Natural Capital Evidence Handbook: to support place-based planning and decision-making

Natural England Research Report 092

NATURAL ENGLAND

Cover photo: Public Footpath - Longshaw Estate, Peak District

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Patricia Rice, Jane Lusardi, Alice Lord and Tim Sunderland

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Project manager

Patricia Rice

Patricia.Rice@naturalengland.org.uk

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Executive Summary

This report is about how to come to shared strategic understanding about the natural environment, in a place, using a natural capital evidence base. It is about working collaboratively and in partnership so that we can do more to enhance nature and human wellbeing. It sets out an approach that will help you include natural capital evidence in your strategic decision-making and identifies Natural England's evidence-based tools that will help along the way.

Working with natural capital helps deliver multiple benefits for people through our actions to improve the natural environment. This is part of the Government's 25 Year Environment Plan (HM Government 2018) and is relevant whether you are trying to plan strategically in your place, contributing to the nature recovery network or planning nature-based solutions that will help alleviate flooding or address the climate emergency.

For over a decade Natural England has been working with natural capital in a practical way. Our approach and products are transparent, easy to use, widely available and collaborative. This report brings everything together in one place to improve your access to this material and share our approach.

We present our best practice view (Figure 1) based on our own learning to date of what is most important to include in a natural capital approach. At each stage we highlight the learning that has brought us to this point and signpost tools and resources we have developed that will help.

Figure 1: A best practice view of a natural capital approach to place-based planning and decision-making.

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Introduction

This report is about how to come to a shared strategic understanding about the natural environment in a place, using a natural capital evidence base. It is about working collaboratively and in partnership so that we can do more to enhance nature and human wellbeing. It sets out an approach that will help you include natural capital evidence in your strategic decision-making and identifies Natural England's evidence-based tools that will help along the way.

Working with natural capital helps deliver multiple benefits for people through our actions to improve the natural environment. This is part of the Government's 25 Year Environment Plan (HM Government, 2018) and is relevant whether you are trying to plan strategically in your place, contributing to the nature recovery network, or planning nature-based solutions that will help alleviate flooding or address the climate emergency.

For over a decade Natural England has been working with natural capital in a practical way. We have tried it on the ground, developed tools, trialled them and developed them further. Our ethos has been to ensure our approach and products are transparent, easy to use, widely available and collaborative. This note brings everything together in one place to improve your access to this material and share our approach.

What is natural capital and how does it help us?

Natural capital refers to the aspects of the natural environment that provide benefits to people. These benefits are wide ranging and include clean air and water, wildlife to enjoy and crop pollination by insects. It is about what nature does for us. The idea behind natural capital is that it helps us define, quantify and value these benefits in ways that help better represent them, and the natural environment that provides them, in decision-making. Importantly, natural capital allows us to focus on those aspects of the natural environment itself that are critical for the long term provision of the benefits our wellbeing depends on, such as essential processes and functions. As such, natural capital helps us make decisions that benefit both people and nature.

Although natural capital seems relatively new to the way we work, there are a range of related ideas that have also informed the work we are drawing together here. The most important ones that will be referred to in this report are described in Box 1.

Box 1: Key terms and concepts relating to natural capital

Natural Capital: The Natural Capital Committee defines natural capital as *"the elements of nature that directly or indirectly produce value to people, including ecosystems, species, freshwater, land, minerals, the air and oceans, as well as natural processes and functions"* (Natural Capital Committee 2017)

Ecosystem services: the components of nature that are directly enjoyed, consumed, or used in order to maintain human wellbeing (Sunderland and others 2019). *A natural capital approach describes the natural environment as a stock of assets from which there is a flow of ecosystem services to people who benefit from them.*

Ecosystem Approach: a framework for the sustainable management of land and sea for the benefit of both biodiversity and people in a way that integrates ecological, social and economic understanding (Waters and others 2012). *The Ecosystem Approach heavily influences **how** we do natural capital in practice in a participatory and equitable way.*

Nature-based solutions (NBS): defined by the IUCN as actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits (Cohen-Shacham and others 2016). *A natural capital approach can help us make arguments in favour of NBS by demonstrating the role of nature in human wellbeing and helps us decide where the best places to put them are.*

Planning strategically

Thinking about the natural environment strategically can help us make better decisions about what we need to do where to recover nature. Using natural capital means we can base our decisions on the benefits nature provides for people too.

The learning, evidence and tools we have brought together in this report are here to help you think about your natural environment more strategically in a way that is both good for nature *and* people. If you do this strategic planning first then you can plan and engage with specific projects and mitigation much more effectively. Additional natural capital tools do exist to help project design and mitigation but they are not the focus of this note.

A natural capital approach

Figure 1 represents our best practice view of the stages that make up a natural capital approach to place-based planning and decision-making. We have agreed these broad stages with our partners in the Environment Agency and they align with the Natural Capital Committee Workbook (Natural Capital Committee, 2017).

The sequence and content summarised in Figure 1 is based on our own learning to date of what it is most important to include in a natural capital approach. We have learnt this from trying it with partnerships on the ground (Appendix A and B) and it builds on our work with National Parks and Areas for Outstanding Natural Beauty in relation to of their contribution to Defra's Biodiversity 2020 policy Outcome 1C (**Appendix 1**).

It is not intended to be a prescriptive or linear process that must be followed in sequence or to the letter. We do recommend reading this whole document though, at least quickly, before starting out. This would be our starting point in future practical applications of a natural capital approach.

The process can be adapted to each circumstance. We have found that when we have done this in practice the process is much more iterative, adaptive and organic than it looks here. Our case studies in Appendix A and B give two examples of that. The report also provides a framework you can refer to for incorporating natural capital into any decision-making about the environment. For example, it can be used alongside **Natural England's Nature Networks Evidence Handbook** (Crick and others 2020) to make best use of natural capital evidence in the collaborative design of networks for nature's recovery.

Caerthillian Cove
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How we have organised this report

We have structured this report around the stages in Figure 1 to make it easier for you to access the evidence and see how it all fits together.

Each section begins with a single page overview. This summarises the aim or goals of that stage and the key things we have learnt are important to include in a natural capital approach. We follow this by digging deeper to emphasise our key learning and the tools and resources we have developed that help. Where necessary, we explain a little more about natural capital so that you can better understand our approach and use natural capital evidence. **Appendix A** and **Appendix B** provide a summary of our experiences on the ground in the Upland Ecosystem Service Pilots and the North Devon Landscape Pioneer, which have helped shaped our approach as a whole. Appendices 1-9 are summary sheets for key pieces of work which help you access those key resources.

Where text is underlined, you can click to be taken to the relevant section of the report. Text which is **underlined and highlighted in blue** is hyperlinked to external sources of information.

