of nature have less positive and in some cases negative effects on health.

3.1.2 Benefits of nearby nature

Local green space and nearby nature are vital for individuals regardless whether this consists of an urban park or a rural wilderness area (Barton and Pretty, 2010). Being in the presence of nearby nature, either intentionally or incidentally, plays an important role in human health and wellbeing (Pretty et al., 2005). Improved general health has been found to be related to increased access to green space regardless of the socioeconomic status of individuals and income-related inequality in health is moderated by exposure to green space (Marmot Review, 2010; Allen and Balfour, 2014). Perceived neighbourhood greenness is strongly associated with better mental and physical health, with those living in highly green areas being between 1.37 and 1.60 times more likely to have better health (Sugiyama et al., 2008)². Longevity is also associated with access to green space (Takano et al., 2002).

Research has identified links between the amount of accessible green space in an area and psychological wellbeing, indicating that accessible green space helps recovery from stress, protects from future stress and improves concentration (Maller et al., 2002; Takano et al., 2002; De Vries et al., 2003; Grahn and Stigsdotter, 2003; Nisbet and Zelenski, 2011; Roe et al., 2013). People living in urban areas with larger amounts of green space show significantly lower mental distress and higher well-being (White et al., 2013); and in another recent study, Roe et al. (2013b) report lower levels of stress and steeper decline in cortisol secretions in individuals living in greener urban areas of Scotland. Nature close to the home is also important for the wellbeing of children (Kaplan and Kaplan, 1989; Thomas and Thompson, 2004; Ward-Thompson et al., 2008), increasing their ability to cope with stressful life events, directed attention and cognitive function (Wells, 2000; Wells and Evans, 2003).

It is not only in our homes that the presence of nearby nature is important, access to nature in health care settings also benefits mental wellbeing via increases in relaxation and the ability to cope, improvements to mood and reductions in stress levels (Cooper-Marcus and Barnes, 1995; Whitehouse et al., 2001). The type of nature close to where individuals work has also been found to be an important factor in quality of life (Chiesura, 2004).

Access to nearby forest environments (either in rural or urban settings) has also been identified to benefit wellbeing (Li et al., 2007; Park et al., 2010, 2011; Lee et al., 2011; O'Brien and Morris, 2013). Forest environments can increase immunity from disease by increasing

² However, the difficulties in determining the direction of cause and effect with the effects of nearby nature must be noted, as healthier, happier, more social and more active individuals may choose (or have the ability to choose) to live in greener areas (Pretty et al., 2011).



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natural killer T cell activity which rejects tumours and infected cells; and increasing chemicals which destroy infected cells (Park et al., 2010). Forest environments also increases the number of anti-cancer proteins, and improves both physical and mental health (Park et al., 2010; Lee et al., 2011; Park et al., 2011).

A higher number of trees and vegetation in an area are associated with greater use and time spent in the environments (Kuo et al., 1998) and this access to nearby nature can also indirectly encourage healthier behaviours such as increased physical activity levels and enhanced social interaction. Individuals with easy access to nature are three times as likely to be active (Wells et al., 2007; Bowler et al., 2010) and the level of 'greenness' in a neighbourhood is associated with greater participation in moderate to vigorous physical activity (Almanza et al., 2012). The benefits for children are more pronounced, with access to nature during school being associated with increased levels of physical activity and with children who are exposed to green spaces for more than 20 minutes per day engaging in five times more moderate to vigorous physical activity (Almanza et al., 2012). Access to nearby nature can facilitate social interaction, providing direct benefits for health (Ward Thompson, 2002; Coley et al., 2007) and greener neighbourhoods have been shown to give rise to stronger neighbourhood ties (Kuo et al., 1998).

Nature near the home also reduces the risk of crime, aggression and domestic violence (Kuo and Sullivan, 2001a, 2001b; Brisman, 2007; Billiteri, 2008). Residents living in areas with high levels of vegetation report less aggressive and violent behaviour; evidence has identified a 52% reduction in property and violent crimes in areas rich in nature (Kuo and Sullivan, 2001a, 2001b; Brisman, 2007; Billiteri, 2008; Pretty et al., 2013).

3.1.3 Benefits of exercise in nature – Green exercise

Natural ecosystems provide an ideal setting for exercise and activity, and Pretty et al. (2003) hypothesised that if physical activity took place in natural environments (termed 'green exercise'), the synergistic benefits of this green exercise could be even more beneficial than either exercise or contact with nature alone. Further studies have since supported this premise and have examined the effects of green exercise in more detail (Pretty et al., 2004, 2005, 2006, 2007; Pretty, 2004; Mind, 2007; Hine et al., 2007; Hine et al., 2008; Hine, 2008; Barton et al., 2009; Pretty et al., 2009; Barton and Pretty, 2010; Hine et al., 2011; Thompson Coon et al., 2011; Pretty et al., 2011; NEA, 2011; Wood et al., 2012 a, b; Gladwell et al., 2013).

From a wide variety of green exercise research three broad health outcomes emerge (Pretty et al., 2011): i) improvement of psychological wellbeing (by enhancing mood and self-esteem); ii) generation of physical health benefits (by reducing blood pressure and burning calories) and iii) facilitation of social networking and connectivity (by enhancing social capital). Furthermore, in a green exercise dose-response study, Barton and Pretty (2010) found that many different types of green exercise in contrasting habitats, for varying durations, were found to lead to improvements in self-esteem and mood. However, the greatest benefits came within the first five minutes of activity followed by positive but diminishing returns (Barton and Pretty, 2010).

Overall there is a large body of evidence to suggest that contact with a wide range of natural environments, in a variety of contexts, can provide benefits for health and wellbeing.

3.1.4 Nature-based interventions for vulnerable groups

The evidence relating to contact with nature and green exercise for the general population also suggests that activities in natural settings have therapeutic properties and that people with lower levels of wellbeing (e.g. lower self-esteem and mood), often experience greater benefits (Pretty et al., 2007, Barton and Pretty, 2010). Therefore, when these activities in nature are delivered as facilitated interventions, they can provide a range of applications for less healthy or vulnerable groups within society. Such nature-based interventions have also been collectively termed 'green care' (Pretty, 2006; Hine et al., 2008; Sempik et al., 2010; Sempik and Bragg, 2013) or 'ecotherapy' (Mind, 2007, 2013; Bragg et al., 2013).

Nature-based interventions take place in a number of different natural contexts and consequently involve various landscape types, all of which allow for slightly different approaches. This results in a wide range of approaches which enables the choice of the most appropriate treatment option for a specific individual as 'bespoke' care. Nature-based initiatives usually consist of a facilitated, regular and specific intervention, for a particular participant (or group of service users), rather than simply a 'natural' experience for the general public (Sempik et al., 2010; Sempik and Bragg, 2013). There is a wide range of vulnerable groups that are currently benefitting from such nature-based interventions, including (but not restricted to): people with mental health problems, people suffering from mild to moderate depression, people with dementia, adults and children with learning disabilities, adults and children with ASD, those with a drug or alcohol addiction history, disaffected young people, and adults on probation.

Therefore there are several different types of nature-based intervention and the area is very diverse. The common linking ethos however is the contact with nature – i.e. using a coherent and deliberate strategy

to generate health, social or educational benefits using nature. Seven key green care interventions currently in use in the UK include: i) Social and Therapeutic Horticulture (STH) and Horticultural Therapy (HT); ii) Animal Assisted Interventions (AAI); iii) Care farming; iv) Green exercise therapy; v) Ecotherapy³; vi) Facilitated environmental conservation; and vii) Wilderness Therapy.

There is a substantial (but not yet complete) evidence base relating to the health and well-being effects of nature-based interventions, which highlights benefits ranging from improvements to physical health and mental wellbeing, increases in social and cognitive functioning and reductions in social isolation, through to increases in coping ability, empowerment and work skills. More information relating to benefits of specific nature-based interventions can be found in a number of recent reviews of the literature (see for example: Hine et al., 2009; Sempik et al., 2010; Grandgeorge and Hausberger, 2011; Annerstedt and Währborg, 2011; Sempik and Bragg, 2013; Iancu et al., 2013; Bragg et al., 2013; Husk et al., 2013; Bragg, 2014).

