

Marches Ecosystem Assessment

An Assessment of the Natural Capital and Ecosystem Services Value
in Herefordshire, Shropshire & Telford and Wrekin

Evidence Summary for Health Professionals

2016

by

Oliver Hölzinger

Consultancy for Environmental Economics & Policy (CEEP)

© Crown Copyright. All Rights Reserved. Herefordshire Council 2016. Ordnance Survey © Crown copyright 2016 OS 100045049

You are not permitted to copy, sublicense, distribute or sell any form of this data to third parties in any form.

This report has been part funded through the European Regional Development Fund



Summary

Ecosystems and Natural Capital are of crucial importance to our wellbeing and health. Nature provides many health benefits including settings for physical exercise, breaking down stress, improving air quality, and many more. However, many of these 'ecosystem services' in the UK are already degraded and/or in decline which is also likely to increase pressure in the health system.

To get a better understanding of nature's benefits to people's health and wellbeing in The Marches an Ecosystem Assessment has been undertaken revealing the value especially for those benefits that don't have a market price and are therefore often undervalued or taken for granted. Most direct health benefits fall within this category. The research revealed that Natural Capital in The Marches provides services worth £14.8 billion, stating the central estimate. This figure is based on the carbon stock value (£7.2b) and the capitalised ecosystem service flow value (£7.5b). It is very important to acknowledge that this is a baseline value and only covers some elements of the total value of Natural Capital (see Figure 3).

This summary also introduces some tools that can be applied by health professionals to better assess and value the benefits of nature to human health so that such values can be better implemented. Furthermore opportunities are outlined for how Natural Capital assets could be better managed collectively to optimise the benefits for all beneficiaries.



Introduction & Business Case for Natural Capital Investment

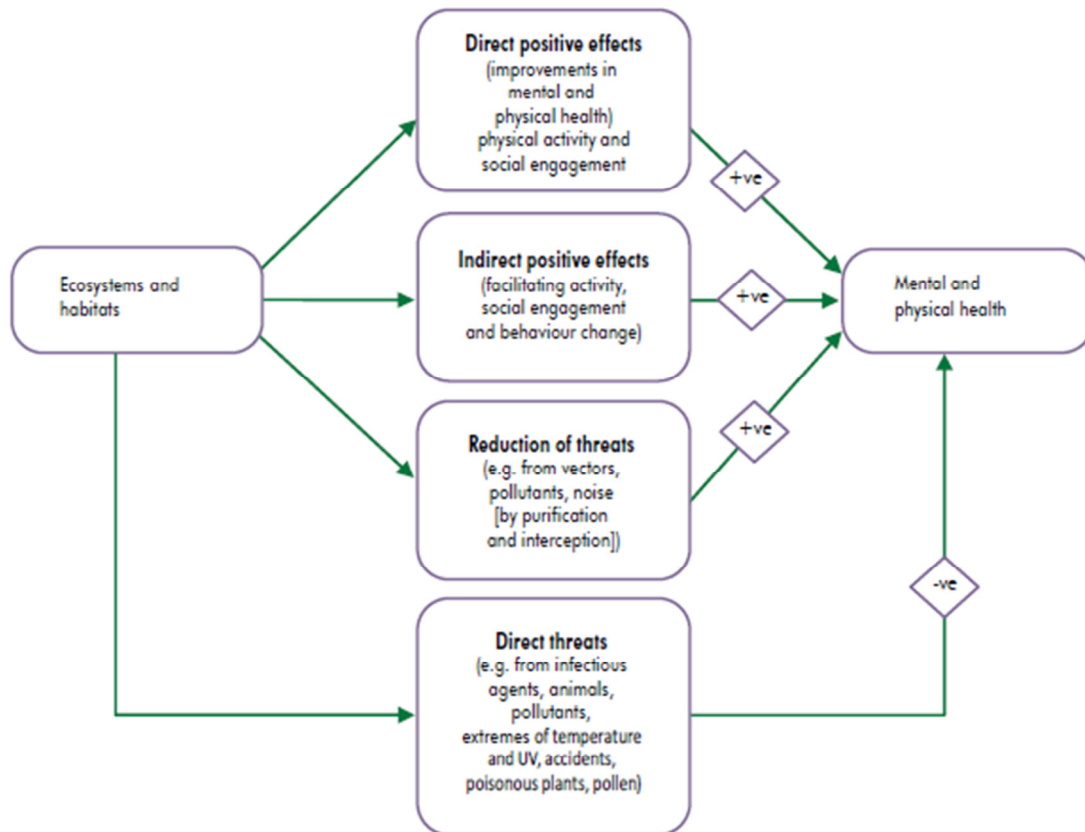
There is a vast and growing amount of evidence suggesting that human health strongly depends on a well-functioning and healthy natural environment. An environmental feature such as a park provides for example the setting for ‘green’ exercise improving physical health. Interaction with nature is also known to improve mental health and reduce stress related illnesses and trees reduce air pollution related illnesses and protect for example from UV radiation; to name just few examples.¹ These services nature provides to our all wellbeing are called ecosystem services which are commonly defined as “the benefits people obtain from ecosystems”.²