Figure 1: A best practice view of a natural capital approach to place-based planning and decision-making.

Click underlined words to be taken to the relevant section

Stage 1:

DEFINE

Define Partnership and Vision

1.1:

Overview

One of the goals of a natural capital approach is to enable nature recovery that sustainably provides benefits central to people's well-being. Meaningful collaboration with a wide range of partners and stakeholders **throughout the entire process** is critical to success. This is because:

- It enables us to combine knowledge, evidence and expertise;
- The goals of different stakeholders are represented from the outset;
- We can ensure the widest range of ecosystem services and benefits are considered;
- It allows us to seek consensus in decision making;
- It secures buy-in from partners and stakeholders, increasing the opportunities for making a difference on the ground and attracting funding;
- It enables partners to pool resources and work towards a common goal.

Successful partnership working requires the investment of time and someone to drive it, such as a project officer, to make it work well. Partner commitment and engagement, with continuity of attendance, are also essential for productive collaboration.

We have learnt the following are key components of building an effective partnership at the outset:

Develop collaborative partnership

This works best when built on an existing partnership and broadened to involve new partners across a range of sectors.

Agree a high level vision for natural capital

Your partnership needs to come together around an agreed natural capital vision for your place. Your vision is where you want to get to.

Define scale and boundaries

It is important to ensure the boundary of your place is understood and accepted by the partnership and is at a scale appropriate for the outcomes of your approach to be applied.

Determine strategic direction

The plans and actions that need to be put in place to work towards the vision. Agree how you will measure progress towards your vision and put an evaluation, monitoring and reporting framework in place.

Return to overview diagram

1.2

Develop collaborative partnership

We have learnt that partnership development works best when built on an existing partnership where governance can be based on the existing structures, as in the Bassenthwaite Upland Ecosystem Service Pilot (Appendix A) and The North Devon Landscape Pioneer (Appendix B). It is also important to involve new partners across a range of sectors in addition to those from the environment sector. For example:

- Private sector partners who might become investors in the environment. Whilst some companies may invest for corporate responsibility reasons, we have found that it is difficult to find new money to improve the environment for public benefits (Eunomia 2020). This is because many potential investors will be looking for a return on their investment, hard to find when environmental improvements tend to provide public goods. Involving potential economic partners throughout would increase buy in and relevance of the problems and potential solutions.
- Partners from the supply side of ecosystem services, such as farmers, land owners and land managers. The support of these partners is key to proposed solutions happening on the ground and their priorities need to be reflected in the deliberative process.
- Partners from other sectors who are also decision-makers such as public health, education, planning and transport. Ultimately you want your plan for natural capital to be integrated in a holistic strategy for your place. Developing it with the input and strategic understanding of those other sectors will aid wider acceptance.
- Communities and local stakeholders. This helps ensure the views of beneficiaries and recognition of the widest range of ecosystem services and values are represented in decision-making. Although community engagement can be challenging and resource intensive, co-created delivery plans are likely to be more resilient because of the high level of agreement.

IPENS Launch Event
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1.3

Agree a high-level vision for natural capital

Our experience on the ground highlights the importance of a partnership coming together around an agreed natural capital vision for their place. This is a crucial step because it allows partners and stakeholders to express what is important to them about the place. The development of a shared vision gives the partnership an agreed sense of direction, but it does not need to be set in stone. It provides a guide to help make the next stages of the process proportionate and relevant. The vision might be revisited and refreshed once the partnership has worked through the evidence and agreed the most important priorities, but a starting point helps to bring everyone together around shared goals.

Developing a vision also provides the context for an implicit conversation about values and what drives the different stakeholders who are involved. If these issues are not recognised and worked through, there is a risk that different value-based priorities will derail the process later. The vision, therefore, provides a positive framing for discussion and an early opportunity to reach some consensus.

1.4

Define scale and boundaries

It is important that the boundary of your place is meaningful and accepted by the partnership. We have learnt that a focused geography within which the ecosystem services and benefits can be understood helps bring the partnership together (Kirkup & Maiden 2018). It also helps to consider connections and what happens outside the boundary. For example, whether people who live outside are beneficiaries and whether there are external pressures. The scale needs to be appropriate for your own vision and to be able to make things happen once you have agreed a plan.

Steel Rigg Northumberland
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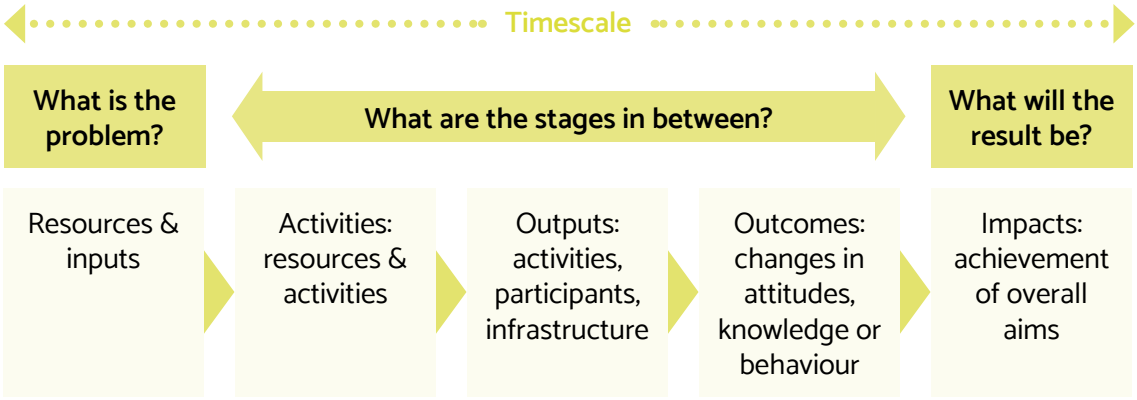
1.5

Determine strategic direction

Establishing your strategic direction can be helped by an examination of how you might reach your vision using a 'causal pathways of change' approach (GIZ, UNEP-WCMC & FEBA 2020). A tool that Natural England, and increasingly central government, have adopted is the Theory of Change (ToC) approach. ToC starts with the desired vision (or impact) you have agreed and works backwards, mapping out the medium and short term outcomes and the causal linkages between them (Figure 2). It also examines the external factors that might enable or prevent delivery of the outcomes, and the assumptions and risks at each stage. ToC is a powerful tool to plan your interventions *and* can help you to evaluate as well (see Section 6 for more on evaluation).

Figure 2: A Theory of Change Framework used in Natural England.



Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 3 Evaluation of the Upland Ecosystem Service Pilots EIN053
- Appendix 9 North Devon Landscape Pioneer EIN059

Stage 2:

ESTABLISH
Establish a Shared Evidence Base

2.1

Overview

The aim of the evidence base is to build a picture of the current state of natural capital. To understand how to manage and enhance your natural capital you need to know what you already have, where it is and what condition it is in, all in terms of how it provides benefits to people. There is likely to be a wealth of evidence, knowledge and understanding held by partners, so working collaboratively to pull together an evidence base, and taking account of existing evidence, is important.

We have learnt the following are key components of a natural capital evidence base:

Evidence for place

Start with understanding and collating evidence about your place, before examining the evidence around individual natural capital assets. Keep your evidence rooted in the place and system as a whole. It is an important part of the baseline in terms of determining the range of benefits.

State of natural capital assets

The links between natural capital assets, their quantity, quality and location and the benefits they provide to people are all essential components of a natural capital baseline.

Who benefits and who doesn't

Not everyone benefits from nature in the same way or has access to the benefits it provides. Beneficiaries may also be further away, not in your place.

Shared outputs

A shared evidence base needs to be transparent, understood and accessible to all partners.

It is important to approach evidence gathering in a proportionate way. You do not need to have everything at the outset and starting at a high level can be sufficient to engage stakeholders, identify priorities and flag areas that need further investigation or data. You can build your evidence base iteratively as you move through the natural capital planning process.

Return to overview diagram

2.2

Evidence for place

Understanding your place is critical to the evidence base. It includes an understanding of geology, soils and hydrology, which fundamentally affect ecosystems, landscape and land-use. It includes the landscape of your area as a whole; its character and how it has changed and evolved over time. It includes the historic environment and cultural assets which provide insight into the cultural connections that people have with a place, whether local or visitors. Natural England's National Character Area Profiles (Box 2) provide a good starting point for conversations with stakeholders about your place and can help identify the range of evidence that partners can share to help inform decision-making. Stakeholders may want to prioritise aspects of this, and your evidence base will reflect that. Ensuring your evidence base and planning remains rooted in the place as a whole will ultimately improve your decision-making and can improve stakeholder engagement and understanding.

Box 2: Natural England National Character Area Profiles

National Character Area profiles - GOV.UK provide information on landscape character, geodiversity, biodiversity, historic environment and landscape change for 159 areas covering England. They include analysis of the ecosystem services provided by a place as well strategic environmental objectives. They are useful in defining and understanding the landscape context and what is special about your place.

2.3

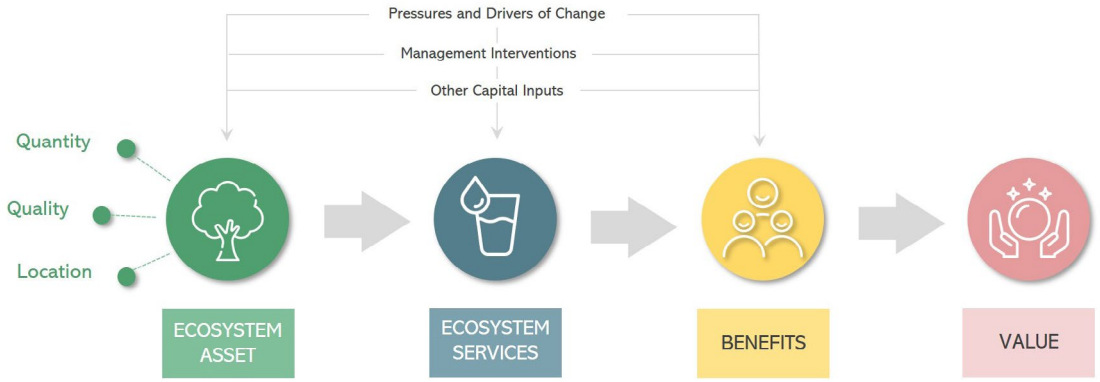
State of natural capital assets

The links between natural capital assets, their quantity, quality and location and the benefits they provide to people are all critical components of a natural capital evidence base. We have broken this down into different sections to help you consider the state of natural capital assets in a systematic way.

2.3.1 A natural capital logic chain

Natural England has developed a logic chain (Figure 3) based on Potschin & Haines-Young (2011) to clearly show how the state of natural capital assets can be linked to the provision of ecosystem services and benefits to people. Figure 3 shows that how much, how good and where natural assets are, underpin the ecosystem services, benefits and value people get from them. It shows that management interventions, pressures and drivers of change affect this chain. Other capital inputs are also often needed for people to obtain the benefits from ecosystem services (a simple example is the processing of trees to produce wood products).

Figure 3: Natural England's Natural Capital Logic Chain based on Potschin & Haynes-Young (2011) ecosystem services cascade. (Source: Wigley and others 2020)



2.3.2 Quantity, quality and location of natural capital assets

Natural England used this logic chain to systematically identify key environmental properties relating to the quantity, quality and location of ecosystems that are essential for ecosystem services. The Natural Capital Indicators (Lusardi and others, 2018) and how you can use them are summarised in Appendix 4. Box 3 identifies key indicators for quantity, quality and location. It is a good idea to try and represent at least some indicators for each of these categories in your evidence base as a minimum, because together they really get to the important attributes for continued ecosystem service provision.

Box 3: Key indicators from Natural Capital Indicators: for defining and measuring change in natural capital - NERR076 (Lusardi and others 2018)

Extent of habitat: eg blanket bog, coastal & marine habitats, woodland, heath, semi-natural grassland, freshwaters, wetlands, urban blue and green space.

Quality:

1. Hydrology and geomorphology: eg naturalness of water levels, flows, flooding, extent of artificial drainage.
2. Nutrient/chemical status: of water, soil/sediment, air.
3. Soil/sediment: carbon, biota, peat depth, coastal sediment supply.
4. Species composition: eg naturalness of biological assemblage.
5. Vegetation: eg vegetation cover, structure, roughness.
6. Cultural: eg nature, landscape, historic and cultural, accessibility, quietness, facilities, safety.

Location: Where ecosystem assets are located can have a significant impact of the provision of some ecosystem services and the design of nature-based solutions eg ecosystem assets can contribute to water quality improvement if located between a pollution source and receiving water body.