In their review of the literature on the health and wellbeing effects of conservation activities, Husk et al. (2013) have developed a model to illustrate the pathways through which health and wellbeing impacts may come about, following participation in environmental enhancement and conservation activities (Figure 1). Although specifically developed for environmental conservation activities, the model could have a wider application and could be adapted for and applied to other nature-based interventions. In addition, the model may serve as a useful tool to explain how the multiple elements of green care interventions can provide multiple health, wellbeing and social benefits.

3 Ecotherapy (in its specific rather than generalised meaning) is a psychological nature-based approach that is rooted in the experience of nature, which acknowledges the interdependence of human health with the health of the environment (Chalquist, 2009)

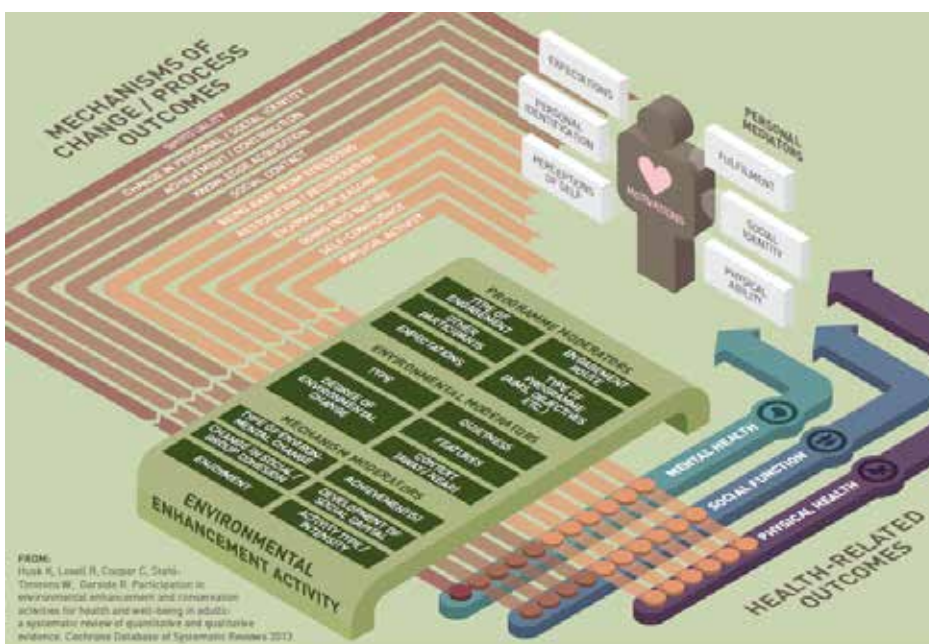


Figure 1. Wellbeing and the environment: Linking conservation activities and health

Notes: The model illustrates the pathways through which health and wellbeing impacts may come about following participation in environmental enhancement and conservation activities. Health-related outcomes are affected by 'mechanisms of change and process outcomes' which are broad themes derived from the research evidence and either link the activity to the health-related outcomes or are considered as desirable outcomes in their own right. Moderators are the factors which might influence the outcomes and have been categorised into three sources – mechanisms of action, environment in which an activity is undertaken and those related to the types of activity itself (i.e. the programme). Personal mediators are included to demonstrate that the evidence suggests that factors such as personal expectations and social identity may influence the outcomes. Motivation is considered separately because it emerged as a key factor as to how individuals approach and potentially benefit from the programme. Finally, the circular arrows are used to demonstrate that participation is a dynamic process whose outcomes can change and affect one another. These outcomes cannot therefore be considered in isolation or as strictly independent (e.g. increased social contact may improve a participant's confidence which may result in further opportunities for social contact, ability to take on leadership roles and so on).

3.1.5 The status of the current nature and health evidence base

The evidence base regarding the health benefits of contact with natural environments is continually expanding from research across the globe, and the weight of evidence suggests that the effects are convincing. However there are still some gaps in the literature and some methodological issues which could benefit from further research, including:

- Limited UK research – although research from the UK is ever increasing, much of the peer-reviewed evidence is from Scandinavia and the US.
- Lack of longitudinal data - many studies do not administer follow-up measures to analyse the effects of long term participation.
- Methodological issues - fewer studies are available that are standardised, have a control group (e.g. RCTs) and that have large sample sizes.

More details of these research issues can be found in Appendix A.

3.1.6 Key findings: Nature and wellbeing evidence

- Overall there is a large body of evidence from published peer-reviewed and grey literature to suggest that contact with a wide range of natural environments can provide multiple benefits for health and wellbeing.
- The evidence is convincing and increasingly shows that nature is associated with enhanced physical and mental health, with benefits to wellbeing demonstrated not only through contact with nature and participation in nature-based activities and interventions, but also through simply viewing natural scenes.
- These health and wellbeing benefits from nature include improvements to physical health (through increased physical activity); improvements to psychological and social wellbeing, in a number of ways, including: reductions in stress and anxiety, increased positive mood, self-esteem and resilience, improvements in social functioning and in social inclusion.
- The evidence base regarding the health benefits of contact with natural environments is continually expanding from research across the globe however there are still some gaps in the literature and some methodological issues which could benefit from further research.

3.2 Health and wellbeing benefits from natural environments rich in wildlife

The previous section gives an overview of the published evidence relating to the health and wellbeing benefits of contact with nature. This evidence refers to benefits from contact with a range of natural contexts from urban greenspaces to wilderness locations but has made limited reference as to the 'quality' of the natural environment or to the level of biodiversity and whether there are specific health and wellbeing

effects of greenspaces associated with more wildlife and biodiversity. The following section specifically examines the literature to assess the particular effects on health and wellbeing of natural environments rich in nature and wildlife.

3.2.1 Definition of biodiversity in this report

There are many definitions of biodiversity available, the Convention on Biological Diversity (CBD, 1993) defines biodiversity as: *"The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are party; this includes diversity within species, between species and of ecosystems"*. Natural England defines it as *"the variety of life on Earth [encompassing] the whole of the natural world and all living things with which we share the planet"* (Natural England, 2012).

In this report however we refer to biodiversity in a more specific sense, referring to natural environments rich in wildlife; places that are home to communities of plants, animals and fungi; that are typically thought of as being 'natural' and seen as valuable for the contribution they make to the biological richness of their immediate surroundings, or of the wider environment.

3.2.2 Ecosystem services and health and wellbeing

Our natural world and its constituent ecosystems provide a range of goods and services essential to man (NEA, 2011). Ecosystem services are defined as the *"benefits people obtain from ecosystems, such as food, water, flood and disease control and recreation"* (Department for Communities and Local Government, 2012). Natural environments provide food, water, fuels and wood (Norris et al., 2011); all of which are required for human existence. Natural environments rich in wildlife can regulate and modulate these ecosystem processes and functions (Lovell et al., 2014) decreasing air pollution, reducing noise and intercepting water, thus regulating climate, food and disease and purifying water (Pretty et al., 2011; Norris et al., 2011). For example, the reduction of air pollution via increased plant abundance is associated with decreased incidence of cardiovascular and respiratory disease (Clark et al., 2014).

Ecosystems and their services are constantly changing (NEA, 2011) but reductions in ecosystem quality, biodiversity and any ultimate loss of such natural environments, may decrease the services they are able to provide; and as a result impact on human health and wellbeing (Diaz et al., 2006; Sala et al., 2009; Mlambo, 2012; Lovell et al., 2014). This may in turn lead to the increase in spread of zoonotic diseases for example, or result in inadequate nutrition (Lovell et al., 2014). These supporting, regulating, and provisioning ecosystem services (NEA, 2011) that nature provides therefore directly impact human health and wellbeing.