Especially when health is understood as a good state of human wellbeing then health is directly linked to ecosystem services. Ecosystem services values are a direct measure of nature’s contribution to human wellbeing. This is in line with the health definition of the World Health Organisation (WHO) which has also been adopted within the UK National Ecosystem Assessment.³

“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”⁴

Therefore all ecosystem services such as for example food provision, recreation, aesthetic values and flood, water, climate and air quality regulation, are directly linked to health benefits in one way or another.

Figure 1: Health Benefits and Threats from Ecosystems



Source: Adopted from Pretty et al. (2011), p. 1157

¹ See below for more evidence and Pretty et al. 2011 for an overview.

² Millennium Ecosystem Assessment 2005, 40.

³ Church et al. 2011.

⁴ World Health Organization 1948, 1.

Referring to Sports England's Active People Survey⁵ in 2013 only about 60% of the adult population in Herefordshire and Shropshire and less than 50% in Telford and Wrekin were regularly physically active. Apart from the negative effects on human wellbeing and reduced life expectancy, physical inactivity also causes significant expenses to the healthcare system and therefore society. The annual costs of physical inactivity to NHS clinical commissioning groups are estimated to be between £455 and £944 million. These figures represent conservative estimates as only 5 diseases and no indirect costs were considered.⁶

An increase in accessible greenspace close to where people live is increasingly being recognised to improve people's health by providing space for physical activity.⁷ Street trees can also encourage people to walk or cycle to work more often.⁸ This in turn helps prevent the onset of diseases such as obesity, diabetes, heart diseases and strokes. Several studies have shown that regular park users are healthier than their counterparts. This applies for a range of measures such as diastolic and systolic blood pressure, depression score and perception of general health.⁹ Large scale studies from the Netherlands, Sweden and Japan suggest that the availability of accessible local greenspace and human health are directly related.¹⁰ About three out of four UK adults agree that green spaces are important for their general health.¹¹ The Department of Health suggests that increasing accessible open spaces could reduce healthcare costs in the UK by more than £2 billion annually and this may still be an underestimate.¹²

The evidence shows that there is a great opportunity to improve people's health and to prevent illnesses by investing in Natural Capital, which is *"the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future"*.¹³ Investment in Natural Capital is not something that has a tradition in the UK health system but could provide a great opportunity for improving people's health and reducing healthcare costs; especially in the long term. Such 'green' investments could trigger a shift from the treatment of poor health for example caused by physical inactivity, mental illnesses or poor air quality 'at the end of the pipe' towards a pro-active prevention of people becoming ill in the first place.

At the moment conservation third sector organisations, some farmers, environmental departments of central government and parks departments of local authorities are the main drivers for the creation, management and protection of Natural Capital. One could argue that the NHS benefits from related health benefits as a 'free rider' without contributing to the costs of management etc. Unfortunately Natural Capital and many ecosystem services in the UK are in declining and/or degrading status.¹⁴ Because public coffers and funding sources for Natural Capital investment and management are under threat and other drivers such as population growth and climate change add pressure on Natural Capital this negative trend is not likely to change without a combined effort. If no additional action is taken then the decline and degradation of Natural Capital will continue which is likely to also increase the pressure on the health system and budget.

⁵ <http://activepeople.sportengland.org/>

⁶ Public Health England 2016.

