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Briefing Note

We have stopped moving

Tackling physical inactivity - a role for the Public Forest Estate in England?

Forests are very highly valued by the public in England, as the consultation in 2011 that proposed selling off the **Public Forest Estate** (PFE) highlighted. The widespread outcry to the consultation showed that people value forests and access to them for many diverse reasons (O'Brien and Morris, 2013). Thousands commented on the importance of having a PFE and how the management of this resource by **Forest Enterprise England** (FEE) afforded everyone with welcoming sites and good facilities that provide opportunities for all ages. This briefing note highlights the importance of the PFE in England and the contribution it can make to tackling the national crisis of physical inactivity. The scale of this problem is enormous and is a national priority that needs to be addressed, in part, by providing many attractive locations and spaces that are suitable for, and can help in, encouraging physical activity. Inactivity is the fourth greatest risk factor for poor health in England. It contributes to almost 1 in 10 premature deaths: equal to smoking (PHE, 2014b). It is a greater cause of death in the United Kingdom (UK) than in comparable countries such as the United States, Netherlands or France.

The evidence outlined in this briefing note draws on research in forests but also greenspace and green infrastructure in which trees are often an important or key component. We conclude that the PFE in England is extremely versatile and has the potential to contribute to cost effective solutions for the health sector targeted at preventing ill health and also in recovery and treatment programmes. It is uniquely placed to replicate and provide opportunities for 'industrial-scale growth' of successful initiatives.

Background summary

The Problem

- The United Kingdom is currently facing unprecedented economic and public health challenges as a result of physical inactivity, sedentary behaviour and obesity levels
- In 2011 24% of men and 26% of women were obese and 41% of men and 33% of women were overweight in England (HSCIC, 2013)
- In 2011 31% of boys and 28% of girls aged 2–15 years were overweight or obese (HSCIC, 2013)
- One of the risk factors associated with obesity and overweight is physical inactivity
- 33% of men and 45% of women are not meeting recommended levels of physical activity (Public Health England, 2014a)
- Only 32% of boys and 24% of girls aged 2–15 are meeting the recommended levels of sixty physically active minutes a day (HSCIC, 2013)
- Sedentary behaviour is not simply a lack of physical activity. For adults it is associated with cardiovascular and all-cause mortality, diabetes, some types of cancer and metabolic dysfunction (DoH, 2010)
- Physical inactivity costs the UK £20 billion per year (All Party Commission on Physical Activity, 2014)
- There are significant human, social and financial costs that are associated with health inequalities (Allen and Balfour, 2014)
- People in deprived areas are less likely to engage in physical activity (Farrell *et al.* 2013).

Contributing to the Solution

- Regular moderate intensity physical activity – such as walking, cycling or participating in sports has significant benefits for health (World Health Organisation, 2014)
- Active children do better. Physical activity is essential for healthy growth and development; it increases cognitive outcomes and school attainment, and improves social interaction and confidence (All Party Commission on Physical Activity, 2014 p6)
- Active people do better. Physical activity reduces the risk of all cause mortality by 30%, of heart disease by 20–35%, of diabetes by 35–50% and of dementia by 40–45% (All Party Commission on Physical Activity, 2014 p6)
- Income related inequality in health is moderated by exposure to greenspace. Overall better health is related to access to greenspace regardless of socio-economic status (Marmot Review, 2010)
- Forests are one of the top 3 nature specific destinations people visited in 2012/13 (Natural England, 2013a)
- 88% agree or strongly agree that forests are places people can exercise and keep fit. As well as important places where people can relax and de-stress (91%) (Forestry Commission, 2013a)
- The Public Forest Estate (PFE) in England offers a huge amount and range of opportunities for physical activities for all age groups, including mountain biking, cycling, walking, conservation volunteering, play, Forest School, running, orienteering, horse riding, yoga and tai chi, health walks and much more. The size and location of the PFE offers massive potential to extend this offer and opportunity to the inactive and sedentary
- Exercise such as walking, running, cycling are the most popular activities for 67% of forest visitors in England (Forestry Commission, 2013). 40 million visits per year are made to the PFE in England (FCE, 2013). Forest Enterprise England (FEE) is the largest provider of countryside leisure activity
- Over half the population of England lives within 6 miles of a FEE forest
- FEE looks after 1,500 forests in England, with 40 key sites and 24 visitor centres. All these are accessible at little or no cost
- The PFE in England can contribute to cost effective approaches to preventing ill health and as a treatment and recovery space
- FEE works in active partnership with a wide range of government bodies and organisations to encourage healthy activity on the PFE, across the health, sports and education sectors.

