



## Research Briefing: Health and the natural environment. A review of evidence, policy, practice and opportunities for the future.

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As a society we are facing epidemic levels of non-communicable disease, including heart and other circulatory diseases, diabetes type 2, and mental health disorders. Evidence is growing as to the potential of the natural environment to contribute to helping reduce the burden to health and social care systems. We now know that living in greener environments is associated with a range of more positive health outcomes and that the use of the natural environment as a setting for health promotion can be effective. Although the links between the natural environment and health outcomes are recognised, to some degree, in existing policy and practice at a range of scales there is a need to find ways in which decision makers can meaningfully act on the evidence of benefit.

This study focused on the interconnections between natural environments and health, and the ways in which these are, or could be harnessed in policy, service delivery and practice.

### Key findings

1. There is evidence of positive associations (after controlling for confounding factors) between living in greener environments and a range of physical, mental and developmental outcomes and reduced health inequality. There is also a growing body of evidence demonstrating the effectiveness of the use natural environments as a setting for specific health interventions and that these interventions can be cost-effective
2. There are gaps in the evidence base, these relate to mechanisms and causal linkages, and to variation in effect according to environment (location, type and quality), population or intervention. However, there is much ongoing multi-disciplinary work which may address these questions. There is a new emphasis on producing evidence suitable to inform future decision making.

3. People value the natural environment for its role in helping achieve and maintain better health. In the UK the natural environment's contribution to health is culturally important. Perceptions of the benefits of the natural environment differ according to socio-cultural group, geographical and political context, and through the life course, however this is less well understood.
4. There is considerable interest, predominantly from 3rd sector and research organisations but also from national and local government, in finding effective ways to harness the potential of the natural environment to promote health. This relates to a tangible recognition that the environment represents an underutilised resource. Examples of activity include local health projects making use of natural environments as a health promotion setting, to regional or national scale multi-sectoral efforts to coordinate programmes of interventions. However, existing activity is often disjointed, short term and opportunities to learn valuable lessons are missed. The multi-sectoral nature of the issues and activities means the potential of the natural environment to contribute to health is, arguably, 'falling through the cracks'.
5. The key constraints of activity are often structural, relating to the organisation and procedures of government (local and national) or institutions. Other barriers to activity relate to: the perception of the peripherality of the environment to health; reorganisations of institutions and the loss of networks and knowledge; difficulties in demonstrating impacts and outcomes of environment-health interventions; and the constrained budgets and (perceived) rigidity of the health and social care system.
6. As current policy and practice display characteristics of 'complex adaptive systems', future activities should involve multiple partners, policy instruments and delivery methods at a variety of scales. Key strategies to increase recognition and activity regarding the health values of natural environments relate to: i) improving the evidence base and increasing evaluative activity; ii) identifying and facilitating key intervention and delivery options; and iii) focusing on the structures and systems in which decision making and delivery takes place.

## Background

This Defra funded study focused on the interconnections between the natural environment and health, and the ways in which these are, or could be harnessed in policy and practice. This briefing is aimed primarily at governmental (national and local) departments or bodies with responsibility for, or an interest in how the natural environment may relate to the health of the population. It is also of relevance to the many non-governmental organisations who are active in promoting or acting on the potential the natural environment to contribute to better health outcomes.

The research consisted of evidence reviews, stakeholder interviews, case studies and a collaborative development of future strategies. The full report details the findings of the study and a separate evidence statement provides details of the review methodology.

## Findings

### *Evidence of the linkages between natural environments and health*

The majority of the quantitative evidence reviewed and discussed here controlled for relevant confounders.

**Mortality:** Evidence shows that living in greener environments (e.g. greater percentage of natural features around the residence) is associated with reduced mortality and that this relationship remains after controlling for confounding factors. Reduced rates of mortality have been found for specific population groups including men, infants and lower socio-economic groups. Several studies have shown that socio-economic health inequalities (in all-cause mortality) tend to be lower in greener living environments.

**Mental health and wellbeing:** There is strong and consistent evidence for mental health and wellbeing benefits arising from exposure to natural environments, including reductions in psychological stress, fatigue, anxiety and depression. These benefits may be most significant for marginalised groups. Although most studies have assessed short term outcomes, the more recent use of longitudinal data and stronger study designs have resulted in more robust evidence and indications of a causal relationship.

**Internal biome:** A newly emerging but relatively consistent body of evidence has found an association between direct contact with nature to the development of a healthy internal biome. Relationships have been demonstrated between environmental biodiversity and reduction of inflammatory-based disease.