⁷ Coombes, Jones, and Hillsdon 2010.

⁸ van den Berg, Koole, and van der Wulp 2003.

⁹ Ho et al. 2003.

¹⁰ Vries et al. 2003.; Grahn and Stigsdotter 2003.; Takano, Nakamura, and Watanabe 2002.

¹¹ Kuppaswamy 2009.

¹² pers comm., Mallika Ishwaran, Defra, 2011, cited in UK NEA 2011b, 1104.

¹³ Costanza 2008.

¹⁴ UK NEA 2011a.

Key Findings of the Marches Ecosystem Assessment

The aim of the Marches Ecosystem Assessment was to reveal the value of Natural Capital and ecosystem services in Herefordshire, Shropshire and Telford and Wrekin; including related health benefits. Revealing the value of commonly undervalued or neglected benefits (which includes most health benefits) is an important step towards implementing such values and targeted management of Natural Capital assets.

The calculations resulted in a total 'external' Natural Capital value of £14.8 billion, stating the central estimate. This value is made up of the estimated stock value of carbon stored in ecosystems and corresponding soils (£7.2b) and the capitalised value of ecosystem services flows over 25 years (£7.5b). The annual flow of 'external' ecosystem services was valued at £358.1 million. The findings (also for each assessed geography) are summarised in Table 1 and Table 2 below. For methods, calculations and more detailed findings see the main report published alongside this summary.

Table 1: Capitalised Baseline Value of Assessed Ecosystem Services in The Marches

Assessment Area Assessed Habitat Area		Herefordshire 110,192 ha			Shropshire 171,878 ha			Telford and Wrekin 8,423 ha			TOTAL 290,494 ha		
Ecosystem Service		High	Central	Low	High	Central	Low	High	Central	Low	High	Central	Low
Provisioning Services	Wild Food	£106	£31	£8	£117	£34	£10	£12	£3	£1	£234	£69	£19
	Ornamental Resources & Non-food Products	£190	£39	£11	£208	£42	£12	£20	£4	£1	£419	£85	£24
	Water Supply	£0	£0	£0	£1	£0	£0	£0	£0	£0	£1	£0	£0
Cultural Services	Wild Species Diversity	£1,851	£404	£164	£3,241	£647	£262	£299	£34	£14	£5,391	£1,085	£440
	Recreation & Aesthetic Values	£464	£259	£111	£1,050	£544	£240	£495	£282	£129	£2,010	£1,086	£479
	Health	£1,364	£852	£451	£2,329	£1,536	£903	£1,074	£700	£403	£4,767	£3,088	£1,757
	Productivity	£182	£118	£67	£366	£237	£134	£156	£101	£57	£704	£456	£259
Regulating	Flood Regulation	£1,326	£656	£160	£1,849	£915	£223	£121	£60	£15	£3,296	£1,631	£397
	Water Quality Regulation	£4	£2	£1	£45	£25	£10	£5	£3	£1	£54	£30	£12
TOTAL		£5,488	£2,362	£972	£9,206	£3,981	£1,794	£2,182	£1,188	£620	£16,876	£7,531	£3,387

Notes:

All values are stated in million pounds (£m); 2015 prices.

The capitalised value represents the present value of ecosystem services provided over a time period of 25 years.

Where monetary values have been calculated this may only cover a proportion of the full value of the ecosystem service.

Legend:

Central Central estimate

High Higher threshold of the sensitivity analysis (even if the real value could still exceed this threshold)

Low Lower threshold of the sensitivity analysis

For valuation methods, underlying assumptions and limitations see the relevant sections of the report.