Policy drivers

The **Public Health Outcomes Framework** (DoH, 2014) vision is to improve and protect the nation's health and well-being, and improve the health of the poorest fastest. Outcome 1.16 focuses on the utilisation of outdoor space for health and exercise by people in England. The '**All Party Commission on Physical Activity**' was set up in 2013 to create a co-ordinated approach to tackling physical inactivity. The **Public Health England** consultation '**Everybody active, Every day**' launched in September 2014 sets out an evidence based approach to physical activity. '**Start Active, Stay Active**' (DoH, 2011) established a consensus from the four Chief Medical Officers in the UK of the importance of physical activity. They provide new flexible guidelines for children, young people and adults to create new ways to achieve health benefit through physical activity. '**Moving More, Living More**' focuses on the physical activity legacy of the London Olympics and Paralympics (HM Government, 2014). '**Turning the tide of inactivity**' (UK Active, 2014) outlines recommendations to encourage physical activity. The **Marmot Review** (2010) provides a strategic review of health inequalities in England highlighting that reducing inequalities is a matter of fairness and justice.

THE WORLD HAS STOPPED MOVING

**TODAY'S KIDS ARE THE
LEAST ACTIVE
IN HISTORY**

-- THE FACTS IN THE UK ARE STAGGERING --

All Party Commission on Physical Activity, 2014 -
It's time for action.

Evidence on the health benefits of forests

The body of literature in this subject area has grown significantly in recent years.

Physical health

A small number of studies have provided evidence of long term physical health benefits of greenspace on mortality, life expectancy, prevalence of asthma and recovery from surgery. Some studies have found short term physiological responses to greenspace including reduced heart rate, blood pressure and muscle tension (O'Brien *et al.* 2010a).

Physical activity

Coombes *et al.* (2010) found that where people have good perceived and/or actual access to greenspace



Forest access for all

they are 27% more like to be physically active. Other studies have reported that physical activity increases with proximity to greenspace, while some have reported more mixed results (O'Brien *et al.* 2010). However, this maybe due to the quality of greenspace, which is important and can have an impact on people's willingness to access the outdoors. Research in Sweden shows an association between levels of physical activity and better quality greenspace (De Jong *et al.* 2012).

The loss of trees in the USA due to the emerald ash borer pest, was associated with an increase in human mortality related to cardiovascular and lower-respiratory-tract illness (Donovan *et al.* 2013). The researchers suggest a connection between tree-rich environments and people's willingness to get out and exercise.

Cost benefit analysis of the Walking for Health Scheme run previously by Natural England and now by the Ramblers found the scheme delivered 2,817 Quality Adjusted Life Years (QALYS) at a cost of £4,008 per QALY. This is well below the National Institute for Health and Care Excellence threshold for cost effective interventions at £20-30K per year (de Moor, 2013).

'It is evident from the structure of the body that exercise is no less necessary than food for the preservation of health' William Buckham, 1785

Health inequalities

A study in England suggests that socio-economic health inequalities is narrower among those living in greener urban areas, perhaps because greenspace in these areas is



Children enjoying a trip to the woods

a freely available resource for protecting health (Mitchell and Popham, 2008). The study found that populations which are exposed to the greenest environments also have the lowest levels of health inequalities related to income deprivation.

Mental well-being

Forests and greenspaces can be restorative not only providing escape from physical and social stressors but also providing a range of benefits that can aid in chronic stress and attentional fatigue (Ambrose, 2013; Hartig *et al.* 2014). Recent research found that higher levels of greenspace were linked with lower stress levels, in deprived neighbourhoods in Scotland using salivary cortisol measurements (Roe *et al.* 2013).