**Obesity and other physiological outcomes:** There is evidence to suggest that rates of obesity tend to be lower in populations living in greener environments, however the evidence is inconsistent. Smaller bodies of evidence have shown that exposure to natural environments is linked with more favourable: heart rate, blood pressure, vitamin D levels, recuperation rates, and cortisol levels, and is also associated with lower prevalence of type 2 diabetes. There is consistent evidence from birth cohort studies which shows exposure to green space during pregnancy is associated with appropriate foetal growth and higher birth weight.

#### *Pathways and influencing factors*

**Physical activity:** Although the evidence is mixed, accessing and using natural environments has been shown in some studies to be associated with a higher likelihood of, and rates of physical activity. A small body of evidence suggests that physical activity in natural environments may be more beneficial to health than that undertaken in other environments and that people enjoy it more. Natural environments are important in facilitating activity in specific populations such as those living in urban areas and young boys. Specific natural environments such as woodlands, gardens, parks, grassland and farmland, are supportive of vigorous activity. However, physical activity does not appear to explain the health benefits (as described previously) of exposure to natural environments and the mere presence of natural environments (e.g. parks in urban settings) does not necessarily translate into higher population levels of activity without further interventions encouraging and supporting use.

**Social and community:** Positive relationships have been found between natural environments and higher levels of social contact and community cohesion and wellbeing.

**Environmental quality:** The quality of the environment may influence health outcomes; a small body of evidence suggests that more biodiverse natural environments and those that are well maintained (e.g. free from litter) and in which people feel safe are associated with good health and wellbeing. Although much of the evidence relates to urban greenspace there is evidence to suggest that exposure to specific types of natural environment (broadleaf woodland, arable and horticulture, gardens, improved grassland, saltwater and coastal) result in greater health gain.

**Quantity and proximity of natural environments and a dose response:** There is evidence which indicates that a greater quantity and proximity of natural spaces (mainly in relation to living environment) is consistently positively associated with health outcomes. Understanding of a potential dose-response relationship is limited but growing.

#### *Variation in benefit according to socio-demographic factors*

The impacts of exposure to natural environments and direct use of green space often differ between social and demographic groups. Although lower socio-economic groups are thought to disproportionately benefit from natural environments they often face the greatest barriers to use and the lowest levels of availability.

Existing evidence suggests that people consider that the natural environment is a contributory factor in their health and wellbeing. These understandings are expressed in many different ways and appear to differ according to life stage, activity and in relation to both internal (to the individual) and external factors.

#### *Evidence of the effectiveness of interventions*

There is a growing body of evidence regarding the effectiveness of specific natural environment related interventions. Newly emerging evidence is clarifying how the siting, design or maintenance of natural environments (particularly in urban areas) can enhance health, however the results are mixed. Interventions which have sought to encourage health related access or engagement with, or which have used the environment as a setting to promote health (preventative or therapeutic), have typically resulted

in positive impacts to outcomes such as mental health, quality of life and to behaviours such as physical activity.

There is a wealth of small scale programme and project evaluations relating to health outcomes of targeted interventions using, or based in, the natural environment. However, these evaluations are typically carried out using less robust study designs, are rarely peer-reviewed or brought together and synthesized using robust replicable methods such as systematic review.

#### *Monetised health values of the natural environment*

There are, as of yet, few studies which have sought to produce monetary values of the impacts of exposure to, or use of the natural environment on health outcomes. However, there is ongoing valuation work underway which should enhance understanding. The small number of available studies have produced values which are, in general, positive. Cost-benefit analyses of interventions typically show that they represent good value for money.

#### *Key evidence needs*

Despite the growing evidence of positive and significant impacts of the natural environment on a variety of health outcomes, there are a number of limitations to the current evidence base, these relate to the scope and extent of specific bodies of the research, the quality of the methodologies used, and the reliability and transferability of findings. Key evidence needs relate to:

- A greater understanding of the socio-cultural and temporal factors within environment-health relationships and of the heterogeneity and consistency of outcomes.
- The necessary conditions for natural environments to be effective in promoting health, and the contexts, settings and life stages during which interventions to promote the health benefits of natural environments are most effective.
- The role of the natural environment in promoting individual or community health related resilience (particularly in relation to multiple deprivation).
- The factors or interventions that are effective in encouraging health related use of the natural environment and how this can be achieved without exacerbating health inequalities.
- Clarification of how the links between natural environments and health are understood and acted upon by professionals or within institutions, for instance, in relation to the acceptability of green prescription approaches.

#### *Extent of activity building on the health values of natural environments*

The linkages between natural environments and health are recognised in the practice of many organisations from governmental departments, research institutions, funding bodies, to 3rd sector and civil society organisations.