3.2.3 The importance of natural environments rich in wildlife and biodiversity

In addition to the importance of the supporting, regulating, and provisioning services derived from nature, there has been increasing interest in the relationship between biodiversity and human

wellbeing through ‘cultural’ ecosystem services (Church et al., 2011; NEA, 2011; Lovell et al., 2014), since the publication of the UK’s National Ecosystem Assessment (NEA) in 2011. Cultural ecosystem services are the ‘nonmaterial’ benefits of aesthetics, leisure, recreation and a sense of place (Clark et al., 2014; Lovell et al., 2014). The importance that we place on cultural services from natural environments is evident in the amount of time and money we spend to enable us to experience nature and in the rise in environmental group membership worldwide (Clark et al., 2014).

Evidence suggests that time spent in natural environments of high value increases health (Barton et al., 2009) and links between health status and the condition of the local natural environment have also been observed (Clark et al., 2014). Environments rich in nature are also associated with improved wellbeing (Huby et al., 2006), with visits to areas rich in nature providing emotional, social and psychological benefits such as improvements in self-esteem and mood (Huby et al., 2006; Curtin et al., 2009; Barton et al., 2009; Lemieux et al., 2012; Clark et al., 2014). Several studies have highlighted the positive association between richness of wildlife and plant species within an environment with mental wellbeing (Fuller et al., 2007; Dalliner et al., 2012; Clark et al., 2014). Wellbeing is increased in individuals who perceive themselves to be in areas more diverse in birds, butterflies and plants (Clark et al., 2014).



Photo: Courtesy of Tim Keeton, The Wildlife Trusts

There is also evidence for the importance of landscapes rich in nature close to the home, with the proximity and quantity of natural spaces in the local environment being related to fewer health outcomes and risk factors (see section 2.2.4; Lovell et al., 2014). Degradation of the natural environment can exert adverse effects on health and wellbeing, particularly mental wellbeing, greater than the adverse effects associated with economic decline, nutritional threats and pollution (Speldewinde et al., 2009; Lovell et al., 2014). Individuals living within 300m of an environment rich in nature and wildlife engage in more physical activity (Bjork et al., 2008; de Jong et al., 2012) and proximity to a national park is associated with increased life expectancy (Poudyal et al., 2009). Furthermore, psychological wellbeing and neighbourhood satisfaction increase in relation to greater species richness and abundance and increased vegetation density (Luck et al., 2011).

3.2.4 The status of the current biodiversity and health evidence base

Despite the evidence highlighted above and in the reviews of the general nature and health literature covered in section 3.1, the health benefits of environments rich in nature and wildlife specifically, have until recently not been fully and consistently assessed. Recently however, a review of the literature by Lovell and her team at the European Centre for Environment & Human Health (Lovell et al., 2014) was conducted, using systematic and robust methods, to assess the state and nature of the current body of evidence, and to examine whether biodiverse environments promote good health and wellbeing.

This systematic review revealed that there were 17 studies that specifically looked at the links between natural environments rich in biodiversity and health; a seemingly small number when compared to the plethora of studies examining the relationship between contact with non-specific natural environments and health and wellbeing. Lovell et al. (2014) found some evidence to suggest that biodiverse natural environments may be associated with good health and well-being. Nine out of 14 quantitative studies showed one or more positive relationships between natural areas rich in wildlife and health – where ‘health’ ranged from better mental health outcomes following nature contact, to associations with an increased incidence of healthy behaviours.

The review however also indicated that much of the existing evidence regarding the effect of biodiverse landscapes on human wellbeing is ‘inconclusive’ and that the causality of the benefits is not always clear (Clark et al., 2014; Lovell et al., 2014). In addition, the review highlighted the challenges in comparing multidisciplinary studies which use a range of different approaches and methods (Appendix A).

Nevertheless, the authors concluded that:

- the relationship between biodiversity and health is multidimensional and is not always clear cut (increasing biodiversity may not increase health in all situations and vice versa);
- the existing ‘weight of evidence’ does suggest that “*there is value in continuing to explore associations between biodiverse environments and good health and wellbeing*” (Lovell et al., 2014, p.16); and
- more high quality research is needed to provide a more reliable evidence base (Lovell et al., 2014).

3.2.5 Key findings: Natural environments rich in wildlife and wellbeing evidence

- Environments rich in wildlife are also associated with improved wellbeing, through emotional, social and psychological benefits such as improvements in self-esteem and mood.
- However, there is currently only limited reference to the ‘quality’ or to the level of biodiversity of the natural environment in the nature and health

evidence base. The health benefits of environments rich in nature and wildlife specifically had until recently not been fully assessed.

- Lovell et al. (2014) performed a systematic review and found evidence to suggest that biodiverse natural environments may be associated with good health and well-being - ranging from better mental health outcomes, to associations with increased healthy behaviours.
- It is generally understood that the loss of natural environments rich in wildlife may ultimately decrease the ecosystem services they are able to provide; and as a result negatively impact on human health and wellbeing.
- The literature review concluded that the relationship between biodiversity and health is multidimensional but increasing biodiversity may not increase health in all situations.
- The existing 'weight of evidence' does suggest that *"there is value in continuing to explore associations between biodiverse environments and good health and wellbeing"* (Lovell et al., 2014, p.16).

3.3 How nature contributes to the Five Ways to Wellbeing

The published evidence shows the convincing links between contact with natural environments and human health and wellbeing. Wellbeing is acknowledged to be a multifaceted concept, and so the promotion of wellbeing is therefore also multidimensional. Those responsible for public health, for commissioning health and social care services and those organisations interested in promoting health and wellbeing in conjunction with nature-based interventions, may find it useful to promote how nature can contribute to wellbeing.

Many of these organisations are already using Nef's Five Ways to Wellbeing as a framework or as an easily understandable way of promoting healthier lifestyles and good wellbeing to the general public. In this section therefore we highlight how contact with nature and involvement in nature-based interventions has been shown to specifically facilitate each of the Five Ways to Wellbeing: i) Connect; ii) Be Active; iii) Take Notice; iv) Keep Learning; and v) Give.

3.3.1 Connect - Nature, social interaction and connection to nature

Engaging in activities within natural environments both directly and indirectly promotes social interaction and connects individuals to others (Pretty et al., 2011; NEA, 2011), both of which are important for wellbeing (Tones and Green, 2010). Modern towns and cities lacking in greenspace restrict social contact as people are not attracted to their surrounding environments and tend to stay inside. Evidence suggests that the more trees and vegetation in an area, the more that people use it and spend time in it (Coley et al., 1997; Kuo et al., 1998; Pretty et al., 2011). Greenspaces therefore give individuals an opportunity to meet new people, an opportunity not readily provided elsewhere in society.

Greenspaces in urban areas for example facilitate social connection, as people are inclined to go outdoors and therefore have contact with each other, increasing the likelihood of social interaction.

This social contact can give rise to stronger neighbourhood ties and help to build stronger communities and connect people through groups and networks (Pretty et al., 2011). Direct involvement in conservation group activities for example has also been found to increase social networking and to foster a sense of belonging (Burls and Caan, 2004; Townsend and Marsh, 2004; Moore et al., 2006; Husk et al., 2013; Gladwell et al., 2013; Bragg et al., 2013; Bragg, 2014). Most nature-based interventions for vulnerable people are largely group-based and cater for several groups of people or individuals at the same time, often also involving participants who are 'well' (e.g. local volunteers). Everyone carries out activities together as a team, which can further break down barriers and encourage social inclusion (Bragg et al., 2013).

The increased connection that nature-based initiatives foster is not restricted to the human-to-human connection, but also to the connection between people and nature (Bragg, 2014). Activities within natural environments have also been shown to increase connectedness to nature, which itself is an important predictor of subjective wellbeing (Mayer and Frantz, 2004; Hine et al., 2008; Bragg et al., 2013). An individual receives a number of health and wellbeing benefits when they are connected to nature. Evidence suggests that the positive effects derived from contact with nature are mediated by increases in connection to nature (Mayer et al., 2009). In an age where we are increasingly disconnected from other people and from nature, contact with nature can therefore help to reconnect us both with others and with the outdoors, which in turn can improve our wellbeing (RSPB, 2010; Moss, 2012; Bragg et al., 2013; Bragg, 2014).