Increasing the amount of greenspace and wooded areas available to urban populations is likely to offer the potential for significant mental health benefits to some, particularly residents of deprived urban communities.

Social connections

Research in deprived housing estates in Chicago in the USA found that residents in estates with the presence of trees and grass used these common spaces for informal social contact with their neighbours and this was also linked to less aggressive behaviours on these estates and fewer crimes (Hartig *et al.* 2014).

Recent in-depth qualitative research in peri-urban forests found social connection benefits related to:

- People enjoying visiting forests with friends and family
- Meeting new people by participating in an event or activity in a forest such as a health walk, conservation activity, bushcraft day
- Watching others, such as families, enjoying themselves and having a positive experience in a forest environment (O'Brien *et al.* 2014).

Air Quality, Noise Reduction, Screening

Trees and other vegetation can reduce levels of pollutants including gasses and particulate matter (Hartig *et al.* 2014). Trees and shrubs can also be effective in reducing noise pollution. For example trees between residences and transport routes can absorb sound (Huddart, 1990). Trees and forest can provide screening from the built environment and road network, providing a sense of escape and freedom (O'Brien and Morris, 2013).

European Network on forests and health

A four year European programme from 2004–2008 involving 160 researchers from 24 countries focused specifically on the contribution of trees and forests to human health. One of the outcomes of the programme is a book that highlights how forest based approaches can contribute significantly to health objectives (Nilsson *et al.* 2011).

Behaviour and behaviour change

Encouraging people to maintain existing physically active behaviours or change to more active behaviour is a strong focus for government and the health sector. In a review of behaviour, specific techniques emerge as effective in the health literature, including self-monitoring, goal setting, motivational interviewing and feedback on performance (Morris *et al.* 2012a). Good quality, accessible and welcoming forests can act as a motivator for physically active behaviours.



Young adults learning orienteering skills

The PFE in England: a great resource for tackling physical inactivity

Recreation on the PFE is estimated to have an economic valuation of around £160 million per year (EFTEC, 2010).

The info-graphics below provide some highlights of what the PFE offers (FEC, 2013b).

The PFE in England covers 258,000 hectares and provides 44% of the accessible forests in England (EFTEC, 2010).

The unique selling points of the PFE resource include:

- ➔ Size of the forest sites individually (approximately 145 hectares on average compared to 14 hectares for other ownership¹)
- ➔ The largest individual land holding in England (Defra, 2011)
- ➔ FEE manages the forests to internationally recognised standards. The standard of recreational facilities on the PFE are significantly above that required under the Countryside and Rights of Way Act (Defra, 2011)
- ➔ Under single management and has long term forest plans for the majority of its sites

¹ Figures only cover forests over 2 hectares in size

- ➔ Can be utilised to trial innovative new approaches which if successful can be scaled up across England
- ➔ The majority of the forests are open access and are very accessible with a proactive focus on welcoming all people at all life stages
- ➔ Facilities available include footpaths, cycle routes, mountain bike trails, visitor centres, cafes, picnic areas, natural play spaces, formal play areas
- ➔ The forests can absorb considerable numbers of people without seeming overcrowded due to trees screening people in the forest environment and the size of the sites
- ➔ Provision of a public space for a wide range of activities (fun runs, health walks, cycle clubs) and events (concerts, family fun days, child focused play)
- ➔ FEE works cross-sectorally in partnership with a range of organisations enabling activity to take place not only on the PFE but also in other woodlands in England.
- ➔ Provision of a public good with a public service remit that enables FEE to work with excluded and disadvantaged communities.



How the Forestry Commission is making a difference

The Forestry Commission (FC) has, over many decades, managed a public forest resource for people to utilise for recreation and enjoyment. In the past 15 years however the FC in England, Scotland and Wales has become much more focused and proactive concerning the health benefits that can be gained by people engaging with and accessing forests particularly on the PFE. A publication in 2005 called 'Trees and woodlands: nature's health service' had its foreword written by the then Chief Medical Officer for England (O'Brien, 2005). The following examples provide a flavour of the range of diverse ways in which the FC is tackling physical inactivity and making a difference.