Source: Author calculations

Table 2: Carbon Stock Value in The Marches

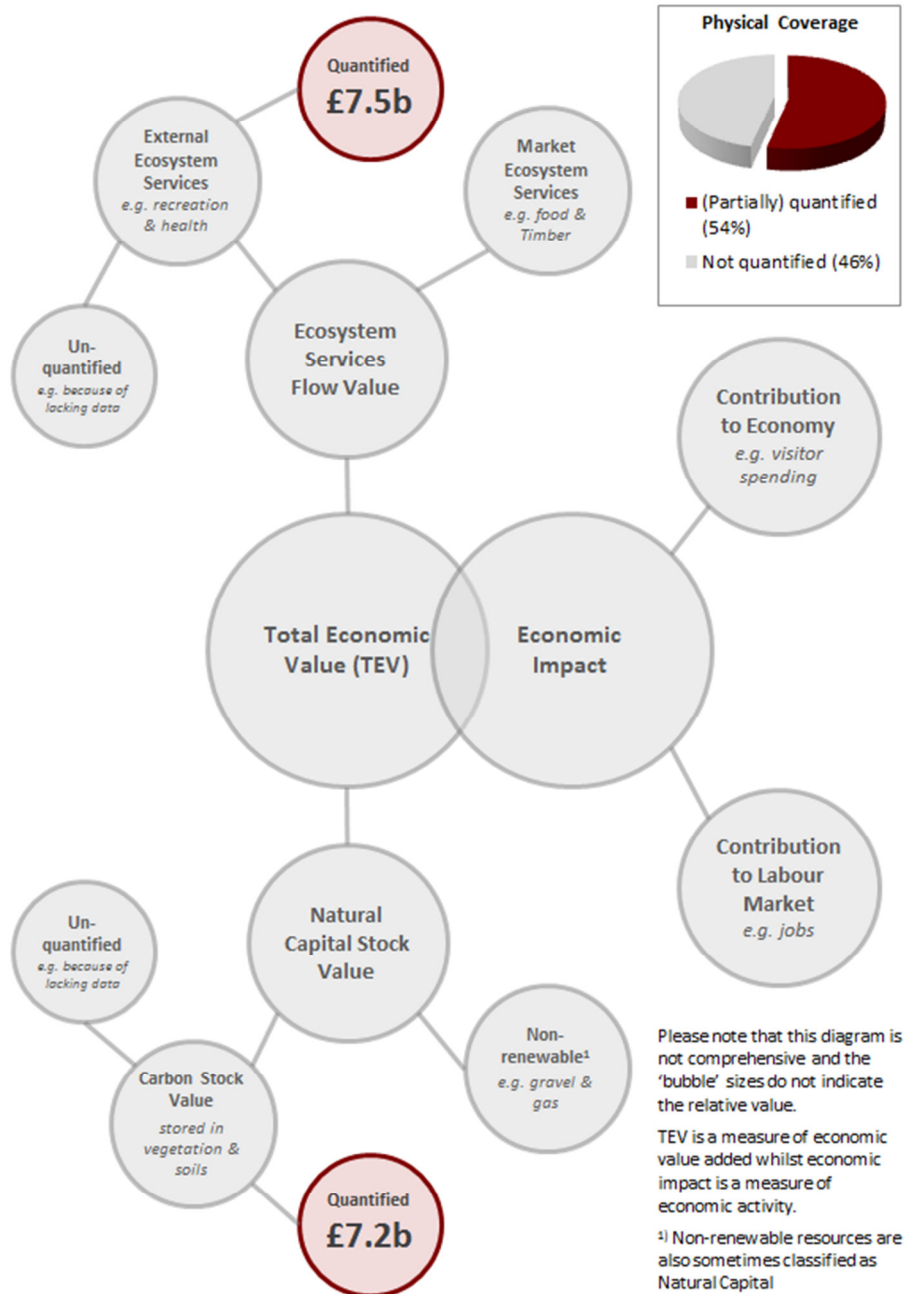
		Assessed Area	Carbon Stock	Stock Value
Carbon	Herefordshire	110,192 ha	12,010,117 t	£2,749m
	Shropshire	171,815 ha	18,389,081 t	£4,209m
	Telford and Wrekin	8,423 ha	1,217,359 t	£279m
	Total Marches	290,431 ha	31,616,557 t	£7,236m

Source: Author calculations

The figures should be interpreted as baseline value of Natural Capital in The Marches. Figure 3 shows what is (and more importantly what isn't) included in the Marches Ecosystem Assessment. Many ecosystem services could not be valued for example because of lacking or missing valuation evidence. It should also be acknowledged that often only an element of an ecosystem service could be valued which means that stated values often still understate the total value. It is important that these values are not ignored which is why many unquantified ecosystem service benefits have been assessed qualitatively in the corresponding sections of the main report.