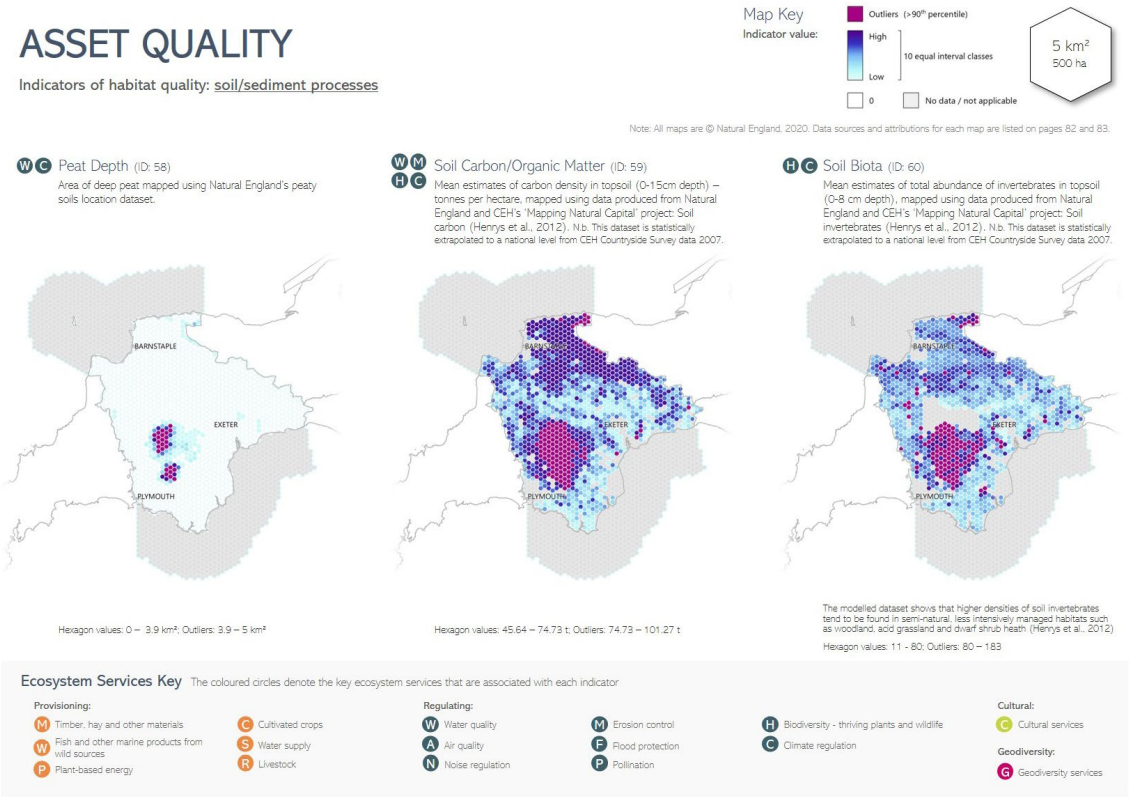
2.3.3 Mapping your natural capital

The Bassenthwaite Upland Ecosystem Service Pilot (Appendix A) showed that a mapped evidence base is a useful communication tool for partnership working. It allowed a range of stakeholders to contribute evidence and enabled the collaborative targeting of action where needed later in the process.

In 2016 Natural England and the UK Centre for Ecology and Hydrology (UKCEH) collaborated to provide publically available maps of natural capital. The **Natural England and UKCEH Natural Capital Maps** are a suite of 10 maps (6 soil related) that represent different aspects of natural capital at a 1km resolution. They use statistical interpretation and extrapolation of sample data, to produce maps at an England scale. The maps are available to download along with images and explanatory reports. These maps, along with an earlier attempt to map ecosystem services (Dales and others, 2014) represent steps in our journey to provide transparent and accessible mapped evidence for natural capital.

More recently, Natural England has produced a series of **natural capital atlases** (Lear and others, 2020) to provide a readily available source of spatial evidence based on the natural capital indicators described in section 2.3.2. Having tested this nationally and locally (Wigley and others, 2020) we have produced 5km^2 atlases at county and city region scale. Figure 4 provides an example of what this looks like. The **mapped data package** is available for you to use along with a **GIS user guide**. We have also produced an explanation of the atlas and how it can be understood and used (**How to Start Using Your Natural Capital Atlas**). Our approach to the atlases and all the links needed to access and use them are included in **Appendix 5**.

Figure 4: A page from the Devon Natural Capital Atlas showing example maps for indicators of habitat quality. (Source: Lear and others 2020)



What we have produced provides off-the-peg mapped data underpinned by indicator evidence. We couldn't map every key indicator with national data, but you may have local data you can use to add to or improve the picture for your place.

The flow of ecosystem services is difficult to measure because often there are numerous factors that influence the services in question. Natural England's Natural Capital Indicators (Lusardi and others 2018) identifies a number of indicators and potential datasets for ecosystem services flow. Those that were feasible to map with national data are included and available in the Natural Capital Atlases above (eg carbon sequestered and greenhouse gasses fixed; water quality).

In the absence of easily sourced ecosystem service data the logic chains in the atlases provide a link between what we do know and how that relates to specific ecosystem services. For example, we may not have data to measure an ecosystem service specifically, but we may have quantity (and some quality) data on the ecosystem assets which support that service. The accompanying atlas guide **How to Start Using Your Natural Capital Atlas** includes a summary of the maps that you need to look at to understand some key ecosystem services.

Natural England's Natural Capital Atlases thoroughly explore the accessible national data sets which can be used to map the state of natural capital. They also show the data gaps that need to be filled. You may have local data which could be used to measure an indicator, where there is currently a gap in the atlas. Depending on its source, local data may also be at a finer resolution, more up to date or accurate than the national data. Care is needed though because not all local data is locally consistent, freely available, transparent or robust. Often the best data will come with licensing restrictions, so it is useful to think about how you want to use and share your data and evidence before collating it.

The **Local Natural Plan project for the Oxford to Cambridge Arc** (OxCam Arc) utilised our Natural Capital Atlas approach to create their own Natural Capital Atlas for the Arc (OxCam, 2019) and provides an example of how evidence based on nationally available data can kick start an evidence baseline and wider collaboration. OxCam then went on to create a more detailed baseline at a closer scale and incorporating local data to build on the atlas (Roquette, 2020a) including lessons learnt (Roquette, 2020b).

2.3.4 Benefits and Values

Evidence at the benefits and values end of the logic chain (Figure 3) is also an important part of your natural capital evidence base.

Often, using techniques that simply **recognise** what people value in a place can provide evidence at this end of the logic chain (TEEB 2010). Simply discussing benefits with partners and local groups can be enough to ensure a good understanding of the value of the natural environment. An example from the South Pennines Upland Ecosystem Service Pilot is shared in Box 4.

Natural capital evidence ideally includes economic evidence for benefits and values. Because the environment is often left out, it is often assumed to have a value of zero in economic decision-making frameworks and not taken into account (Natural Capital Committee 2013). Economic valuation provides an opportunity to redress that balance. Including monetary evidence can be crucial in engaging some stakeholders, particularly those that are not conservation organisations. It can be particularly useful in getting other stakeholders to recognise the benefits of protecting and improving the natural environment. It is also critical for value for money assessment of projects and for comparing environmental investments to non-environmental investments.

