

Ecosystem services

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This Information Note introduces ecosystem services and ecosystem service frameworks.

1. Introduction

- 1.1 Over the last decade there has been growing interest in ecosystem services and their potential role to guide decisions about the planning, design and management of landscape.
- 1.2 This Technical Information Note has been produced to help Landscape Institute members learn more about ecosystem services and how they might use an ecosystem service framework. It explains the relationship between ecosystem services and other terms that are now used to communicate the role of the environment in society. It also provides examples of ways in which landscape professionals could make use of an ecosystem service framework in their work.
- 1.3 The Note introduces ecosystem services, including key issues such as measurement and valuation. It then provides some examples of how an ecosystem service framework can be applied.
- 1.4 This Note is at this stage provided for information only.

2. Ecosystem services

2.1 What are they?

- 2.1.1 Ecosystem services are products and processes of the environment that lead to benefits for people. The UK National Ecosystem Assessment – a major study of the value of the environment to people – defined ecosystem services as:

'The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling that maintain the conditions for life on Earth.'

- 2.1.2 Ecosystem services are the result of the interaction of human and natural systems, including the way that environments are designed and managed.
- 2.1.3 Understanding ecosystem services helps us recognise the complex interactions between the living and physical environment and people in planning, design and management decisions. They help us describe how the environment contributes to people's wellbeing. Examples of ecosystem services include products such as food and water, processes such as regulation of floods and soil erosion, and non-material benefits such as for recreation and spiritual growth.
- 2.1.4 The UK National Ecosystem Assessment places ecosystem services in four categories, as described in Table 1.

Category	Description	Examples
Provisioning	Things of nutritional, energy or material value that arise from the natural processes on land and water that contribute to people's wellbeing.	Agricultural products, timber, drinking water, energy sources.
Regulating	The ways in which natural processes keep the environment in good condition. This includes natural degradation of wastes and harmful substances.	Flood regulation, carbon storage in soils and plants, regulating soil nutrients.
Cultural	All the non-material things arising from ecosystems that affect people's well-being. Normally these are perceived and enjoyed but not consumed.	A sense of place. Opportunity for recreation.
Supporting	Ecological processes and functions that are necessary for the production of other ecosystem services.	Pollination. Regulation of the flow of nutrients.

Table 1. Categories of ecosystem service

2.1.5 All ecosystem services are influenced by culture, as this shapes what people recognise as useful, valuable and 'good' in the environment. This is especially the case in the UK, where the landscape (and the condition of the environment) has evolved as a result of many people's actions over a long period.

2.2 How are they measured?

2.2.1 While some ecosystem services are relatively easy to measure, others are not. For example, measuring the amount of a crop grown in a given area (a provisioning service) is much easier than measuring the level of emotional significance and spiritual meaning that people may hold for a place (a cultural service). Measurement can be quantitative or qualitative. It can be based on a physical description or based on desirability and value.

2.2.2 The use of proxies can be a useful way of measuring regulating or supporting ecosystem services. For example the presence of peatland plant species can be used to indicate the availability of the service of carbon storage. Measuring the perceptual services that nature provides, such as cultural ecosystem services, can be a more complex task. For example, measuring how a local greenspace contributes to people's wellbeing may be based on visitor satisfaction surveys and frequency of visits. Such information does not, however, represent the value of greenspace to those who cannot (or do not) visit.