The most immediate health benefit that could be valued is the effect of 'green' exercise (recreational walking and cycling only) on reducing mortality rates. The direct effect of the existence of greenspace on people's exercise levels in The Marches has been valued at £146.9 million annually or £3.1 billion capitalised over 25 years. It was estimated that 46 deaths are prevented each year due to the existence of natural accessible greenspace.

Figure 3: Marches Ecosystem Assessment Scope



Source: Author

These are notable figures and indeed the highest single calculated ecosystem services flow values in the assessment but still paint a very incomplete picture and the total health benefit is likely to be magnitudes higher. Research from the United States, for example, suggests that the view of woodland can improve mental health by breaking down stress and that the view of woodland from hospitals has a positive effect on recovery times.¹⁵ Other research suggests that a high tree density per square kilometre significantly reduces asthma prevalence in very young children.¹⁶ Greenspace and especially trees contribute to the purification of the air, therefore reducing the risk of related illnesses such as respiratory ailments, heart disease and cancer. A case study modelling the mitigation effects of particulate (PM10) pollution in East London estimates that an increase of grassland and tree cover could avert two PM₁₀-related deaths and

¹⁵ Ulrich 1984; Ulrich and Simons 1986.

¹⁶ Lovasi et al. 2008.

two hospital admissions annually in a 10 km² area.¹⁷ The latter examples for positive Natural Capital health effects should not be neglected even if a monetary quantification was not possible. And as mentioned before most if not all ecosystem services benefit health directly or indirectly. The calculated productivity gains (see Table 1) are for example a direct result of improved health due to 'green' exercise due to the availability of accessible greenspaces in The Marches.

Natural Capital Management: How To?

As mentioned in the 'business case' it is likely that targeted Natural Capital investment would improve people's health and therefore reduce healthcare costs to the NHS in the long term. A good starting point may be to collaborate with those organisations that are managing Natural Capital such as the Local Nature Partnerships (LNPs) to explore how common goals could be achieved (and funded) collectively so that the Natural Capital benefits to each party can be maximised and sustained over time.

It is often easier to assess the cost-effectiveness of treating illnesses rather than the effects of preventing them in the first place through greenspace creation and enhancement. However, there are tools available to establish related cost-benefit analysis for Natural Capital investments. One tool is the [Health Economic Assessment Tool \(HEAT\)](#) developed by the World Health Organisation (WHO).¹⁸ This tool has also been used to calculate the effect of 'green' exercise and the methods developed in Section 3.4 of the main report could be modified to estimate benefits of project scale interventions as well. The National Institute for Health and Care Excellence (NICE) has also developed a [Physical Activity Return on Investment Tool](#) that may be used to quantify further benefits such as productivity gains or healthcare treatment costs.¹⁹

As a funding mechanism for greenspace enhancement and creation, a Payments for Ecosystem Services (PES) scheme could be developed, together with other stakeholders who benefit from Natural Capital assets. The creation of a park, for example, does not just benefit health but also provides space for recreation, acts a carbon sink mitigating climate change, reduces flood risk, etc. There are many different beneficiaries. If well designed then a PES scheme could ensure that costs are fairly shared between beneficiaries and the organisations that represent them. The share of costs would be based on the share of the benefits value to each beneficiary group. Such a PES scheme with multiple 'buyers' could facilitate delivery of green infrastructure projects/interventions which might be beyond the budget of a single beneficiary group. A project could be demonstrated to be cost-effective if the total benefits across all beneficiaries are considered. A map showing areas in The Marches in greatest need of accessible greenspace creation has already been established as part of the Marches Ecosystem Assessment and is available in Chapter 5 of the main report. For more information about PES see for example [Defra's best practice guidance](#).²⁰ For more information about PES schemes you can also contact the author of this report, [Oliver Hölzinger](#).

¹⁷ Tiwary et al. 2009.

¹⁸ 2014 version.

¹⁹ Mallender et al. 2013.

²⁰ Smith et al. 2013.