Photo: Courtesy of Hampshire & Isle of Wight Wildlife Trust

3.3.2 Be active - Nature and physical activity

Natural environments can play a key role in increasing physical activity levels (Mind, 2007), and can do so in three contexts: i) physical activity as a result of nature nearby the home; ii) incidental activity as a result of nature-based activities; iii) active participation in activity within nature.

Individuals with easy access to nature are three times more likely to participate in physical activity and 40% less likely to become overweight or obese (Wells et al., 2007; Bowler et al., 2010). Nature near the home has been shown to facilitate physical activity in adults and young people (Humpel et al., 2002; Cohen et al., 2006; Roemmich et al., 2006; Kaczynski et al., 2008; Coombes et al., 2010) and open spaces such as parks can provide important places for people to be active, especially in urban areas (Coombes et al., 2010). There is also strong and significant reduction in the odds of achieving physical activity recommendations with increasing distance from local green space (Coombes et al., 2010). Young people from rural areas with easy access to green space are more active than children from urban areas (Ogunleye et al., 2011), suggesting that improving access to green space can therefore encourage people to be more active (Coombes et al., 2010).

Being active within nature is also often incidental to nature-based activities. For example, individuals may take part in gardening or conservation activities in order to engage with nature and socialise, but these activities will also involve physical activity (Pretty et al., 2005; Pretty et al., 2007; Barton et al., 2011; Thompson-Coon et al., 2011). Given the challenge of meeting the 30 minutes, five times a week exercise recommendation and the difficulties that many people face sticking to an exercise regime, green exercise may be a more viable and appealing option for maintaining long term activity levels in adults and children, as often the opportunities for social interaction and contact with nature are the main motivation rather than the exercise itself (Pretty et al., 2007; Barton et al., 2011).

Some people also use natural environments for the direct purpose of engaging in physical activity. Natural environments can provide an environmental setting for activity or an exercise programme (Bowler et al., 2010) for example orienteering, green gym activities and cross-country running. It is suggested that people are attracted to taking exercise in greenspaces due to the psychological restoration they experience within them (Hartig, 2008; Bowler et al., 2010). Furthermore, evidence suggests that young people engage in more physical activity in a natural environment compared to a built environment, even when engaging in comparable activities (Wood et al., 2014). Increased participant adherence levels has sometimes been observed (and often implied) in nature-based interventions (Hug, 2008; Focht, 2009; Thompson Coon et al., 2011; Bragg et al., 2013a; Iancu et al., 2013b) together with the lower perceived exertion of physical activity in natural surroundings (LaCaille et al., 2004; Thompson Coon et al., 2011; Reed et al., 2013; Gladwell et al., 2013). Natural environments can be used to encourage people to take part in physical activity and to gain the associated health and wellbeing benefits.

3.3.3 Take notice - Nature and mindfulness

Taking notice of the natural environment can provide important benefits for wellbeing (Mitchell and Popham, 2008; Hine et al., 2011). Viewing nature from a window can increase recovery from mental

fatigue (Kaplan, 1992; Maller et al., 2006), reduce stress (Maller et al., 2006; Kaplan and Kaplan, 1989), enhance recovery from illness (Diette et al., 2003) and improve concentration and mood (Maller et al., 2002). Taking notice of nearby nature can also increase recovery from stress, protecting individuals from further incidences of stress and improving concentration (Maller et al., 2002). In health care settings taking notice of nature through the use of a garden can help patients to relax, improve the ability to cope with illness, reduce stress and improve mood (Cooper-Marcus and Barnes, 1995; Whitehouse et al., 2001; Ulrich, 2002).

Mindfulness is said to aid wellbeing by enhancing self-understanding, reducing stress and improving mental health (Feldman et al., 2007; Nef, 2008; Williams, 2010; Hofmann et al., 2010; Chu, 2010; Keng et al., 2011; Howell et al., 2011). Taking notice of nature can foster mindfulness (Nisbet et al., 2009; Markowitz et al., 2012; Wolsko and Linberg, 2013), with research suggesting that being in a natural environment and connecting with nature is associated with increased awareness of experience, which is considered to be an extension of attention restoration (Nisbet et al., 2009; Markowitz et al., 2012; Wolsko and Linberg, 2013). Individuals who are connected to nature also display greater levels of mindfulness, which is shown to be associated with increased wellbeing (Brown and Kasser, 2005; Wolsko and Linberg, 2013).

3.3.4 Keep Learning - Learning through nature

Natural environments can provide opportunities for learning. Engaging in nature-based activities can help people to learn about nature and develop ecological knowledge; whilst also developing social and physical skills (NEA, 2011). For example, joining an allotment project would help participants to learn about food growing and planting, whilst joining a green exercise group could help participants to interact with others (Wood et al., 2013). This learning is not always the aim of the activity, but can provide a number of benefits for wellbeing such as increased self-esteem and resilience, a sense of purpose and hope, a feeling of competency and can often act as a distractor from stressful life events, fostering coping skills (Feinstein and Hammond, 2004; Hammond, 2004; Wood et al., 2013).

In addition, the natural environment can also be used as a learning tool. In schools with environmentally focused curriculums attainment is 72% greater, with outdoor learning experiences allowing children to develop cognitive skills more effectively than classroom based learning (Dillon et al., 2006). Learning in nature also benefits social skills, improves self-esteem and enhances social, personal and emotional development (Kings College, 2011). It can also impact upon long term memory, increase knowledge and understanding, educational attainment, behaviour and attitude to others. The natural environment adds value to everyday experiences in the classroom, allows children to achieve more and develop more effectively, thus promoting greater wellbeing (Kings College, 2011).



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3.3.5 Give - Nature, volunteering and giving to others

Volunteering in any sense can help people experiencing difficulties in their lives to get back on their feet and become integrated in the community, resulting in improved wellbeing. However volunteering in natural environments provides a greater number of benefits for wellbeing as participants receive high levels of satisfaction from nature-based activities and experience personal autonomy (O'Brien et al., 2008, 2011). Volunteering in nature creates social capital and reduces social isolation by connecting individuals to communities and allowing them to meet other people. Environmental volunteering also increases confidence, self-esteem and pride, facilitates skill development, provides opportunities for self-discovery and helps participants to develop a 'sense of place' and 'sense of self' (O'Brien et al., 2008, 2011; Husk et al., 2013). Through volunteering in nature, individuals are also offered an opportunity to become an active member of their local community by improving local green spaces. Furthermore, frequency of volunteering in natural spaces is associated with delayed mortality (O'Brien et al., 2008, 2011); suggesting its importance for wellbeing.

In addition, spending time in natural environments encourages generosity. When people are in contact with nature they focus on others more (Weinstein et al., 2009), often develop close and satisfying relationships with others and are encouraged to act positively for the larger social community. These actions stimulate a sense of vitality and positive effect and can ameliorate the experience of depression and physical illness (Weinstein et al., 2009). Through nature-based activities

individuals also often 'give to others', for example working on a community allotment which provides food for the community, building a community natural area or helping others to achieve goals through a shared group. Together with environmental volunteering, nature-based activities can encourage 'giving to others' and through this, health and wellbeing can be enhanced.

3.3.6 Key findings: Nature and the Five Ways to Wellbeing

In conclusion, both initiatives for the general population that increases contact to nature and nature-based interventions for vulnerable groups, result in participants:

Being more *Active* by taking part in exercise and activities in natural environments, gaining physical and mental health benefits;

Being Connected both with nature and with other people, thus increasing social inclusion;

Taking Notice of nature and the green environment around them and gaining the associated mental health benefits and increased connectedness to nature;

Keep Learning, by developing new skills and learning about themselves; and

Being able to *Give*, through sharing and supporting each other and working as a team, by volunteering their time and also by giving back to nature through shaping and restoring natural environments.