Ecosystem service	Examples of how the service can be measurement
Drinking water (provisioning service)	Amount of water provided by streams or aquifers
Energy production (provisioning service)	Amount of energy produced
Flood protection and regulation	River flow monitoring and analysis

(regulating service)	
Pollination by bees and other insects (regulating service)	Presence of pollinator species.
Enjoyment provided by visiting landscapes or urban greenspaces (cultural service)	Visitor satisfaction surveys, frequency / duration of visits; membership of groups/trusts; use of facilities
Bird watching (cultural service)	Visitor satisfaction surveys, frequency / duration of visits; membership of groups/trusts; use of facilities
Nutrient cycling (supporting service)	Levels of nutrients in soils / vegetation
Soil formation (supporting service)	Depth and condition of soil layers

2.2.3 The inherent complexity of measuring many ecosystem services has led to ongoing debate about the merits of using the term. There is concern amongst some that there will be a focus on ecosystem services that are easy to measure, whilst those that are less easy to measure will not be accounted for. A counter argument is that without attempting to measure ecosystem services, the benefits that the natural environment provides to us will not be recognised, valued or considered within decision-making.

2.2.4 While supporting, regulating and provisioning services are generally focused on functions of the environment, cultural ecosystem services embody people’s ideas about the value of biodiversity and landscape beyond what it does. This is sometimes referred to as ‘intrinsic’ value.

2.3 What is an ecosystem service framework?

2.3.1 An ecosystem service framework is a way of considering the whole environment as an interconnected system that supports benefits enjoyed by people. It can help apply a holistic approach to how we plan, design and manage our environments.

2.4 What does using an ecosystem service framework achieve?

2.4.1 Using an ecosystem service framework considers all ecosystem services together rather than in isolation. It can help embed ecosystem service thinking in projects from the outset, identifying what services are important, what needs to be protected and what could be enhanced. It links people’s needs with what the environment provides.

2.4.2 An ecosystem service framework can improve reasoning over how and why the environment should be protected and enhanced. It considers the environment as it is, providing a baseline study of ecosystem services against which future change can be measured. It links ecosystem services directly to the needs, values and aspirations of people affected.

2.4.3 An ecosystem service framework:

- Makes the full spectrum of environmental processes and functions in any one place **explicit**;
- Highlights the **positive** contribution that the environment plays in people's wellbeing and prosperity; and
- Provides a basis for in-depth **discussion** with stakeholders about what the natural environment provides for them, including experiential qualities. Stakeholders can include local community, local authority or investors in the project.

2.5 Who benefits and who provides?

- 2.5.1 Ecosystem services provide goods and functions that may be valued by individuals or society as a whole.
- 2.5.2 Different groups in society may have differing views on which services are most important to them and which they would like to benefit from. Recognising which services are most important for people can indicate what should be protected or enhanced, and for whom. For example, horticulturalists and farmers will be interested in services such as pest control that are directly related to the success of their businesses. Others may be concerned with the use of land and water for recreation and associated health benefits.
- 2.5.3 Many ecosystem services are public goods that come from private land. In addition, private businesses benefit from ecosystem services provided by land and water that they don't own. For this reason, 'Payments for ecosystem service' (PES) schemes are increasingly being advocated. These link the people that provide ecosystem services with people that benefit from them in financial agreements. Practical experience is however, limited to financial arrangements relating to specific services such as water quality improvements.
- 2.5.4 There is always a need to balance the provision of ecosystem services for a range of different people with conflicting interests. This means that trade-offs need to be made clear when making decisions about which services should be enhanced or protected, and who should receive the benefits. Some issues may become political and it may not be possible to address these within an individual project.

2.6 Site analysis, ecosystem services and design

- 2.6.1 Landscape professionals are tasked with designing places that meet the diverse needs of people today and into the future. An ecosystem services framework can help landscape professionals to work with others to identify the multiple functions of a site and to get the most out of them. It builds on the process of understanding the landscape through site survey and analysis by identifying all the physical, environmental and social ecosystem services present and quantifying their current state.
- 2.6.2 Ecosystem services help us understand the landscape as a system by identifying and recording the services provided at a site, understanding who is benefitting from them and where there are gaps in service provision. Having information on ecosystem services can inform the design of a site so that our landscapes are truly **multifunctional**, serving the

needs of different groups of people that benefit from them. It can contribute to more **holistic place-making** that benefits both people and the natural environment, as well as planning for drivers of change such as climate change.