Box 4: Assessing and evaluating the cultural services of the South Pennines ecosystem services pilot (Flemming & Inwood 2013)

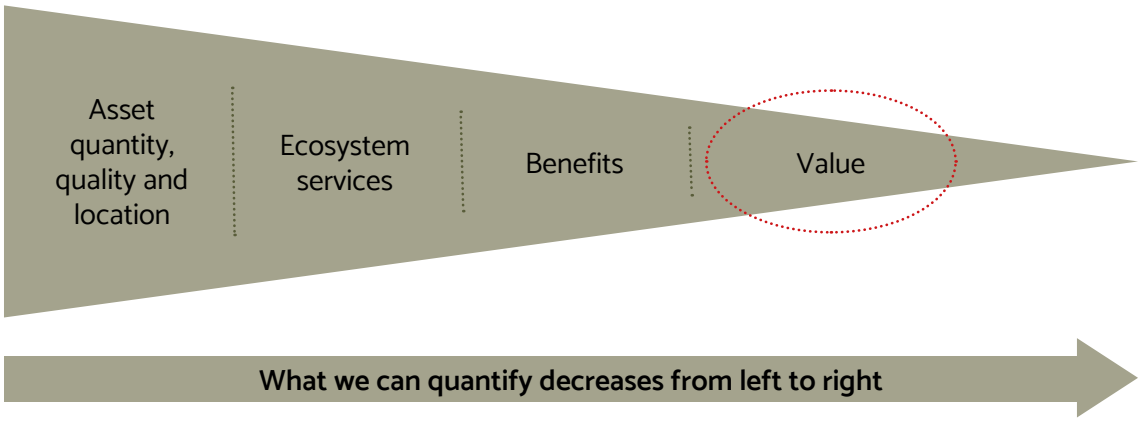
Work commissioned by Pennine Prospects in partnership with Natural England to identify the cultural services that are delivered by the moorland landscape of the South Pennines for both visitors and residents. The work focussed on the moorlands, and the likely changes to them that might arise from the delivery of other ecosystem services. This work explored which attributes of this natural environment contributed to people's experience and feelings about it, how land management change might affect this and what might be acceptable to these beneficiaries. It showed how highly valued these upland areas were by the people who live, work and visit there.

2.3.5 Natural capital accounting

In this context, natural capital accounting (NCA) is one framework that is often used to present information on the monetary value of benefits provided by existing natural capital. They extend traditional accounts by attempting to put values on benefits that are not provided through the market. These benefits tend to be valued using a range of techniques from environmental economics (Sunderland and others 2019). For example, in addition to the market values of food and timber we may be able to put an Indicative value on the recreation value of woodland based on the cost of an average trip.

Natural capital accounts (NCAs) usually present a final balance sheet that reports on the costs and monetary values of the assets. However, values alone don't tell us whether the assets can continue to provide benefits into the future, for that we need to understand their quantity, quality and location (Figure 3). In addition, evidence and experience tells us that as we move to the values end of the logic chain the quantified evidence becomes increasingly partial and incomplete (Figure 5). If we only present the benefits that we can value in monetary terms (eg those with a market value such as food or timber) then we end up omitting those public benefits we can't value (such as thriving wildlife and public enjoyment of nature). This in turn risks skewing decision-making towards the benefits we can value rather than those that might be most important.

Figure 5: Loss of information across the Natural Capital logic Chain (Source: Sunderland and others 2019)



Methods for NCAs are still developing and different approaches are adopted by different organisations. Here, we focus on the approach Natural England has taken to develop an NCA for its National Nature Reserves (NNRs) (Sunderland and others 2019). This includes adjustments that better reflect the wide range of public benefits NNRs provide that are difficult to value, whilst also presenting evidence across the logic chain in Figure 3. Specifically:

- To avoid the problem of partial accounts which only report benefits that can be valued, we developed a methodology that presents an 'extended balance sheet' which shows the state of our assets, services, benefits and their economic value next to each other;
- Where quantified data is missing, we have estimated the significance of ecosystem service provision and benefits qualitatively using expert judgement;
- We have been transparent and show Red-Amber-Green confidence levels to indicate the quality and appropriateness of the information behind the value figures we have used.

We have done this to reduce the risk that a partial valuation is misinterpreted and to present a more complete picture of the evidence base to better inform decision-making. Our approach is summarised in **Appendix 6**. In **Appendix 7** we explain how we have tested this approach to NCA with our natural capital atlas data. Could we easily produce an account using the data we have at hand and create a transferable methodology? We have found that it still remains a process that requires significant resource and additional data. This resource includes an economist, an ecologist and a GIS data analyst.

2.4 Who benefits and who doesn't

The beneficiaries of ecosystem services can be individuals, communities or businesses. Understanding this is an important part of the evidence base. Knowing who and where beneficiaries are can help you define your boundary of influence eg beneficiaries may be outside your area. It can also help you understand who your stakeholders are and who you need to engage (see Section 1). It is all part of the collaborative process and determines who to involve in the partnership and gathering of evidence.