4. Nature and wellbeing: Implications for policy and practice

In this chapter, the growing recognition of the role that nature plays on wellbeing and nature is outlined, before the policy implications are divided into those for: i) public health, and health and social care commissioning and ii) environmental conservation and urban planning. In the health section, an overview of how nature can help to tackle current health issues and inequalities is given, followed by details of the policy background. Finally, recommendations for this sector are given. Similarly in the environmental conservation and urban planning section, the policy background is outlined before recommendations are given.

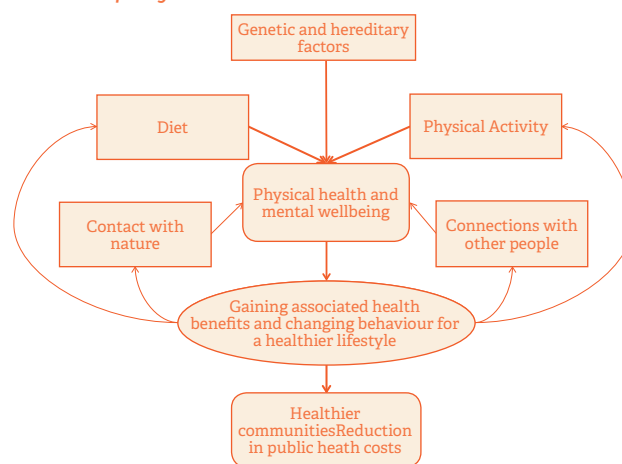
4.1 Growing recognition of the influence of nature on wellbeing

Although diet and physical activity (together with inherited factors), are the main influences on human health, evidence from published literature and subsequent definitions of wellbeing have shown the importance that both contact with nature and social interaction have for improved health and wellbeing. The wellbeing benefits, the increased physical activity (often as an incidental outcome) together with the increased adherence to nature-based initiatives (thought to be due to the emphasis on being part of a group), are likely to raise the total health dividend of these initiatives still further. This will in turn increase the likelihood of participants returning to the activities time after time and ultimately adopting healthier behaviours, an important consideration for individual, community and public health (Figure 2).

There has undoubtedly been progress in raising the awareness of this relationship, and it is now widely accepted that ecosystem services can also include health and wellbeing benefits. Given the challenges facing society, nature can act as an essential health resource; and given the impacts of ill health both on the individual, and on the costs incurred in the provision of care, access to nature and greenspace is vital. Public bodies, government departments, voluntary organisations, and the media are becoming more interested in the health and wellbeing benefits from the natural environment and as a result, many are actively promoting the importance of green exercise and contact with nature for all.

The increasing body of evidence outlined in this review supports the effectiveness of natural environments in promoting health and wellbeing and therefore has important implications for a wide range of sectors including public health, health and social care, environmental conservation and management, and urban design (Bragg, Wood and Barton, 2013).

Figure 2. Influencing factors on health and wellbeing and their relationship to behaviour change and healthier lifestyles.



Source: Bragg, 2014 (Adapted from Barton, 2008).

4.2 Implications for public health and health and social care

Since the concept of green exercise was first introduced (Pretty et al., 2003), the term has been adopted and promoted by organisations such as NHS Health Scotland, Health Alliance Scotland, Scottish Natural Heritage, Public Health Wales and Natural England. However, although there has been an increasing appreciation that nature can be a valuable health resource, the wellbeing value of nature has not yet featured highly in policy, despite the fact that several NHS organisations advocate green exercise for many different groups of society.

4.2.1 Nature and current wellbeing challenges

Physical inactivity and obesity

Physical inactivity is the fourth highest cause of disease and disability in the UK (Murray et al., 2013; PHE, 2014a) and generates health costs of an estimated £7.4 billion a year (Ossa and Hutton, 2002; Scarborough et al., 2011). As highlighted in section 3.2.2, natural environments can play a key role in increasing physical activity levels. Areas with more greenspace have more active populations; taking part in nature-based initiatives increases incidental activity levels; and active participation in activities within nature, increases physical fitness. Evidence from the Monitor of Engagement with the Natural Environment (MENE)

data (NE, 2013) illustrates a relationship between the frequency of visits to the natural environment and overall levels of physical activity. Approximately half (52%) of those people who visit the natural environment at least once a week take part in 30 minutes or more of physical activity on three or more days per week compared to 34% of infrequent visitors and 21% of non-visitors (NE, 2013). Nature can therefore play an important part in tackling the problem of physical inactivity in the UK population.

Nature-based initiatives and interventions have also been shown to be an enjoyable pastime for many, causing people to return time after time, thus increasing adherence levels. Many projects also involve food growing and food and nutrition education as part of the activities in nature. With the additional challenge of tackling the rise in obesity levels in the UK, these factors, combined with the associated increase in physical activity, suggest that nature-based initiatives may also be part of the solution to reducing obesity in the UK.

Mental ill health, dementia and isolation

The evidence in this review highlights the links between nature and mental health and wellbeing. For instance, reduction in stress, increases in attention restoration and self-esteem have been recorded. Sections 3.2.1 and 3.2.3 have highlighted the ways in which nature can help people to become both connected with nature and with other people (thus increasing social inclusion), and to gain the mental health benefits of mindfulness in nature – all important to our mental health. Nature-based initiatives can therefore help to enhance the population's mental health.

Many environmental volunteers are aged in their 50s and 60s, and for this age group, it is recommended that light activity, social engagement and keeping the mind busy are three of the six pillars of a brain-healthy lifestyle, said to delay the onset of Alzheimer's (Laurin et al., 2001; Middleton and Yaffe, 2010; Barnes and Yaffe, 2011; Vickland et al., 2012). Individuals who volunteer with organisations such as The Wildlife Trusts, TCV, RSPB and The National Trust can benefit from these three pillars. It could be argued that either incidentally or by design, nature-based initiatives that include conservation volunteering, are working towards delaying the onset of dementia, as taking part in conservation volunteering as a group, learning new skills and undertaking light exercise are core aspects of conservation volunteering.

4.2.2 Nature and health inequalities

There is evidence that access to green space is associated with a range of better health outcomes. The research has shown that income-related inequality in health is often mitigated where people have access to greenspace (Mitchell and Popham, 2008; Balfour and Allen, 2014). However as illustrated in Chapter 2, accessibility to natural greenspaces is not equally distributed over the UK and as a result some of the poorest most deprived communities have the least opportunity to have contact with nature (Balfour and Allen, 2014; Allen and Balfour, 2014).

In order to illustrate the importance of nature in tackling health inequalities, Public Health England, Natural England and UCL's Institute of Health Equity have recently produced two reports⁴ that: i) highlight where the natural environment already helps to reduce health inequalities; and ii) outline steps to ensure that nature can be used further as part of the solution in tackling health inequalities. This review does not seek to duplicate this work but rather gives an overview of the priorities for action found in these reports.

In the '*Natural solutions for tackling health inequalities*' report it is suggested that "*interventions using the natural environment to improve health can deliver costs savings for health and related services and improve physical and mental health outcomes*" (p. 5, Allen and Balfour, 2014). The four main priorities listed in this report are to:

- Improve co-ordination and integration of the delivery of health outcomes and ensure nature-based interventions are user-led
- Build a stronger evidence base to ensure nature-based programmes are evidence-led
- Ensure sustainable delivery of services that use the natural environment, and
- Increase the quality, quantity and use of natural environment spaces that benefit people's health and help prevent ill health.

Furthermore, the '*Local Action on health inequalities: Improving access to green spaces*' report states that "*increasing the amount and quality of green space can be part of a low cost package to address health inequalities, improve health outcomes and deliver other benefits*" and suggests that "*increasing the use of good quality green space for all social groups is likely to improve health outcomes and reduce health inequalities*", in addition to facilitating greater community cohesion and less social isolation (p. 4, Balfour and Allen, 2014).

4.2.3 Policy background

Since April 2013, public health specialists from more than 70 organisations have been brought together into a single public health service under the newly formed Public Health England (PHE) (PHE, 2014b). PHE set out the strategic priorities for public health but much of the responsibility for implementing public health has now been passed to Local Authorities⁵ (LAs).