Multiple types of activity and decision making processes are evident, these include: local health intervention delivery, examples include health programmes on Dartmoor and Exmoor National Parks; regional efforts to coordinate environment-health activity (ranging from improving greenspace provision to delivery of green prescriptions), such as in the Liverpool region; collaboration between institutions to improve policies and practices, for example recent interaction between a Local Authority and a University to better understand the transferability and applicability of evidence for decision making; to national and international integrated framing of issues such as through the Natural Capital approaches.

#### *Factors which act as facilitators or barriers to activity*

There are a number of common factors which appear to act as facilitators or constraints to environment-health activity at a range of scales. Examples of facilitators include linkages at strategic points (e.g. between chairs of Health and Wellbeing Boards and Local Nature Partnerships); interest from key funders (e.g. Big Lottery); perceived legitimacy (e.g. local action backed by national policy); and persuasive arguments and narratives (for instance the idea of a ‘Nature Deficit Disorder’).

Some of the key constraints of activity appear to be similar to those faced by other cross-departmental and complex issues and are often structural, relating to the organisation of government (local and



national) or institutions. Other barriers to activity relate to: the perception of the ‘peripherality’ of the environment to health; reorganisations of institutions and the loss of networks and knowledge; the challenges of demonstrating impacts and outcomes of health interventions; and the constrained budgets and rigidity of the health and social care system.

### *Evidence of linkages between natural environments and health in decision making*

The role of evidence in supporting and contributing to relevant decision making varies greatly. In some circumstances the evidence of linkages between natural environments and health has demonstrably supported activity and has helped make the case for action, in other situations the existing evidence has failed to convince decision makers that activity is justified. In such cases, some argued that more monetised values may have been persuasive.

There is a perception that current research activity is decoupled from decision making processes, with few research studies explicitly making it clear how the results will be useful and what they will add to decision makers’ knowledge. Decision makers also suggested there is a lack of evidence, and evidence transfer processes, which can help them identify what to do, where and when.

### *What are the most promising opportunities and strategies to act on the potential of natural environments to promote better health?*

Future strategies to improving our understanding, and increase activity around the value of natural environments to health need to be multi-dimensional and inter-sectoral, and should reflect the complex systems within which natural environments could be used to help promote better health outcomes. To be effective most of the key activities should involve multiple i) partners, ii) policy instruments and iii) delivery methods at a variety of scales.

### **Evidence and evaluation strategies:**

- 1. Supporting the ongoing collation of robust, causal and explanatory evidence.** There is a clear demand for evidence which can help clarify causal pathways and mechanisms. There is also a need to better understand the magnitude, duration and consistency of impacts. Such evidence would help further understanding of how natural environments could be better used to promote health. Greater interaction between policy/decision makers, practitioners and researchers may be necessary so that opportunities to apply more robust research designs can be identified at an early enough stage to be effective. Greater coordination and sharing or pooling of resources between departments, governments and research councils or charitable funders could facilitate the creation of a more extensive and robust evidence base.
- 2. Effective evaluation and ‘mixed economies’ of evidence.** Despite the wealth of activity building on the links between natural environments and health there is a lack of good quality evaluative work undertaken (it is recognised that evaluation is expensive, time consuming, and difficult). This represents a significant lost opportunity. There is a need to take a more strategic approach to the evaluation of policies, programmes and projects and to collect and make use of multiple forms of knowledge regarding what is (cost-)effective and how such activities *contribute* to achieving better health within the wider context.
- 3. Identifying what works, for whom and when** in relation to effective environment and health practice is fundamental to identifying future interventions options that are equitable and cost/resource effective. It will be important to translate knowledge into meaningful formats suitable to inform decision makers.

### **Potential delivery and intervention options:**

- 4. Supporting the development of plausible mental health, physical activity and obesity interventions in key target groups.** There is a need to provide a context in which the ongoing and sustainable development of environment based health interventions can be supported. Any efforts should seek to overcome the key constraints faced by those developing and delivering interventions, including: ‘siloes thinking’ and the difficulties in cross-sectoral communications; the perceived peripherality of activities; the impacts of reorganisations and the loss of networks; and the short term and novelty driven funding landscape. Commissioners of activity could build on the outcomes

of the previous three strategies and work with providers to establish effective and sustainable routes to delivery. Interventions should be embedded in wider care and support delivery structures and not provided in isolation.