2.7 Green infrastructure, natural capital and the ecosystem approach

- 2.7.1 Ecosystem services are derived from the networks of natural features often referred to as green infrastructure or natural capital. However, as shown in the diagram below, ecosystem services also rely on other forms of 'capital', such as social and human capital and financial capital.

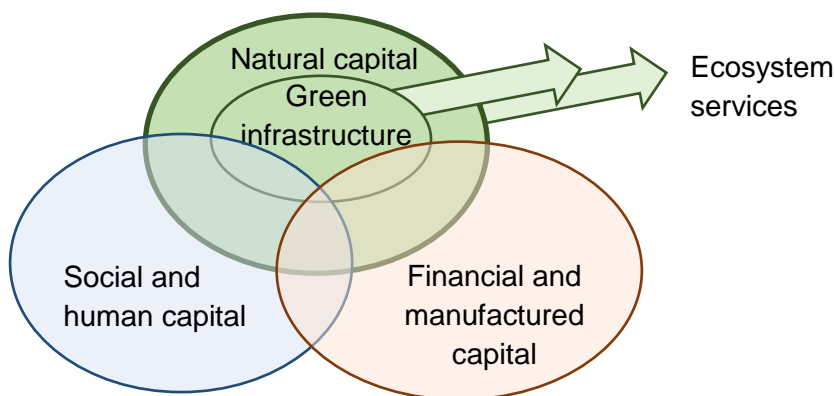


Figure 1. Relationship between ecosystem services, natural capital and green infrastructure

- 2.7.2 **Green infrastructure** is defined in the Green Infrastructure Landscape Institute Position Statement (2013) as,

'the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect villages, towns and cities. Individually, these elements are GI assets, and the roles that these assets play are GI functions.'

The term blue infrastructure is sometimes used to refer to water features on land and around the coastline.

- 2.7.3 **Natural capital** encompasses the network of features that are considered green infrastructure but also includes the land, soils and materials below ground, and the atmosphere. The term 'capital' indicates that these features have a form of value that can be measured and valued in economic terms. This is a growing area of interest which aims to give the natural environment the same level of importance as financial and social capital by defining its monetary value. This can make it more easily understood in established markets. Natural capital accounting methods are being developed to quantify and value environmental features following professional accounting methods.

- 2.7.4 Both green infrastructure and natural capital are referred to as assets. Some place strong emphasis on how the features work together as a system or network. Others divide them

into discrete asset classes such as woodland, waterbodies or soils. Ecosystem services help to make the connection between how green infrastructure and natural capital work together to deliver economic and social value. An example is found in the value of landscape in providing a unique visitor experience (when considered like this, the whole may be greater than the sum of the parts).

- 2.7.5 Green infrastructure, natural capital and ecosystem services provide alternative concepts to the fragmented traditional approaches to environmental planning, where issues are dealt with in isolation rather than as part of a system.
- 2.7.6 The **Ecosystem approach** is a holistic way of planning and managing the environment for both nature and people. It is based on a set of 12 principles set out by the International Convention of Biological Diversity. Using ecosystem services to understand what the environment does for people is just one aspect of the ecosystem approach. It also places an emphasis on involving local people and using all local knowledge in decision-making.

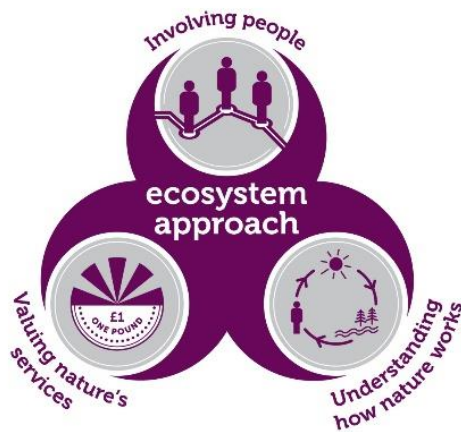


Figure 2. Models for mainstreaming an ecosystem services framework and the ecosystem approach. Source: © Ecosystems Knowledge Network

- 2.7.7 To ensure that an ecosystem service framework does not become a solely technical exercise it is important that it involves all parts of society. Research shows that while members of the general public are keen to discuss how it gains from the environment they are cautious about the potential loss of appreciation of nature's intrinsic worth (Fish and Saratsi, 2015).