Children cycling in the forest

Forests as prevention

The Active England programme ran from 2005 to 2009 with funding from the Big Lottery and Sport England. The aims of the programme were to increase community participation in sport and physical activity in England. Out of the 250 projects that were funded as part of the overall programme, five projects were located in forests. Three projects were based at single PFE sites (Bedgebury Forest, Haldon Forest Park and Rosliston Forest Centre) and two projects took place in Community Forests (Great Western CF and Greenwood CF). At the PFE sites infrastructure improvements were made such as new walking and cycling paths, mountain biking paths and play areas for children. Events and activities were also organised such as health walks, family fun days, and regular cycle rides. At the two Community Forests events and activities were undertaken at a number of forests.

The projects targeted those who were inactive such as the under 16s, over 45s, black and minority ethnic communities (BME), people on low income and the disabled. An evaluation of the five forest projects found increases in visits by BME groups, and a significant increase in the 16–44 age group visiting the PFE projects.

There was a higher representation of people on low income amongst visitors to the two Community Forests. There were significant increases in activities such as cycling, use of play areas and mountain biking at the PFE projects due to investment in site infrastructure. There were significant increases in total visitor numbers at Bedgebury Forest and Haldon Forest (Morris and O'Brien, 2011). The outreach activity was able to help overcome some of the barriers disadvantaged groups face in accessing forests for physically activity and health benefit.



Involving Black and Minority Ethnic Groups

Young people and mountain biking

Cross country mountain biking, dirt jumping and freeride areas were created at Bedgebury Forest as part of the Active England project. These specially created facilities along with the local cycle club, youth coaching initiatives and organised racing events encouraged strong youth participation in a physically active pursuit. In depth research with forty youth mountain bikers aged 13–25 years of age, explored their experiences and understandings of mountain biking and their relationships with countryside and forest spaces (King, 2010). The young people involved in dirt jumping and downhill riding used the freeride area at Bedgebury. This provided them with an informal leisure setting to practice cycling skills away from adult surveillance. These riders were thrill seekers and risk takers using the freeride area which provided the most challenging mountain biking terrain at Bedgebury. The young people that were cross country cyclists valued the technical single track which was perceived as very physically and psychologically demanding and involved cycling long distances. These riders were more dispersed around the forest than those using the freeride area. For the young women, mountain biking was often undertaken as a fitness activity and this was linked to potential health benefits or sometimes with losing weight. Young men enjoyed the challenge of mountain biking and the idea of being 'outdoorsy'. The facilities at Bedgebury provided leisure opportunities in a rural area where the young people felt there were few such opportunities. The forest also provided them with a sense of escape and freedom.



Walking on the edge of the urban environment

Sports focused intervention

FEE in 2014 started a new initiative funded by Sport England called 'Active Forests' to develop greater opportunities for people to undertake sport on the PFE. Eight forest centres will work to inspire more people to participate in enjoyable and high quality sporting experiences including those who are new to sport and to encourage regular sports activity. The eight forest centres are close to major populations and provide excellent opportunities for people to get involved, both those who are new to sport and those already undertaking some sports activities. A variety of approaches are being encouraged comprising of core activities such as running and cycling, along with 'play on the day' activities and organised events that provide taster sessions to encourage further or greater involvement in sport. Robust monitoring and evaluation of Active Forests will enable FEE to learn from what works and adapt the initiative to meet the needs of users, as well as scale up the programme to other PFE sites.

Forests on prescription

The Chopwell Wood Health Project (Snowdon, 2006) was funded by Forestry Commission England and the then Primary Care Trusts of Gateshead and Derwentside, and they all worked in partnership to deliver the project. General Practitioner (GP) surgeries near to Chopwell Wood were encouraged to offer their patients the opportunity of getting involved in health walks via the

Gateshead GP referral scheme. 33 people referred by their doctors to take up exercise chose to participate in Chopwell Wood activities for the 13 week referral programme, with a retention rate of 91% (Snowdon, 2006). Reasons for referral included coronary heart disease, overweight, depression and raised blood pressure. Promotion of the project led to 128 additional attendances at health activities in the wood.