LAs are also responsible for social care in England, and social care too has seen changes in recent years. The most significant development in this sector has been the availability and increased uptake of personal budgets (Bennett and Stockton, 2012). Since 2007, those with complex care needs, eligible for social care can elect to be given a budget based on their personal

4 Local action on health inequalities: Improving access to green spaces (PHE) https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/357411/Review8_Green_spaces_health_inequalities.pdf and Natural Solutions for tackling health inequalities (NE) <http://www.instituteofhealthequity.org/projects/natural-solutions-to-tackling-health-inequalities>

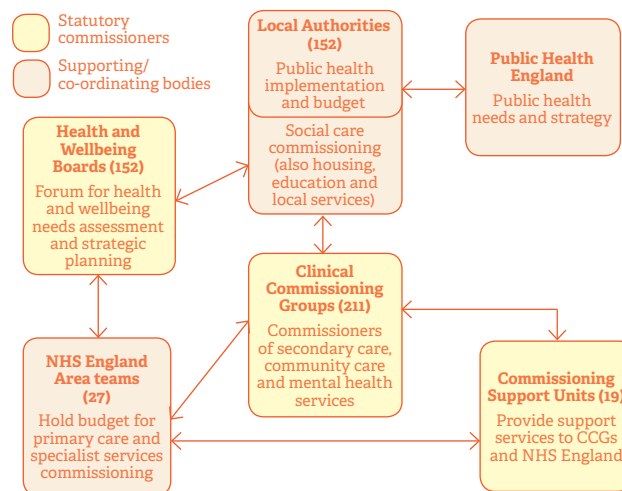
5 County Councils and Unitary authorities

requirements. The individual can then manage their own budget (either directly or by LAs on their behalf) in order to choose the format of their care and support. Figures from March 2014 suggest that nearly 650,000 people have taken up a personalised budget although the majority are still having their budget managed on their behalf by the LAs (Bennett, 2014). That said, evaluations of personalisation in social care concluded that this is a cost-effective approach, which offers the service user more choice and control over their care (The Audit Commission, 2010, 2011; Ipsos Mori, 2011). The Care Act 2014, intends to roll out personal budgets to include all those eligible for healthcare services through Integrated Personal Commissioning so that health and social care funding is centred around the individual (Bennett, 2014).

Historically, social care has been the domain of LAs and primary healthcare service commissioning the role of NHS Primary Care Trusts, both acting as separate entities with limited collaboration and communication between them. Whilst social services commissioning has remained the responsibility of LAs, secondary and community healthcare services commissioning is now the responsibility of newly formed clinically-led organisations called Clinical Commissioning Groups (CCGs). CCGs are set up on a regional county level and all GP practices are legally required to be part of a CCG (Naylor et al., 2013). GP services are in turn commissioned by NHS England (who are responsible for primary and specialist care commissioning) and their 27 area teams support the CCGs and hold them to account (Naylor et al., 2013).

In addition, as part of the Health and Social Care Act (2012), a network of regional Health and Wellbeing Boards (HWBs) has been established in England, organised by Local Authorities. The role of these HWBs is to improve health, mental health and social care provision and delivery by facilitating partnership between the CCGs and LAs and thus increasing the integration between the two services (Local Government Association, 2014). By conducting a joint health and social care needs assessment of their area population and subsequently developing a health and wellbeing strategy, the aim is to encourage coherent, joined-up and more effective commissioning (Allen and Balfour, 2014). HWBs therefore consist of strategic commissioners of both health and social care from CCGs and LAs respectively. Details of the links between the various health and social care organisations in England are shown in Figure 3.

Figure 3. The new health and social care commissioning system in England



Source: Adapted from Naylor et al., 2013b.

The case outlined in Figure 3 is for England only, as the structures and mechanisms for health and social care commissioning in Scotland, Wales and Northern Ireland are different. More details of the health and commissioning systems in the devolved nations can be found in the paper for The Kings Fund developed by Ham et al. (2013). This report does not detail the situation in each country but an overview (taken from Ham et al., 2013) is provided below:

- Northern Ireland has integrated health and social care commissioning structures since 1973. Health and social care commissioning is the concern of the Health and Social Care Board, and five large health and social care trusts responsible for the delivery of primary, secondary and community health care; and public health is the realm of the Public Health Agency.
- Scotland is also working towards more integration between health and social care. Social care is commissioned by LAs, Territorial NHS Boards handle primary and community health care through the Community Health Partnerships.
- In Wales LAs are responsible for social care commissioning, Local Health Boards commission primary, secondary and community healthcare services and public health is the responsibility of three NHS Trusts.

4.2.4 Opportunities for Local Authorities

Individuals exist within a wider global system comprising: the natural and built environments; everyday activities (working, shopping, playing and learning etc.); the local economy (wealth creation and markets); the community (social capital and networks) and lifestyle, all of which are determinants of our health and wellbeing.

For Local Authorities particularly, the new policy environment has provided a number of reasons why promoting all aspects of wellbeing, including good health, social networks and local economies, has become increasingly important. Improving wellbeing is part of The Big Society agenda (The Cabinet Office,



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2010), LAs are now responsible for implementing Public Health policy, setting strategic health and wellbeing requirements through HWBs and must also integrate social care commissioning with healthcare in CCGs (Barton and Grant, 2006; Local Government Improvement and Development, 2010).

LAs are also responsible for a wide range of other services that impact on the everyday lives of individuals, their communities and the physical environment, services such as housing, urban planning, health and safety at work, transport, parks, education and leisure to name but a few. The opportunity for LAs to integrate wellbeing enhancement into multiple aspects of their work is therefore considerable. Given the positive influence on wellbeing from both viewing and contact with nature, LAs could further facilitate this improvement of their communities' wellbeing by conserving and creating local natural spaces, and by encouraging local people to access nature.

4.2.5 Recommendations

Based on the review of the literature relating to the wellbeing benefits derived from nature, the following 12 recommendations for public health and health and social care commissioning are made:

Public Health - initiatives for the general population

- **Increasing access to a wide range of nature based activities within society will provide benefits to public health and provide savings to the UK economy.** Healthy, active people who have high levels of social contact will lead to a better overall health and reduced costs for the NHS and public health bodies.
- **Agencies responsible for providing health and social care services and promoting social contact would also benefit from recognising the importance**

of nature-based activities for increasing health and wellbeing within communities. Nature-based activities reduce social isolation and help to integrate people into society, something that is relevant to priorities set by both strategic health and public health commissioners.

- Contact with nature has been shown to improve mental wellbeing, even after as little as five minutes of contact with nature (Barton and Pretty, 2010; Bragg, Wood and Barton, 2013; Bragg, 2014). **Thus encouraging people to incorporate more green exercise and nature contact into daily routines has the potential to increase wellbeing for health promotion at the population level,** particularly for those at risk of certain types of illness.
- **Public health bodies and Health and Wellbeing Boards (and the equivalent organisations in Scotland, Northern Ireland and Wales) are urged to focus on increasing the amount, quality and use of natural places in order to improve community health outcomes and reduce health inequalities**
- Public health bodies and Health and Wellbeing Boards (or the equivalent organisations in Scotland, Northern Ireland and Wales) will have prioritised particular health issues which need addressing in their region, such as obesity, mental ill-health, dementia or physical inactivity for example, and will also have identified which needs they are currently most and least successful at addressing. **Managers of nature-based interventions are encouraged therefore to target their bids to commissioners with the issues and needs of the particular region in mind, in order to show where a natural intervention may be more effective and appropriate.**

Health and social care - interventions for the vulnerable:

- Contact with nature provides a number of positive health outcomes. However, there remains a lack of knowledge and acceptance among GPs and social care commissioners of the benefits to patients gained from nature-based interventions as an additional or alternative treatment for mental and physical ill health. **Commissioners of health and social care services need to be encouraged to take the idea of nature-based interventions more seriously and GPs and other clinicians should be encouraged to consider and recognise the importance of 'Green Prescriptions'.**
- **The National Institute of Clinical Excellence (NICE) should also be called upon to recommend the use of nature-based interventions alongside other treatment options** - for mental illnesses such as depression, for example. A NICE recommendation will help to increase the legitimacy of nature-based interventions and make it easier for GPs to prescribe and patients to receive the treatment.
- The debate regarding **nature-based interventions** is not whether they are more effective than traditional treatment options but rather that they **represent another treatment choice for GPs, social care commissioners and service users.** Different treatments or interventions suit different people and what works for one person may not work for another. Furthermore, people often benefit from a combination of approaches. Thus, the addition of another tool to tackle health and wellbeing problems is especially important given the challenge of tackling current health issues such as mental ill-health, obesity and declining physical activity.
- **Health and social commissioning services should consider that nature-based activities are an enjoyable, socially acceptable treatment option and that the observed effect on attendance and adherence levels could prove to be effective in encouraging uptake or treatment.**
- In light of recent changes to health and social care referral systems, in order to facilitate a greater integration of needs and services, **organisations such as Clinical Commissioning Groups (and their equivalents in the devolved nations) need to ensure that nature-based interventions are incorporated into the regional lists of services and interventions available for commissioning.**
- Similarly, in light of the recent changes to CCGs and HWBs, **managers of nature-based interventions should be proactive in: i) promoting how nature-based interventions have multiple outcomes and are so are particularly suited to integrated health and social care; and ii) ensuring that their programmes are included in the lists of services and interventions available for commissioning.**
- There is also a need to raise service users' awareness of nature-based interventions and for them to understand that they are a valid and effective

treatment option for a variety of different vulnerable groups. A concern in encouraging more 'green prescriptions' for nature-based health interventions is to overcome patients perception that it is not an effective treatment response. **Education is needed for GPs, social care teams and service users to highlight the additional health and wellbeing benefits that nature-based interventions can provide that traditional or other approaches do not.**

4.3 Implications for environmental conservation and urban planning

4.3.1 Policy background

Land managers and environmental conservation organisations have quickly seized on the opportunity to promote health and wellbeing benefits of nature, as another reason to conserve natural places. Urban planning policy on the other hand does not yet consider the inclusion of natural greenspaces as essential in urban design for promoting wellbeing and for enabling harmonious and healthy communities.

There appears to be an inconsistency between the positive wellbeing outcomes of green exercise and the existing drivers of economic development. With worries over a shrinking economy, increases in unemployment and the number of people living in poverty there has been a call to increase building, to employ more construction workers and more houses in order to revive the economy. However there is a danger that these actions will sacrifice a valuable health resource as green spaces are often removed to build houses, reduce maintenance costs and criminal activity. Building on green spaces also has serious implications for health and social inequalities as a lack of green space in residential areas corresponds with poor wellbeing, reduced physical activity and low socio-economic status. Additional nature facilities in the poorest areas may therefore be beneficial (see section 4.2.2).

The importance of natural environments for health and wellbeing has important implications for those responsible for managing and promoting natural spaces. The importance of green spaces to the nation's health is largely underestimated by policy makers and the general public, yet there are multiple health outcomes resulting from nature contact. Furthermore, urban nature provides a number of benefits for health and wellbeing, thus highlighting the importance of green spaces within communities. For all of us to have access to nature there is a need for more quality green spaces and the protection and conservation of our existing green spaces in both rural and urban locations.

Local Nature Partnerships (LNPs) were set up in England as part of the Natural Environment White Paper (2011) in order that local areas could work in a joined up and strategic way to help manage the natural environment for multiple benefits simultaneously for people, the economy and the environment (Defra, 2012). There are 48 LNPs in England and they comprise partnerships of a broad range of local organisations, businesses and people who aim to help bring about



Thurrock Thameside Nature Park © Matthew Roberts

improvements in their local natural environment (Defra, 2012). The idea is for LNPs to make sure that within the local decision-making process that the region's nature and the value of the services it provides to the economy and the people who live there, is taken into account. This means that in planning and development for example, the impact on local nature and the health and wellbeing of the local people should be as much of a consideration as the impact on local economic growth⁶.

4.3.2 Recommendations

Based on the review of the literature relating to the wellbeing benefits derived from nature, the following 7 recommendations for environmental conservation, land management and urban planning are made:

- The National Planning Policy Framework (Department for Communities and Local Government, 2012) states that local planning authorities in England have a duty to take account of and support local strategies to improve health, social and cultural wellbeing. **Directors of Public Health should therefore use their roles to work with departments across local authorities to ensure health considerations are at the heart of planning decisions, particularly those regarding natural spaces.**
- **LNPs should** also be encouraged to further recognise the wellbeing benefits of contact with nature and to act to **ensure that urban and rural green spaces are preserved for the benefit of the nation, with planners / developers working to enhance green infrastructure and to encourage public access.**
- **Conservation organisations such as The Wildlife Trusts, should focus on the obligation for LNPs, HWBs, Directors of public health and planners to consider community wellbeing and to suggest a possible solution by highlighting the direct links between access to nature and community health and wellbeing,** in order to effectively promote the importance of conserving greenspaces in urban and rural areas and promoting good access to nature.
- Many health organisations are using the Five Ways to Wellbeing as a framework to encourage individuals to enhance their wellbeing and **in order to secure funding. Nature-based interventions are also encouraged to draw on the evidence provided in this review, to highlight the multiple outcomes of such initiatives and their relevance to the Five Ways to Wellbeing.**
- **Environmental organisations who provide opportunities to access nature or nature based interventions for vulnerable groups should frame their outcomes to align with the health and wellbeing needs of their locality,** as identified by PHE and HWBs in order to facilitate public health and health and social care commissioning.

⁶ Note: This section refers to the context in England, however key messages are likely to be transferable to the equivalent bodies in Wales (e.g. The Wales Biodiversity Partnership), Scotland and Northern Ireland

- There is likely to be a marked increase in individuals holding a personal budget with the implementation of the Care Act 2014, therefore **providers of nature-based interventions for the vulnerable should recognise the need for targeted advertising of the benefits of their service to potential service users on personalised budgets.**
- Conservation organisations such as The Wildlife Trusts have contact with large numbers of people through managing their nature reserves, organising events and running a variety of initiatives, not to mention contact with thousands of Wildlife Trust members. **The Wildlife Trusts should therefore be encouraged to promote the health and wellbeing benefits of contact with nature more widely to members and non-members alike, to help to raise awareness and to increase nature contact within the UK population.**

5. Conclusions

Overall there is a large body of evidence (including several comprehensive reviews) to suggest that contact with a wide range of natural environments, in a variety of contexts, can provide benefits for health and wellbeing. These health and wellbeing benefits from nature include improvements to physical health (through increased physical activity); and improvements to psychological and social wellbeing, in a number of ways, including: reductions in stress and anxiety, increased positive mood, self-esteem and resilience, and improvements in social functioning and social inclusion. This review shows that these benefits to wellbeing are demonstrated not only through contact with nature and participation in nature-based activities, but also through simply viewing natural scenes.

Literature regarding the health and wellbeing benefits of natural environments rich in nature has been given less attention however, with currently only a limited reference to the 'quality' or to the level of biodiversity of the natural environment in the evidence base, or to the specific benefits of such nature-rich environments. Nevertheless, environments rich in wildlife are similarly associated with improved wellbeing, through emotional, social and psychological benefits such as improvements in self-esteem and mood. In a recent systematic review of the literature in this field, Lovell et al. (2014) also found evidence to suggest that biodiverse natural environments are associated with good health and wellbeing with improvements ranging from better mental health outcomes, to associations with increased healthy behaviours. Although smaller than the evidence base for nature and health in the general sense, the existing 'weight of evidence' for natural environments rich in wildlife suggests potential for added value and scope for further research.