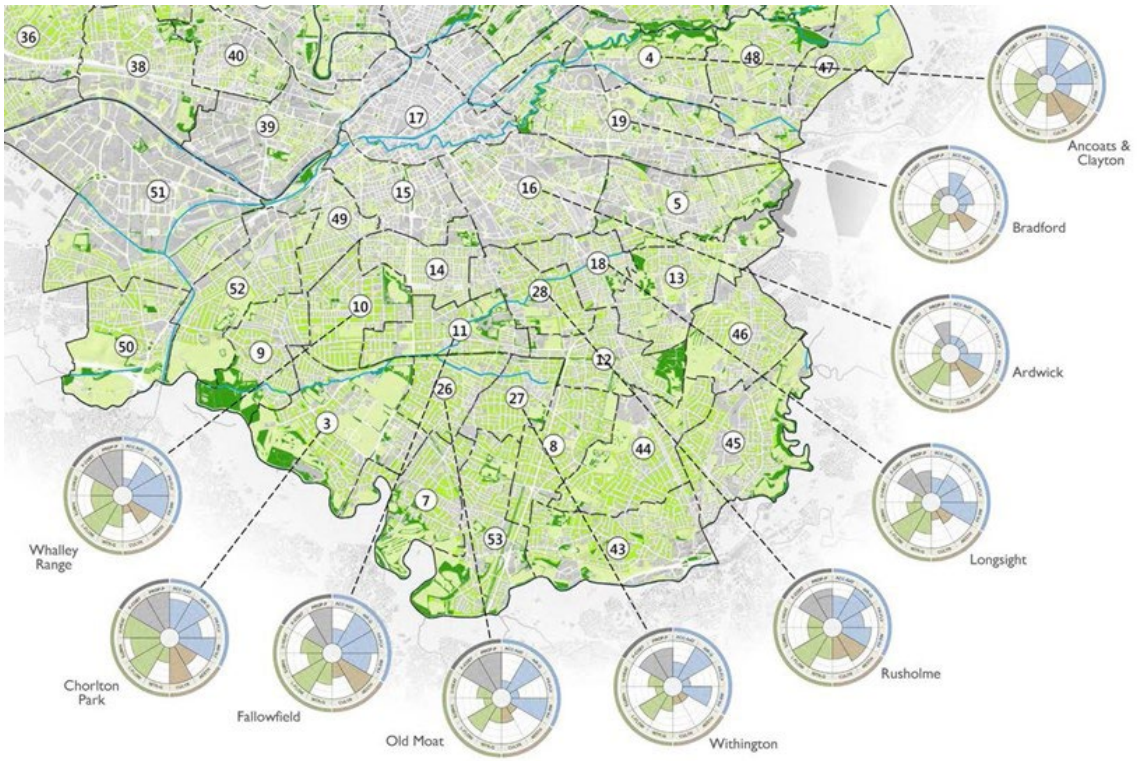
Evidence tells us that not everyone experiences or values nature in the same way (Natural England 2019). We also know that there are inequalities in the social distribution of benefits provided by natural capital (Mullin and others 2018; Mitchell 2019). The People and Nature Survey (formerly MENE) summarises this evidence for England and provides an opportunity to query and use it for your place (**Appendix 8**). This is an easily available data source that can provide added insight and evidence around your beneficiaries.

Why do we need to know this? Where we invest in our natural capital matters. For example, improved greenspace in a deprived inner city area might lead to more health improvements than in a wealthy area that already has lots. The Government's 25 Year Environment Plan recognises that the natural environment helps deliver social justice and has an ambition to 'ensure equal distribution of environmental benefits, resources and opportunities' (HM Government 2018, p.16).

In building an evidence base it is possible to take an approach that allows us to include some understanding of the distribution of environmental benefits and demand into decision-making. At it's simplest, examining where natural capital is present and where it is not, alongside areas where socio-economic challenge is greatest will provide added insight into where improvements can be targeted with beneficiaries in mind. This could be using the natural capital atlas data described earlier and accessible socio-economic data such as **English Indices of Deprivation**.

Defra's Local Action Project led by the Westcountry Rivers Trust (Defra 2016) developed an approach for assessing opportunities to enhance or create ecosystem service provision in urban areas. Of particular interest here is the way the ecosystem service indicators were visually presented by Super Output Areas or wards in a series of pilot case-studies such as in Manchester (Figure 6). Collating evidence in this way provides a strategic overview of the ecosystem service needs of people living in each community. This visual presentation in itself becomes a tool for engagement and discussion, further stimulating collaboration and a shared vision.

Figure 6: Local community variation of Local Action Project ecosystem service indicators, Manchester. (Source: Manchester City Council and Westcountry Rivers Ltd 2018).



2.5

Shared outputs

A shared evidence base needs to be transparent, understood and accessible to all partners. In the North Devon Landscape Pioneer for example, we used participatory evidence gathering to create stakeholder ownership of the evidence base in the first instance. The importance of presentation and transparency in maintaining stakeholder confidence in this evidence base is emphasised in Appendix B and summarised in Lord and others (2020). There are also practicalities to consider, for example data licensing which may restrict whether and how you share the base data and/or outputs. You therefore need to think carefully at the start about who is going to use the data, what is going to be shared, and for what purpose. We have seen above that evidence can be presented accessibly in ways that engage stakeholders and help build relationships.

Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 4 Natural Capital Indicators EIN054
- Appendix 5 Natural Capital Atlases: Mapping Indicators EIN055
- Appendix 6 Accounting for National Nature Reserves EIN056
- Appendix 7 Natural Capital Account for the Tees Valley EIN057
- Appendix 8 People and Nature Survey EIN058
- Appendix 9 North Devon Landscape Pioneer EIN059

Stage 3:

FORECAST

Forecast and Understand Drivers of Change

3.1 Overview

A shared evidence base, as discussed in Section 2, provides a baseline to understand the current state of your natural capital. But your evidence base also needs to look ahead at how climate change and other drivers of change affect your natural capital and the ecosystem services it provides. The approach is an integrated one, so that pressures are addressed together, rather than individually. This means that actions for one pressure, like climate change, is integrated with action for others.

We have learnt the following are key components of ensuring an evidence base can be related to risks, opportunities and long term planning:

Understand current drivers of change

Drivers of change are the natural and human driven processes that cause landscapes and ecosystems to change. They can be direct (eg land management interventions, urban development) and indirect (eg population change, policy change). Climate change is an important driver that can have both direct and indirect effects on natural capital.

Forecast the impact of climate change and other pressures

Focus on what the impacts of the important drivers may be on your natural capital assets and ecosystem services into the future. What changes might these drivers cause to the extent, location and the attributes of quality you have identified in your evidence base? How can these impacts be managed or reduced and what opportunities do they present?

Return to overview diagram

3.2

Understand current drivers of change

Considering drivers in an integrated way means that the solutions can address them together and deliver public benefits as a result. In the context of natural capital this means reviewing key drivers of change specifically in terms of the impact they are having on the natural capital assets and ecosystem services you have identified. Drivers of change are the natural and human-made processes that cause landscapes and ecosystems to change. They include land management interventions, such as grazing, land drainage, physical modification of watercourses; direct drivers of change such as climate change, urban development, mineral extraction and indirect drivers of change such as population change, agricultural subsidies or policy change. Considering whether these put pressure on natural assets and the ecosystem services they provide or present opportunities to bring about positive change is part of the approach.