Forests as part of a therapeutic recovery programme

Branching out is an innovative intervention for those who use mental health services within Greater Glasgow and Clyde. Run by Forestry Commission Scotland in partnership with a wide range of organisations including NHS Scotland. For each patient the intervention consists of 3 hours of activity (such as bushcraft, conservation, health walks) in small groups in a forest every week for 12 weeks. An evaluation of the intervention by Glasgow University found very low attrition rates. Out of 110 patients studied, 70% completed the programme. The use of pre and post intervention measures on physical activity, mental well-being, and health and well-being found strong improvements across all of these scales for all groups, along with significant increases in physical activity. Patients self-reported improvements in their confidence and self esteem. The intervention was found to offer excellent value for money (Wilson, 2009).

A literature review of the benefits and barriers of those living with dementia to accessing greenspace found that access to these spaces was important to them and played an important role in their quality of life (Natural England, 2013b). Further research is called for in this area.

Learning on the move on the PFE

Forest School has become increasingly popular and widespread over recent years (O'Brien, 2009). Lovell (2009) found that children were significantly more physically active on Forest School days than on typical school days or school days with a physical education lesson. They also exceeded the daily recommended one hour of moderate to vigorous activity on Forest School days. There was also no significant difference in physical activity between boys and girls on Forest School days, however this was not the case on typical schools days.

There is also substantial evidence that physical activity can improve academic achievement through its impact on cognitive skills, attitudes and academic behaviour such as enhanced concentration and attention (Centres for Disease Control and Prevention, 2010; US Department of Health and Human Services, 2010).

The PFE offers many opportunities for natural and wild play for children of all ages and abilities, as well as more formal play facilities. The Growing Adventure (Gill, 2006) report and FEE activity in the mid 2000s gave a much higher profile to natural play on the PFE. An update of this work outlines that:

- ➔ Nature, adventure, challenge and even a little danger are part of the essence of forest sites and make them ideal places for children to play.
- ➔ Free play is a healthy and valuable developmental and learning process for children of all ages.
- ➔ Forest sites are probably unsurpassed in their potential for engaging children of all ages and abilities in outdoor activities (Gill, 2014).

Conserving forests, conserving oneself

Practical conservation activity on the PFE provides physical, mental, social well-being benefits as well as a sense of meaning and satisfaction from making a worthwhile contribution to conserving forests (O'Brien *et al.* 2010b). This type of activity can be especially useful for those who are marginalised and excluded as well as be a therapeutic approach for those suffering from mental ill health (O'Brien *et al.* 2011).

Active hands-on engagement such as conservation volunteering allows people to work at their own pace, since these approaches are not target focused, and skills and social networks can be developed slowly. Practical engagement in environmental conservation work is one approach that may provide people with a new role, identity, skills and social networks. Volunteering in forests has the potential to provide a shared purpose for people, independent of gender, age, physical ability, mental functioning and socioeconomic status.



Natural play in the forest



Mums walking with their babies

Reaching the physically inactive and sedentary

Four key principles are important when creating any intervention that tries to encourage behaviour change such as reducing physical inactivity or sedentary behaviour² :

1. Start where people are – understand their values, motivations and perceptions
2. Target the wider social and physical environment – e.g. focus on families/schools to encourage children to be active, provide infrastructure such as good walking, cycling trails, nearby that makes it easy for people to be active
3. Adopt a multi-faceted approach – provide facilities, run events and activities, provide good publicity, incentivise, and provide attractive spaces such as forests
4. Facilitate active involvement by participants in project design and delivery – meeting the needs of the target population (Morris *et al.* 2012b).

² *Sedentary behaviour is not defined simply as a lack of physical activity. It is a group of behaviours that occur whilst sitting or lying down and that require very low energy expenditure (British Heart Foundation 2012. What is sedentary behaviour?)*

³ *Facilitated access involves organised transport to a site and supported led activity on site.*

Evidence from forest interventions suggests that led activities and facilitated access³ are critical to reaching under-represented groups, in physical activity, and encouraging them to become active via the use of forests. (Morris and O'Brien, 2011). Project design should recognise the high social value of regular scheduled group activities, which often constitutes a primary motivation for continued involvement in an activity. A range of organisations and bodies need to work in partnership to integrate a targeted approach and contribute diverse expertise.