- 5. Engage children with nature and foster lifelong motivations to use natural environments for healthful activities.** Effective options are likely to be those which take a whole systems approach and build use of the natural environment into everyday activities such as play, active travel, or even as a learning space, and create systems and contexts where going out into the natural environment is easy, safe and enjoyable. This would likely need to be a multi-armed strategy, targeting not only the perceptions of children, their parents and carers, but also of institutions such as the education and health sectors.
- 6. Improve the amount, quality, standards and accessibility of urban natural environments.** Some of the strongest and most robust associations relate to the positive health outcomes of living in areas with a greater amount of good quality natural environment. Strategies could include working with local authorities and other environmental managers to develop standards for health promoting natural environments and identifying the additional and interactive role of urban greenspaces in delivering wider policies and programmes (e.g. health or education).
- 7. Build on the potential of National Parks and other designated spaces.** Some of the most innovative work linking natural environments and health outcomes is taking place in National Parks and other protected or designated landscapes. It is suggested that Defra and others could work with the National Parks and other partners (from a variety of sectors - public, private and 3rd) to help realise the value of the physical resources they manage. Key strategies include developing sustainable structures through which the National Parks Authorities, NGOs and the health sector can work together to identify, commission and/or deliver suitable intervention options.
- 8. Developing and implementing the use of Social and Environmental Impact Bonds.** S&EIBs could be used to support interventions which i) improve environmental provision (e.g. parks provision), or ii) make use of the natural environment as a setting to deliver health outcome specific activities (e.g. reduced poor mental health) or iii) address both health *and* environmental outcomes (e.g., conservation volunteering for poor health).

#### **Systems and structures options:**

- 9. Strategic cross-sectoral and departmental working** is likely to be necessary. There is a danger that the considerable resource the natural environment represents is undervalued and underappreciated because no single department has 'ownership' (e.g. one department may have responsibility for the resource, while it may be a different department that will feel the benefit of any activity). Achieving more joined up working could be facilitated by translating priorities and highlighting the co-benefits of cross-departmental activities and identifying where the motivation and capacity for such synergistic activity exists.
- 10. Ensuring sustainability and continuity of activity.** There is a need to maintain momentum where it has been achieved and to avoid 'reinventing the wheel'. Potential actions to create systems which facilitate sustainable activity include: learning from the process of existing effective activity; identifying and building on synergies and shared interests; ensuring sustainability is a pre-requisite of funded or commissioned activity; developing mechanisms for sustainable and long term support for effective initiatives and certain forms of research (e.g. longitudinal); and providing a context in which longer term decision making is a rational option. A better understanding of the factors which have led to sustained, coherent activity in the past would help inform future decision making and help avoid demonstrably disruptive events.

#### **Conclusions**

The weight of the evidence suggests that those with responsibility for, or whose activities could influence or impact on the natural environment or health (including Defra, but also the Departments for Communities and Local Government, Education or Health, and their equivalents at a more local scale and within the private, civil and 3<sup>rd</sup> sector) should recognise and act on the potential of the natural environment as a resource for promoting health. There are many good examples of policies,

programmes and interventions which could be further developed to make best use of the considerable resource the natural environment represents. Key actions should include:

- recognising and using evidence of the value and potential of the natural environment to contribute to better health while increasing understanding of key mechanisms;
- ensuring interventions are effective, appropriate and equitable;
- working collaboratively (e.g. across government and between sectors) and integrating awareness of the value of natural environments to health across social, health and environmental policies; and
- facilitating systems through which activity can be supported and sustained to make a meaningful contribution to better population health outcomes.

### About the project

The aims of the project were to: i) clarify what is known about the linkages between natural environments and health, to characterise how different social groups understand the health potential of the natural environment, and to examine the factors that may facilitate or prevent the realisation of those benefits; ii) evaluate how evidence of the value of natural environments to health is recognised, taken into account by, and incorporated into existing policy and practice; and iii) identify effective and promising opportunities to act on the value of natural environments to promote better health.

A range of methodologies were used to complete the work:

- Production of a summary statement of the evidence for the relationship between natural environments and health and articulation of the extent and strength of the current evidence
- Systematic mapping of evidence relating the ways in which different social groups perceive of and value the natural environment as a resource for health.
- Case studies to better understand current activity around the value of natural environments to health and to examine the role of evidence in relevant decision making.
- Consultation with a range of stakeholders (from health, environment and other relevant sectors) regarding the value of natural environments to health in relation to decision making processes
- Participatory and deliberative methods to collaboratively identify effective and promising opportunities to act on the value of natural environments to promote better health.

This Research Briefing, the evidence statement, and the full report *Health and the natural environment: A review of evidence, policy, practice and opportunities for the future* are published by Defra (Defra Project Code BE0109) and are available from the Department's Science and Research Projects Database at <http://randd.defra.gov.uk>.

While the research was commissioned and funded by Defra, the views expressed reflect the research findings and the authors' interpretation and do not necessarily reflect Defra policy.

The majority of the work was undertaken in 2015-2016, prior to a number of significant developments such as the EU referendum and the publication of the 25 Year Plan to Improve the Environment. The research informed development of the 25 Year Plan and can inform the delivery of both the health themes of the 25 Year Plan and the development of environmental policy after leaving the European Union.

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