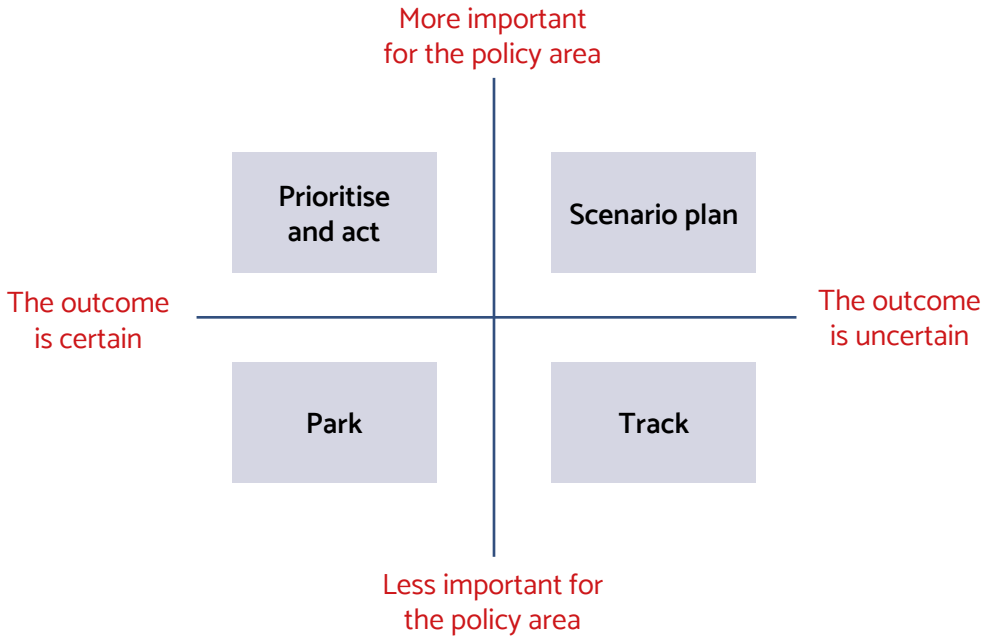
Looking back at the effects of past changes on landscapes, natural capital and ecosystem services can help understand the consequences and future trajectory of change. The following sources may also help prompt discussion and understanding of drivers of change:

- Natural England's National Character Area Profiles each contain a place-specific summary of landscape change through time and identify key drivers and pressures.
- The Ecosystem Approach Handbook provides more information on a range of drivers to consider if your partnership needs a prompt.
- Chapter 3 of The UK National Ecosystem Assessment (2011) (UKNEA) contains an assessment of the impact of significant UK drivers of change on the extent and condition of the eight broad habitats and provision of ecosystem services used by the UKNEA.

NCA 23 Tees Lowlands - Teesmouth National Nature Reserve
Credit: © Natural England/Rosy Eaton

The Government's **Futures Toolkit** (GO-Science 2017) provides a range of practical tools and approaches to explore futures thinking in a strategic way. Within Natural England we have used PESTLE mapping to explore the political, economic, societal, technological, legislative and environmental factors driving change in a place. These can be mapped onto an importance and certainty matrix (Figure 7) according to how important they are in terms of natural capital and ecosystem services, and how certain or uncertain the outcome is likely to be. This provides an opportunity to prioritise the drivers and identify which need action and/or future planning.

Figure 7: PESTLE driver mapping matrix (Source: GO-Science 2017, p.44)



3.3

Forecast impact of climate change and other pressures

In the evidence base we need to look particularly at how climate change is likely to affect the natural environment and how our decisions about natural capital can help us mitigate the effects of climate change through nature-based solutions.

Climate change **mitigation** is aimed at reducing the concentrations of greenhouse gasses in the atmosphere, through reducing emissions. This can include nature-based solutions (Box 1). Planting trees for carbon sequestration and managing habitats for carbon storage are examples of nature-based solutions for climate change. In taking a natural capital approach we would ensure that any actions for climate change were integrated with actions for the continued provision and enhancement of other benefits for people. For example, in the North Devon Landscaper Pioneer process our stakeholders identified interventions for climate change that were also positive for biodiversity and other ecosystem services, such as locating tree planting in places that would also help reduce flooding and improve water quality (Sunderland and others 2020).

Climate change **adaptation** is about measures to reduce the adverse consequences, or take advantage of the opportunities, climate change presents. In this context a natural capital evidence base needs to specifically consider how climate change is likely to affect the ecosystem services that the natural environment provides.

Natural England and the RSPB's Climate Change Adaptation Manual (2020) provides a comprehensive source of information to aid decision-making in relation to climate change adaptation. It examines how sensitive different habitats are to climate change and provides habitat sheets that help identify appropriate management responses.

In addition, the Climate Change Adaptation Manual (2020) provides broad guidelines to assist those who want to carry out a high level assessment of the impacts of climate change in a place, based on vulnerability assessment. This approach focuses on identifying the assets you are interested in, the likely climatic changes for your areas, the likely consequences of these changes for your assets and the vulnerabilities of your assets to these changes. As such, it has clear synergies with the way your natural capital evidence base is developing.

Planted up gaps in hedge
© Natural England/Peter Roworth

Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 9 North Devon Landscape Pioneer EIN059

Stage 4:

DECIDE

Decide and plan for multiple benefits

4.1

Overview

The aim here is to reach a shared understanding of priorities, then work together to examine the barriers to achieving them before identifying actions and interventions. This phase draws together and takes forward the earlier work in assembling the evidence base.

We have learnt that the following are key components of a successful prioritisation and planning phase:

Establish practical vision with clear priorities and goals: Your practical vision builds on the understanding you have about your place and the current and future state of natural capital. Having a practical vision helps prioritise the ecosystem services that your stakeholders are most concerned about.

Understand current barriers and opportunities: What is stopping you from moving towards your vision? The evidence gathered around past, current and future drivers of change will help here. Consider and understand internal contradictions. Why are the things you are doing already not taking you where you want to go and what do you need to change?

Determine actions for multiple benefits: What are the solutions and interventions that deal with the barriers and contradictions and how can you maximise multiple benefits? Integrated actions are those that deliver for a range of ecosystem services and benefits where overlaps, synergies and conflicts have been identified and openly discussed by stakeholders.

Shared outputs eg opportunity mapping: What is the art of the possible in your place? Where is it possible to carry out your prioritised actions and where would you want to avoid? Opportunity mapping is a tool that helps make sure interventions occur in the right places. You may also want to specifically map constraints; places where there may be conflicts between priorities.

Assess and appraise options: Identify interventions that move you towards your vision as a whole. Your process may generate a long list of actions and interventions, some strategic and some quite specific. Stakeholders can set their own 'rules', guided by the practical vision, to determine which interventions are going to be most effective to develop in terms of broad costs, benefits, and the level of control the partnership has.

There is no set way of moving through this planning and prioritisation stage. We have tried different approaches depending on the goals and partnership. The case stories (Appendix A and B) summarise two of these in a little more detail.

Return to overview diagram

4.2

Establish a practical vision

Your initial high level vision (Section 1) needs to be translated into a practical vision that reflects where you want to get to in the short to medium term. It is a clear and achievable goal based on sound principles and defined environmental outcomes. Having defined this, you will find it much easier to come to consensus with your stakeholders around priorities and potential solutions.