References:

- van den Berg, Agnes E., Sander L. Koole, and Nickie Y. van der Wulp. 2003. Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology* 23 (2): 135–146.
- Church, Andrew, Jacquelin Burgess, Neil Ravenscroft, William Bird, Kirsty Blackstock, Emily Brady, Michael Crang, et al. 2011. UK National Ecosystem Assessment of Cultural Services. In *The UK National Ecosystem Assessment Technical Report*. Cambridge: UNEP-WCMC.
- Costanza, Robert. 2008. Natural Capital. *The Encyclopedia of Earth*. Available from <<http://www.eoearth.org/view/article/154791/>>.
- Grahn, Patrik, and Ulrika A. Stigsdotter. 2003. Landscape planning and stress. *Urban Forestry & Urban Greening* 2 (1): 1–18.
- Ho, Ching-Hua, Laura Payne, Elizabeth Orsega-Smith, and Geoffrey Godbey. 2003. *Parks, recreation and public health: parks and recreation improve the physical and mental health of our nation. (Research Update).: An article from: Parks & Recreation*. National Recreation and Park Association. Available from <http://findarticles.com/p/articles/mi_m1145/is_4_38/ai_100960607/pg_4/>.
- Kuppuswamy, Hemavathy. 2009. Improving health in cities using green infrastructure: A review. *FORUM Ejournal* 9: 63–76.
- Lovasi, Gina Schellenbaum, James W Quinn, Kathryn M Neckerman, Matthew S Perzanowski, and Andrew Rundle. 2008. Children living in areas with more street trees have lower asthma prevalence. *Journal of Epidemiology and Community Health*. Available from <<http://jech.bmj.com/content/early/2008/05/01/jech.2007.071894.abstract>>.
- Mallender, J., E. Bertranou, L. Owen, A. Lester-George, T. Jhita, and S. Roberts. 2013. *Physical Activity Return on Investment Tool (version 1.04)*. London: National Institute for Health and Care Excellence (NICE).
- Millennium Ecosystem Assessment. 2005. *Ecosystems and human well-being*. Synthesis Report. Available from <<http://www.maweb.org/documents/document.356.aspx.pdf>>.
- Pretty, Jules N., Jo Barton, Ian Colbeck, Rachel Hine, Susana Mourato, George MacKerron, and Carly Wood. 2011. UK National Ecosystem Assessment of Health Values. In *The UK National Ecosystem Assessment Technical Report*. Cambridge: UNEP-WCMC.
- Public Health England. 2016. *Physical inactivity: economic costs to NHS clinical commissioning groups*. London.
- Smith, S., P. Rowcroft, M. Everard, L. Couldrick, M. Reed, H. Rogers, T. Quick, C. Eves, and C. White. 2013. *Payments for Ecosystem Services: A Best Practice Guide*. London: Department for Environment, Food and Rural Affairs.
- Takano, T, K Nakamura, and M Watanabe. 2002. Urban residential environments and senior citizens' longevity in megacity areas: the importance of walkable green spaces. *Journal of Epidemiology and Community Health* 56 (12): 913–918.
- Tiwary, Abhishek, Danielle Sinnett, Christopher Peachey, Zaid Chalabi, Sotiris Vardoulakis, Tony Fletcher, Giovanni Leonardi, Chris Grundy, Adisa Azapagic, and Tony R. Hutchings. 2009. An integrated tool to assess the role of new planting in PM10 capture and the human health benefits: A case study in London. *Environmental Pollution* 157 (10): 2645–2653.
- UK NEA. 2011a. *UK National Ecosystem Assessment: Synthesis of the Key Findings*. Cambridge: UNEP-WCMC. Available from <http://archive.defra.gov.uk/environment/natural/documents/UKNEA_SynthesisReport.pdf>.
- UK NEA. 2011b. *UK National Ecosystem Assessment: Technical Report*. Cambridge: UNEP-WCMC.
- Ulrich, R S. 1984. View through a window may influence recovery from surgery. *Science (New York, N.Y.)* 224 (4647): 420–421.
- Ulrich, R. S., and R. F. Simons. 1986. Recovery from Stress During Exposure to Everyday Outdoor Environments. In *The cost of Not Knowing*. Barnes, R. et al.
- Vries, Sjerp de, Robert A Verheij, Peter P Groenewegen, and Peter Spreeuwenberg. 2003. Natural environments -- healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A* 35 (10): 1717 – 1731.
- World Health Organization. 1948. Preamble to the Constitution of the World Health Organization. New York, United States of America.