2.8 Ecosystem service assessment

- 2.8.1 Ecosystem service assessment (ESA) is a structured process for measuring and evaluating the services the environment provides for people. It identifies what ecosystem services are being provided and where there are gaps in service provision. It can also provide evidence for supporting planning, design and management decisions. ESA can help to optimise public benefits from ecosystem services, avoid potential costs and risks arising from overlooking the implications for some services, and expose the social and economic costs implicit in any trade-offs.

- 2.8.2 ESA provides a baseline of ecosystem service provision which can be used to determine conflicting interests and make plans for enhancement, protection of those services.
- 2.8.3 It differs from Environmental Impact Assessment (EIA) in that it does not assess the impact of a development. Instead, it records what ecosystem services are being provided, and can identify the implications of possible changes in habitat management.
- 2.8.4 Landscape professionals are well placed to undertake ESAs due to their broad interdisciplinary thinking. In the future, ESA may be a task in its own right undertaken by landscape professionals. They are currently being undertaken by environmental economists, ecologists and multi-disciplinary consultants. Guidance on undertaking an ESA can be found in a guide entitled *Ecosystem Services Assessment: How to Do One in Practice* (Institution of Environmental Sciences, 2013). Additional information is provided by Hölzinger and Everard (2014) in work that formed part of the UK NEA.

2.9 Ecosystem service mapping

- 2.9.1 Mapping ecosystem services can help people understand and visualise the range of ways that the natural environment contributes to the economy and well-being. This geographical information can be used to communicate with clients and decision makers, and as the basis for developing designs and management plans.
- 2.9.2 Tools to map ecosystem services include Geographic Information Systems (GIS), which provide a database to record a range of information on ecosystem services, such as habitats and land use.

2.10 ESA and EIA

- 2.10.1 Worldwide, ESA is increasingly being scoped into EIA. Using ecosystem services highlights the multiple benefits we receive from the natural environment, and including this in EIA can lead to an accurate and effective way of describing the effects of a development on the environment. It can also frame the environment differently, presenting it as adding value rather than as a constraint.
- 2.10.2 These factors could result in more integrated and valuable EIA outcomes in the future. More information, with UK examples, is available in Baker and Scott (2013).

2.11 Ecosystem services and landscape character

- 2.11.1 The European Landscape Convention sets out a requirement to identify and assess landscapes by considering the character and condition of the landscape, including cultural and perceptual aspects, and to set landscape quality objectives.

- 2.11.2 ESA can help to clarify the relationship between the form of a landscape and the functions that it supports. Understanding these functions can highlight the benefits that the landscape provides for human well-being. Ecosystem services can also provide a basis for involving local communities and other stakeholders in a holistic understanding of landscape.
- 2.11.3 Ecosystem services are now included in the updated National Character Area profiles (Natural England, 2014). They include a description of key ecosystem services associated with the attributes and processes of the landscape, and an analysis of how to enhance these services. This is used to inform the 'Statements of Environmental Opportunity' (SEO) which brings together all the information in the profile and provides suggestions to conserve and improve the natural environment. The analysis in the profiles can show the projected impact of the SEO on the value of ecosystem services.
- 2.11.4 Ecosystem services are also increasingly being used in local characterisation studies. For example, the Brecon Beacons Landscape Character Assessment identifies the contribution that each landscape character area makes to ecosystem services (Fiona Fife Associates et al., 2012). Landscape Character Assessment is also used as a framework for subsequent more detailed assessment of ecosystem services, such as in the South West Peak Landscape Partnership (work which is ongoing). Historic Landscape Characterisation has also been used for historical assessment of ecosystem services, in an assessment of the River Irwell in Greater Manchester (James et al. 2014).