Realising the opportunities of the PFE

The PFE and FEE are part of the solution for tackling the physical inactivity crisis. An attractive, accessible well managed resource such as the PFE provides multiple opportunities for recreation, sport, activity as part of education, volunteering and as part of treatment and recovery from illness. The wide range of benefits people gain from accessing forests is a strong motivator for continued access and activity. There are significant opportunities to expand current projects and programmes, to work in partnership across sectors and use the PFE more effectively as a resource for targeting the inactive. There is enormous potential that can be realised with an adequately funded PFE.

References

- Allen, J and Balfour, R. 2014. Natural solutions for tackling health inequalities. University College London Institute of Health Equity.
- All Party Commission on Physical Activity. 2014. Tackling physical inactivity – a coordinated approach. All Party Commission on Physical Activity.
- Ambrose-Oji, B. 2013. Mindfulness Practice in Woods and Forests: An Evidence Review. Research Report for The Mersey Forest, Forest Research. Alice Holt Lodge Farnham, Surrey.
- British Heart Foundation. 2012. Physical activity statistics 2012. British Heart Foundation, London.
- Centres for Disease Control and Prevention. 2010. The association between school based physical activity, including physical education, and academic performance. Atlanta, GA: U.S. Department of Health and Human Services.
- Coombes, E., Jones, A. P., & Hillsdon, M. 2010. The relationship of physical activity and overweight to objectively measured greenspace accessibility and use. *Social science & medicine*, 70, 6: 816–822.
- Department for Environment, Food and Rural Affairs. 2011. Models for the future of the PFE in England: Impact assessment. Defra, London.
- de Jong, K, Albin, M, Skarback, E, Grahn, P & Bjork, J. 2012. Perceived green qualities were associated with neighbourhood satisfaction, physical activity, and general health: results from a cross-sectional study in suburban and rural Scania, southern Sweden. *Health & Place* 18: 1374–80.
- de Moor, D. 2013. Walking Works: Making the case to encourage greater uptake of walking as a physical activity and recognise the value and benefits of Walking for Health. London: The Ramblers.
- Department of Health and Department for Children, Schools and Families. 2010. Sedentary behaviour and obesity: review of the current scientific evidence. DoH, London.
- Department of Health, Physical Activity, Health Improvement and Protection. 2011. Start Active, Stay Active: A report on physical activity from the four home countries' Chief Medical Officers. Physical Activity Team, London.
- Department of Health. 2014. The public health outcomes framework for England, 2013–2016. DoH, London.
- Donovan, G H, Butry, D T, Michael, Y L, Prestemon, J P, Liebhold, A M, Gatzliolis, D & Mao, M Y. 2013 The relationship between trees and human health: evidence from the spread of the emerald ash borer. *American Journal of Preventative Medicine*, 44: 139–45.
- EFTEC. 2010. The economic contribution of the Public Forest Estate in England. Report for Forestry Commission England.
- Farrell, L. Hollingsworth, B. Propper, C. Shields, M. 2013. The socio-economic gradient in physical inactivity in England. The Centre for Market and Public Organisation. Working Paper No 13/311. Bristol.
- Forestry Commission. 2013. Public Opinion Survey of Forestry 2013, UK and England. FC, Edinburgh.
- Forestry Commission England. 2013. Corporate plan 2013–14. FCE, Edinburgh.
- Gill, T. 2006. Growing adventure. Final report to the Forestry Commission, England.
- Gill, T. 2014. Growing adventure revisited. Report to the Forestry Commission, England.
- Hartig, T, Mitchell, R, de Vries, S, Frumkin, H. 2014. Nature and health. *Annual Review Public Health*. 35: 207–28.
- Health and Social Care Information Centre (HSCIC). 2013. Statistics on obesity, physical activity and diet: England 2013. National Statistics. <http://www.hscic.gov.uk/catalogue/PUB10364/obes-phys-acti-diet-eng-2013-rep.pdf> accessed 11/7/14
- Health and Social Care Information Centre. 2009. Adult psychiatric morbidity in England – 2007, results of a household survey.
- HM Government. 2014. Moving more, living more. The physical activity, Olympic and paralympic legacy for the Nation. Cabinet Office, London.
- Huddart, L. 1990. The Use of Vegetation for Traffic Noise Screening. Research Report 238, Transport and Road Research Laboratory. Department of Transport. Berkshire, England.
- King, K. 2010. Lifestyle, identify and young people's experiences of mountain biking. Forestry Commission, Research Note FCRN007.
- Lovell, R. 2009. Physical activity at Forest School. Forestry Commission Scotland, Edinburgh.