Inevitably there are some opportunities for future research regarding the health benefits of contact with nature. There is a need for more UK-based research, with studies based on larger sample sizes, standardised outcome measures and with a long term follow-up. Comparison studies between nature-based interventions with traditional (or other available) health and social care interventions should be conducted, together with cost-benefit analyses to demonstrate the potential savings to the UK of using nature-based interventions for certain health problems and groups.

Several major health and wellbeing issues face the UK (both at an individual and population level) including physical inactivity; the increase in obesity; growing mental ill health, dementia and social isolation; and continuing health inequalities. These issues have created real challenges for policy makers, public health and for statutory, voluntary and private sector organisations responsible for providing health and social care services. In addition, the pressure on natural places in the UK is ever growing, the need for housing and economic opportunities is continually rising and inevitably, development is likely to put greenspaces at risk. However this review has highlighted the multiple wellbeing and social inclusion outcomes that come from contact with nature, and has demonstrated why

nature is vital to the health and wellbeing of people in local communities and therefore should be preserved.

Initiatives that increase contact to nature (and nature-based interventions for vulnerable groups) result in participants improving wellbeing by: being more *Active* by taking part in exercise and activities in natural environments, gaining physical and mental health benefits; *being Connected* with other people, thus increasing social inclusion; *taking Notice* of nature and the green environment around them and gaining the associated mental health benefits and increased connectedness to nature; *Learning*, by developing new skills and learning about themselves; and being able to *Give*, through sharing and supporting each other and working as a team, by volunteering their time and also by giving back to nature through shaping and restoring natural environments.

In current times where there are real concerns about the burgeoning costs of maintaining good public health and tackling health inequalities, combined with the drive for integration in health and social care services, the multiple outcomes gained from nature-based initiatives present a possible solution. The need for access to good quality nature has important policy implications for a wide range of sectors, including public health, mental health and social care, social inclusion, the management of natural places and urban planning.

Increasing access to a wide range of nature-based activities within society will provide benefits to public health and provide savings to the UK economy. Nature-based activities reduce social isolation and help to integrate people into society, something that is relevant to priorities set by strategic health commissioners. Public health bodies and HWBs (and the equivalent organisations in Scotland, Northern Ireland and Wales) would benefit from focussing on increasing the amount, quality and use of natural places in order to improve community health outcomes and to reduce health inequalities.

Nature-based interventions also represent another treatment choice for GPs, social care commissioners and service users. Different treatments or interventions suit different people and what works for one person may not work for another. The addition of another tool in the toolbox to tackle health and

wellbeing problems is especially important given the challenge of tackling current health issues. In light of the recent changes to health and social care referral systems, in order to facilitate a greater integration of needs and services, organisations such as Clinical Commissioning Groups (and their equivalents in the devolved nations) should take advantage of the multiple wellbeing outcomes from nature-based interventions and ensure that they are incorporated into the regional lists of services available for commissioning. Similarly, managers of nature-based interventions should be proactive in promoting how their interventions are particularly suited to integrated health and social care.

The importance of natural environments for wellbeing also has important implications for those responsible for managing and promoting natural spaces. The importance of green spaces to the nation's health is largely underestimated by policy makers and the general public, even though there are multiple health outcomes resulting from nature contact. Local Nature Partnerships therefore need to further recognise the wellbeing benefits of contact with nature and act to ensure that urban and rural green spaces are preserved for the benefit of the nation, with planners and developers working to enhance green infrastructure and to encourage public access. Conservation organisations such as The Wildlife Trusts should focus on the obligation for LNPs, HWBs, Directors of public health and planners to consider community wellbeing and to suggest a possible solution by highlighting the direct links between access to nature and community health and wellbeing. In so doing, they will be effectively promoting the importance of conserving greenspaces in urban and rural areas and facilitating better access to nature.

In conclusion, the significant improvements to wellbeing found as a result of contact with nature in this review have implications for not only the wellbeing and resilience of individuals but also for public health of communities and the management of natural environments. Could one answer to improving both the nation's health and natural places simultaneously be to encourage people to become more active outdoors and interact with nature? It is hoped that this report will give individual Wildlife Trusts (and other interested parties) an easily accessible and up-to-date insight into the scientific evidence for nature's potential to improve wellbeing and use it to convince funders of public health and of health and social care that nature can be a valuable health resource and so should be preserved.



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6. Appendix A. Gaps in the nature and health evidence base and methodological issues

Limited UK research

The majority of research concerning the health and wellbeing benefits of contact with nature has originated from the US, Scandinavia, the Netherlands and Japan (Bragg, 2014). Whilst research into the health benefits of green exercise for the general population and the therapeutic use of nature-based interventions for vulnerable groups has increased in the UK in the last ten years, more comparative data from the UK is required to explore the wellbeing benefits of contact with natural environments (Bragg, 2014). This research will expand the evidence base and provide direct evidence as to the benefits of natural environments within the UK.

Lack of longitudinal data

Another issue is that research to date also generally lacks longitudinal data, as many studies do not administer follow-up measures to analyse the effects of long term participation in nature-based activities (Bragg, Wood and Barton, 2013; Bragg, 2014). Furthermore, the literature has not addressed the ideas of exposure time and sustainability. Whilst research has demonstrated that as little as five minutes of contact with nature can provide benefits for health (Barton and Pretty, 2010), little is known regarding whether this leads to longer term improvements and how long the benefits last once participants enter a more stressful environment. Research therefore needs to be conducted to determine how long changes last for, whether contact with nature contributes to long term changes in behaviour or thinking and whether all of this leads to healthier communities, enhanced public health and preservation of natural areas (Bragg, 2014).

Methodological issues

Much of the literature examining the health benefits of contact with nature also suffers from methodological flaws (Bragg, Wood and Barton, 2013; Bragg, 2014). The methodologies currently used do not meet the existing standards for medical evidence as there are a number of key problems. Firstly many studies do not use standardised, validated and reliable measures for health and wellbeing, limiting the ability of other researchers to replicate methodologies and research findings. Studies also lack control groups to which the results of intervention groups can be compared, do not blind participants to which type of research group they are in, do not randomly allocate participants to particular intervention groups, or use random sampling techniques to select participants. Sample sizes also tend to be small, limiting the power of the statistical analysis and application of findings (Bragg, Wood and Barton, 2013; Bragg, 2014). Randomised controlled trials (RCT) are considered the gold standard methodology in healthcare as they involve blinding, randomisation and the comparison of two treatments/interventions under conditions that remove bias from both the selection of participants and measurement of outcomes (Sempik, 2007; Bragg, 2014). Thus, future research into the health benefits of contact

with natural environments should seek to conduct randomised controlled trials. However researchers and practitioners argue that evaluations of nature-based interventions may find it difficult to live up to RCT standards, due to the fact that RCT were developed to test treatments such as drugs or a surgical intervention and nature-based interventions do not involve the application of such a discrete or defined 'treatment' (Bragg, Wood and Barton, 2013; Bragg, 2014).

Evidence for wellbeing benefits from natural environments rich in wildlife.

As with the more general nature and health evidence base, both the definition and the measurement of complex multifaceted concepts of 'wellbeing', 'health' and 'biodiversity' differ between the studies, resulting in heterogeneity not only of design but also of methods and measurement. In addition many of the studies were observational, effects were not compared using a 'control' condition and the numbers of studies were small.

Future research needs

Different types of nature-based interventions need to be compared amongst a variety of different cohorts. These nature-based interventions also need to compare different types of experiences and activities, different natural elements and levels of engagement with nature. Furthermore, the effects of nature-based interventions for the vulnerable need to be compared with traditional treatment options, as this will provide additional credibility for the use of nature in influencing health (Bragg, Wood and Barton, 2013; Bragg, 2014).

Cost-benefit analysis studies also need to be conducted, as this will inform the Government and Health sectors not only of the potential of nature-based interventions to act as a treatment for certain types of illness, or for general public health, but also how much money the use of these initiatives will save the UK economy. This evidence also needs to be published in the mainstream public health and health and social care literature, so that it provides the greatest opportunity to influence policy (Bragg, Wood and Barton, 2013; Bragg, 2014).



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