2.12 Valuing ecosystem services

- 2.12.1 Just as natural capital can be assigned a monetary value, ecosystem services can also be valued in this way. Valuation is seen as a way to reflect the extent of what nature does for people in market terms; and to ensure that ecosystem services inform decisions affecting the environment.
- 2.12.2 Various methods can be used to value ecosystem services, such as value transfer or benefit transfer. This is a growing area of work for multi-disciplinary, economic and environmental consultancies. It is important to remember, however, that valuation is not just about monetisation. This is especially the case when it comes to people's relationship with nature as they express their values in many different ways both individually and collectively. Defra has produced a guide to valuing ecosystem services (Defra, 2007).

3. Applying an ecosystem service framework

3.1 Specific examples

3.1.1 Ecosystem service frameworks can inform design at various scales, from city regions, green infrastructure strategies to small-scale site designs. In practice, an ecosystem service framework can be used to:

- a) Produce detailed ecosystem service assessments and valuations of ecosystem services;
- b) Consider how landscape can better satisfy the demand for and provision of ecosystem services, such as through landscape character assessment; and
- c) Map services to show features and processes provided by the environment.

3.1.2 Landscape professionals may want to consider how ecosystem services will benefit their work, and the rationale for using techniques such as ecosystem service assessment.

3.1.3 The following examples of application of ecosystem services may be of interest.

Landscape Character

Ecosystem Services in National Character Area Profiles

Natural England and partners



Image: Natural England National Character Area Profile 52.

Overview

The 159 National Character Area (NCA) profiles now include a description of key ecosystem services associated with the attributes and processes of the landscape, and an analysis of how to enhance these services.

How were ecosystem services included?

As an example, the White Peak NCA profile (No. 52) states that the key ecosystem services for this landscape area are food production and water availability from the limestone aquifer and major rivers (provisioning services); regulation of water quality due to filtering of groundwater (regulating services); a strong sense of place/inspiration due to its geology, far-reaching views, steep-sided valleys and well preserved historic landscapes, sense of history, tranquillity, recreation, biodiversity and geodiversity (cultural services).

Across England, Natural England has an ongoing Character Area Climate Change Project. As part of this, consultant Atkins has developed a process for assessing the vulnerability of ecosystem services to the impacts of climate change in a number of NCAs. This method identifies features of the natural environment which contribute to provisioning, regulating, supporting and cultural services within an NCA. It assesses exposure and sensitivity to the impacts of climate change, and their adaptive capacity. Through consultation with local stakeholders, potential adaptation actions were identified which aimed to reduce the vulnerability of ecosystem services to the impacts of climate change.

Outcome

Landscape professionals using NCAs will be able to consider ecosystem services as part of the local scale landscape character assessments.

Further information

<https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making>

Informing Masterplanning and Regeneration

Mapping ecosystem services across Cumbernauld Scottish Wildlife Trust



Image credit: Jonathan Winn / Scottish Wildlife Trust

Overview

Maps have been produced to explore the supply and demand of ecosystem services in Cumbernauld, a town in North Lanarkshire. The aim is to inform improvements to greenspace, green travel routes and plans for new homes and businesses.

Context

The town of Cumbernauld, situated in North Lanarkshire, lies within the Central Scotland Green Network (CSGN). The CSGN initiative has the aim of transforming the environment of central Scotland and making it a more attractive place to live, visit and do business. The Cumbernauld Living Landscape, which commissioned the study, is one of over 100 recovery plans for nature initiated by Wildlife Trusts around the UK.

How were ecosystem services included?

Ecosystem service maps were produced for the Cumbernauld Living Landscape area. The EcoServ-GIS software developed by Durham Wildlife Trust and Scottish Wildlife Trust was used for this. The maps indicate where green infrastructure (also referred green networks in Scotland) is most beneficial to the local population and where it is most needed.