Day out for all the family

Marmot Review. 2010. Fair society, healthy lives: strategic review of health inequalities in England post-2010. The Marmot Review.

Mitchell, R and Popham F. 2008. Effect of exposure to natural environment on health inequalities: an observational population study. *Lancet*. 372: 1655–60.

Morris, J and O'Brien, L. 2011. Encouraging healthy activity amongst under-represented groups: An evaluation of the Active England woodland projects. *Urban Forestry and Urban Greening*. 10, 323–333.
<http://www.forestry.gov.uk/fr/INFD-923FBR>

Morris, J. Marzano, M. Dandy, N. O'Brien, L. 2012a. Forestry, sustainable behaviours and behaviour change. Lessons learnt from interventions and evaluations. Forest Research Farnham.

Morris, J. Marzano, M. Dandy, N. O'Brien, L. 2012b. Forestry sustainable behaviours and behaviour change – setting the scene. Summary Report. Forest Research, Farnham.

Natural England. 2013a. Monitor of engagement with the natural environment: the national survey on people and the natural environment – Annual report from the 2012/13 survey. NE commissioned report NECR122.

Natural England. 2013b. Greening dementia. NE Commissioned Report NECR137.

Nilsson, K. Sangster, M. Gallis, C. Hartig, T. de Vries, S. Seeland, K. Schipperijn, J. 2011. *Forests, trees and human health*. Springer, New York.

O'Brien, L. 2005. *Trees and woodlands: nature's health service*. Forest Research, Farnham.

O'Brien, L. 2009. Learning outdoors the Forest School approach. *Education 3-13*. 37: 45–60.

O'Brien, L. Williams, K. Stewart, A. 2010a. *Urban health and health inequalities and the role of urban forestry in Britain: a review*. Forest Research, Farnham.

O'Brien, L., Townsend, M. and Ebdon, M. 2010b 'Doing something positive': Volunteer's experiences of the well-being benefits derived from practical conservation activities in nature. *Voluntas: International Journal of Voluntary and Non profit organisations*, 21: 525–545.

O'Brien, L., Burls, A., Townsend, M. and Ebdon, M. 2011. Volunteering with nature as a way of enabling people to re-integrate into society. *Perspectives in Public Health*, 131: 71-81.

O'Brien, L and Morris, J. 2013. Well-being for all? The social distribution of benefits gained from woodlands and forests in Britain. *Local Environment*, 19, 4: 356–383.

O'Brien, L. Morris, J and Stewart, A. 2014. Engaging with peri-urban woodlands in England: the contribution to people's health and well-being and implications for future management. *International Journal of Environmental Research and Public Health*, 11: 6171–6192.

Public Health England. 2014a. Everybody active, every day: an evidence based approach to physical activity. PHE, London.

Public Health England. 2014b. Presentation: Building a cross sector coalition of the willing: PHE and the national physical activity implementation framework. Moving more, living more forum, Cambridge July 2014.

Roe, J. Ward Thomspon, C. Aspinall, P, Brewer, M. Duff, E. Miller, D. Mitchell, R and Clow A. 2013. Greenspace and stress: evidence from cortisol measures in deprived urban communities. *International Journal of Environmental Research and Public Health*, 10: 4086–4103.

Snowdon, H. 2006. Evaluation of the Chopwell Wood Health project. Report for Forestry Commission England.

UK Active. 2014. Turning the tide of inactivity. UK Active, London.

US Department of Health and Human Services. 2010. The association between school based physical activity, including physical education, and academic performance.

Wilson, N. 2009. Branching out. Greenspace and conservation on referral. Report to Forestry Commission Scotland.

World Health Organisation. 2014. Physical activity. http://www.who.int/topics/physical_activity/en/



Adapted cycle for all abilities

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