A map of greenspaces was overlain with data on housing, roads, pathways and schools. It then matched the data against local population characteristics taken from the census and Scottish Index of Multiple Deprivation. Using this information, nine ecosystem services provided by Cumbernauld's green network were mapped. These included carbon storage, local climate regulation, pollination and outdoor education.

Outcome

The ecosystem service maps have been used to plan a survey of urban greenspace and will be used as part of a Green Routes Feasibility Project. The information will also be used in the Living Landscape's advocacy work on North Lanarkshire Councils Green Infrastructure Strategy and the South Cumbernauld Community Growth Area, providing an additional layer of evidence for the integration of the green network into the development of 600 new homes.

Further information

<http://www.arcgis.com/apps/MapJournal/?appid=630bed649378458f8c8d5af3d1cd4776>

Ecosystem service assessment and valuation at Mayesbrook Park

Environment Agency and Queen Mary's University



Image credit: Environment Agency/Thames River Restoration Trust

Overview

A £1.6 million programme to regenerate an underused public park in East London was informed by a detailed ecosystem service assessment and valuation.

Context

The study formed the basis for a project to restore an under-used park in the London Borough of Barking and Dagenham. The project was led by the Thames River Restoration Trust in association with the London Borough of Barking and Dagenham and other partners.

How were ecosystem services included?

The assessment began with a baseline assessment of the ecosystem services provided by the park. This was then used to compare a range of options for enhancing public value from the scheme, including:

- enhancing the hydrological function of the whole park landscape and infrastructure;
- using reedbed filtration to improve water quality in a bypassed reach of river and at lake inflows and outflows;
- improving climate regulation through energy-efficient building design, installation of renewable energy sources and reusing tree and other park trimmings as biomass fuel (or mulch) on site; and
- optimising park restoration design to provide health and educational resources to the local community.

The lifetime value of restoring the site across the four ecosystem service categories (provisioning, regulatory, cultural and supporting) was estimated at £27 million, excluding the value of regulation of air quality and microclimate. The anticipated cost-benefit ratio was 7:1.

Outcome

Assessment of the ecosystem service implications of the design option for the site helped to support the overall economic case for the project and secure individual funding contributions. Phase 1 of the scheme, involving re-routing the Mayes Brook along a more natural course, renewing the disused lakes and planting trees, has now been completed.

Further information

<http://ecosystemsknowledge.net/resources/examples/mayesbrook>

Communicating the value of trees in Torbay, Devon

Treeconomics and Torbay Borough Council



Image credit: © Treeconomics

Overview

The tool, i-Tree Eco, is a system to map tree locations and calculate the financial value of ecosystem services they provide. It was used in Torbay, Devon to identify the contribution that trees and other vegetation make to the area.

How were ecosystem services included?

The study found that trees in Torbay (mostly Ash) stored 98,000 tonnes of carbon, as well as playing a significant role in removing airborne particulates. The tool calculated that the tree's carbon storage was worth £1.5 million, air pollution removal was worth £1.3 million. The cost to replace them would be £280 million.

Outcome

Information from this survey has also been used to justify an additional investment of £25,000 into Torbay's tree maintenance budget, arresting a decline seen in recent years.

Further information

https://www.itreetools.org/resources/reports/Torbay_UF_Report.pdf

[http://www.forestry.gov.uk/pdf/Trees-people-and-the-buit-environment_Rogers.pdf/\\$FILE/Trees-people-and-the-buit-environment_Rogers.pdf](http://www.forestry.gov.uk/pdf/Trees-people-and-the-buit-environment_Rogers.pdf/$FILE/Trees-people-and-the-buit-environment_Rogers.pdf)

Informing design and management

Creating multiple benefits at Nursery Street, Sheffield

Sheffield City Council



Overview

Flood defences in the centre of Sheffield have been designed to provide multiple benefits for people. The plans have been informed by ecosystem service thinking. This includes the design for a 'pocket park' at Nursery Street.

Context

Following flooding in 2007, the Sheffield Central Area Flood Protection Scheme was developed. Within the broader context of adapting to climate change, investments in flood defences that also provide multiple benefits are being encouraged. Sheffield City Centre has a growing residential population. The environment has become an important factor in the area's regeneration.

How were ecosystem services included?

Consideration was given to the wide range of cultural ecosystem services arising from urban green spaces and provided to both local communities and businesses. This is in addition to the flood regulation service that any new scheme would provide.

To strengthen the case for investment, efforts have been made to value improvements to greenspace on the basis of the multiple benefits they will provide. This necessitated a greater understanding beneficiaries of ecosystem service provision.

The study analysed the main ecosystem services provided by the investment. Values were generated by transferring from other projects where this exercise has been undertaken with adjustments made accordingly. The monetised benefits to costs are £4,342,000 relative to scheme costs of £650,000, resulting in a benefit-to-cost ratio of almost 7:1. All of this added value was due to cultural ecosystem services, including recreation and tourism and social relations, as well as increases in property value.

Outcome

Design of a 'pocket park' at Nursery Street.

Turning a liability into an asset at Thorpe Marsh, Yorkshire

National Grid and AECOM



Overview

National Grid appointed AECOM to undertake assessments of its sites with the aim of turning some of the environment-related liabilities into assets, increasing the ecosystem services they provide. Thorpe Marsh in North Yorkshire was one of the study sites.

Context

The site is 16 ha at the former Thorpe Marsh Power Station site, within the North Doncaster *Living Landscape*. Although the site had risks associated with surface water and derelict buildings it was important for biodiversity. It also had former amenity features and strong connections with the local community.

How were ecosystem services included?

The main categories of natural capital on the site (woodland, wetland etc.) were mapped, and the area measurements were recorded in a spreadsheet. The ecosystem services provided by this natural capital were identified along with who was receiving each service. The main ecosystem services identified were carbon storage, water quality regulation, flood control, recreation and the presence of wild species (biodiversity).

A spreadsheet valuation tool was then used to calculate the economic value of the baseline natural capital and ecosystem services. It generated a 'natural capital baseline' of £170,000 indicative over 30 years. It also showed which type of natural capital this value comes from. This valuation was used as the basis for engaging stakeholders, including Yorkshire Wildlife Trust, the local community and regulatory bodies.

The baseline valuation and the stakeholder consultation were used to model potential scenarios for how the site should be managed, including restoring grassland, enhancing wetland or planting more trees. This enabled National Grid to determine the best return on investment.

Outcome

The valuation indicated the scenario that would provide the best return on investment for both the National Grid and stakeholders. This was used to develop management plans for the site to provide ecosystem services for all those involved. This included meeting Yorkshire Wildlife Trust's objectives, as well as providing benefits for local schools, dog walkers and ramblers in terms of health and wellbeing.

Further information:

http://naturalcapitalforum.com/docs/092_426_b2casestudies_chriswhitechrisplester_aecomnationalgrid_1450176006.pdf

4. Recognition in policy and research

4.1 Policy in the UK

4.1.1 Governments in the UK are now using the term ‘ecosystem services’ in national policies and strategies. Paragraph 109 of the National Planning Policy Framework for England, published in 2012, states that the planning system should recognise “*the wider benefits of ecosystem services*”. Updates and renewals of the Biodiversity Strategies for England (2011), Scotland (2013) and Northern Ireland (2015) make multiple references to ecosystem services.

4.1.2 Local Plans and Supplementary Planning Guidance in England have made reference to ecosystem services. Examples include:

- The Local Plan for North Devon and Torridge (for adoption in 2017). This makes numerous references to ecosystem services and how they underpin the area’s economy and identity. Policy ST14 (Enhancing Environmental Assets) seeks to protect and enhance northern Devon’s natural environment by ensuring that development that contributes to “*conserving and enhancing the robustness of northern Devon’s ecosystems and the range of ecosystem services they provide*”.
- The Preferred Options for the Local Plan for the South Downs National Park (subject to public consultation in 2015). This is based on an ‘ecosystem services approach’. Ecosystem service maps form part of the evidence used in support of the Plan. One of the Core Policies relates to ecosystem services. Final adoption of the Local Plan is expected in 2017 (South Downs National Park, 2016).

4.2 Sharing Information

4.2.1 The Ecosystems Knowledge Network was established to enable professionals throughout the UK to share information and case studies on the use of ecosystem services and the broader ecosystem approach.

4.3 Research in the UK

4.3.1 In the UK, various research programmes focus on advancing understanding of ecosystem services. These include the NERC Biodiversity and Ecosystem Service Sustainability (BESS) Programme, the Valuing Nature Programme and the Ecosystem Services for Poverty Alleviation Programme. A major part of the BESS Programme is to examine the relationship between biodiversity and ecosystem service provision in different settings around the UK. Publication of the findings is expected in 2017.

4.3.2 The UK National Ecosystem Assessment appraised the way in which eight key habitats provide ecosystem services throughout the UK. Expert judgement was used to assess how important each habitat is for ecosystem service provision, and whether the capacity of the habitat to provide each service is declining, improving or stable.

4.4 International research

- 4.4.1 Ecosystem services have international recognition. The European Union Biodiversity 2020 Strategy sets targets for the restoration of biodiversity and ecosystem services. Their importance is also illustrated through the International Panel on Biodiversity and Ecosystem Services (IPBES) which has similar status to the Inter-governmental Panel on Climate Change (IPCC).
- 4.4.2 The Millennium Ecosystem Assessment was published in 2005. This used an ecosystem service framework to highlight the deterioration of key parts of the global natural environment.
- 4.4.3 Ecosystem service frameworks are being used in various countries across the world. A variety of European research initiatives have been established to help people apply an ecosystem service framework. Examples of these include the OpenNESS and OPERAs consortiums. Both of these projects aim to use natural capital and ecosystem service science in practical ways to integrate them into land, water and urban management and decision-making. They examine how the concepts link to wider EU economic, social and environmental policy initiatives; and scrutinise the potential and limitations of the concepts.

5. Further information

Ecosystems Knowledge Network (information on the practical application of the ecosystem approach, with case studies and resources. <http://ecosystemsknowledge.net/>).

A quick start guide to ecosystem services produced by Natural England is available at <http://ecosystemsknowledge.net/resources/quickstart>.

Further information on valuation of ecosystem services: <http://ecosystemsknowledge.net/resources/tools-guidelines/valuing/economic>

Ecosystem Service Partnership (a worldwide network to enhance the science and practical application of ecosystem services) <http://www.fsd.nl/esp>

The National Ecosystem Assessment Toolkit, produced as part of the UK National Ecosystem Assessment, contains guidance on integrating an ecosystem service framework into decision making. <http://neat.ecosystemsknowledge.net/>

Research-led initiatives:

Biodiversity and Ecosystem Service Sustainability Programme, Natural Environment Research Council <http://www.nerc-bess.net/>

OPERAs <http://www.operas-project.eu/>

OpenNESS (Operationalisation of Natural Capital and Ecosystem Services) <http://www.openness-project.eu/>

HM Government guidance:

Ecosystem service web page <https://www.gov.uk/guidance/ecosystems-services>

Ecosystem assessments:

UK National Ecosystem Assessment <http://uknea.unep-wcmc.org/>

Millennium Ecosystem Assessment <http://www.millenniumassessment.org/en/index.html>
Inter-governmental Platform on Biodiversity and Ecosystem Services <http://www.ipbes.net/>

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