Appendix B summarises how we approached prioritisation with stakeholders in the North Devon Pioneer, leading to agreement around a set of asset-ecosystem service pairings. In this case, working towards a concrete practical vision would have made the next steps much easier (Lord and others 2021) particularly the identification of barriers and the problems we needed our interventions to solve (Section 4.3).

4.3

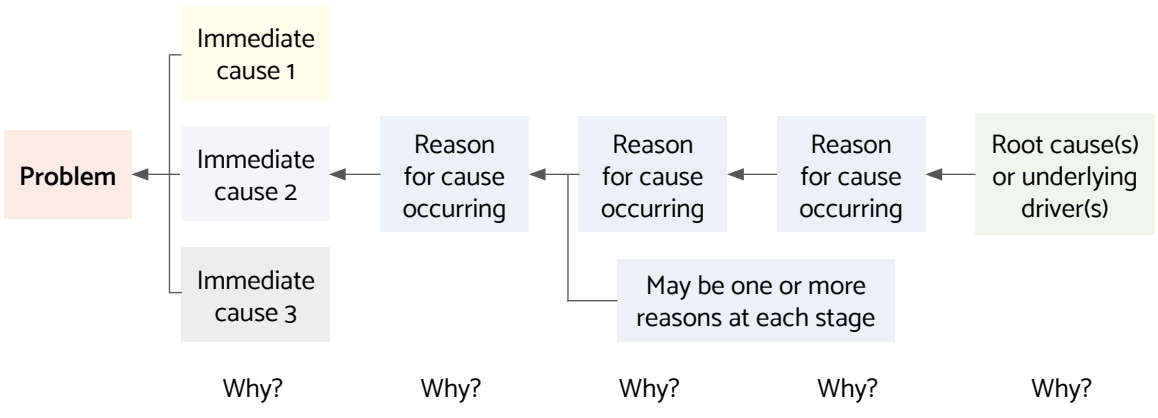
Understand current barriers and opportunities

Understanding what is preventing you from moving towards your vision and goals draws on the drivers of change that you have examined in your evidence base. It is also important to understand internal contradictions, those things you are already doing that aren't working alongside how you are working and who you are working with.

In the North Devon Landscape Pioneer we experimented with using Root Cause Analysis (RCA) (Rooney & Vanden Heuval 2004) to understand the issues surrounding the declining trend in ecosystem service provision. It is a process designed to identify the point in a causal chain where intervention would prevent the problem from occurring. This enables preventative action to be planned rather than focusing on actions that deal with symptoms or effects of the problem (Figure 8).

RCA was applied in North Devon as a participatory and deliberative process with stakeholders. We found this to be effective in moving the consideration of the drivers of change and subsequent scoping of interventions to a more strategic space. It allowed everyone to contribute in their area of expertise. Natural England has published the report of this process for the North Devon Landscape Pioneer (eftec 2020) showing the root cause maps for a series of problems. Appendix 9 provides the links to this resource in the context of the wider strategic process adopted.

Figure 8: The '5 whys' approach to Root Cause Analysis (Source: eftec 2020)



4.4

Determine actions for multiple benefits

Having identified the barriers and contradictions it becomes clearer what solutions and interventions you need to consider. In doing so, considering how you can maximise multiple benefits helps ensure your resulting actions will improve natural capital strategically. Integrated actions are those that deliver for a range of ecosystem services and benefits where overlaps, synergies and conflicts have been identified and openly discussed by stakeholders. The next sections illustrate how this approach could be iterative using the two examples from our experience (Appendix A and B).

4.4.1 Distinguishing strategic interventions

In the North Devon Landscape Pioneer we used an iterative and participatory approach with stakeholders to arrive at strategic solutions and interventions to solve the problems identified in our Root Cause Analysis. We wanted these solutions to be as close to their root cause as possible, good for biodiversity, provide a wide range of benefits and be both feasible and investible. Because this resulted in a whole suite of solutions that varied from specific land management interventions to those we have little control over, such as the policy context, we found it helpful to distinguish them broadly in three ways. These were:

1. Physical changes to the landscape – land use and land management interventions applied strategically and at scale.
2. Incentives, motivations and capabilities – of those groups and organisations who are essential to the success of the strategy.
3. Governance and decision-making – which covers the way responsibility is taken, decisions are made and resources are allocated.

Sorting our solutions and interventions in this way *before* exploring how we would develop them further was absolutely key to our strategic response because the three categories needed to be treated differently. It allowed us to include root cause interventions that relate to system change and enabled strategic consideration of the whole. The next section introduces how strategic land use and management actions were practically explored in the Bassenthwaite pilot.

4.4.2 Land management actions for multiple benefits

The Bassenthwaite Upland Ecosystem Service Pilot trialled a matrix tool (Figure 9) to arrive at land management actions that will deliver multiple ecosystem services and link directly to partner objectives. This matrix has proved to be an adaptable and effective way to facilitate collaborative decision-making on actions to enhance multiple ecosystem services. We have used the matrix both within Natural England and with partnerships and stakeholders to arrive at agreed and priority actions for multiple benefits in places. The matrix also begins to show where trade-offs and potential areas of conflict exist.

The matrix has proved most effective working with landscape-scale partnerships and focused on land use and land management actions. It is therefore best employed once those interventions have been distinguished from incentives and governance (as above), if you are working at that level of strategy.

To help make decisions on land management for multiple benefits Natural England have produced a web-based, searchable toolkit in partnership with Simomics and the University of York. The **Managing Ecosystem Services Evidence Review** (MESER) tool provides evidence from a literature review for the consequences of specific land management actions on the provision of ecosystem services by different habitats. The tool considers the evidence of effects and magnitude, the strength of the evidence and how transferable it is. **Appendix 10** provides more information on the tool, and how it can be used.

Figure 9: The Bassenthwaite Pilot delivery matrix

Land Management Action	Ecosystem Services and Benefits									Partner Objectives										
	Water provision	Food and fibre	Carbon storage and sequestration	Erosion control	Water quality	Flood regulation	Cultural landscape, historic environment	Recreation, inspiration, education & health	Biodiversity	SSSI PSA target	Cumbria BAP targets	Climate change adaptation	Landscape Character Assessment targets	Catchment Sensitive Farming	Improved access to natural environment	SCaMP2	Catchment Flood Management Plan	Water Framework Directive	Heritage at Risk	Lake District National Park Partnership Principles of Land Management
1. Increase woodland cover	x	x	x	x	x	x	x	x	x		X	X	X	X		X	X	X		X
2. Achieve sustainable grazing	x		x	x	x	x	x		x	X	X	X	X	X		X	X	X		X
3. Sustainable river management			x	x	x	x			x	X	X	X		X			X	X		X
4. Restore Scheduled Monuments at risk				x	x		x	x				X	X						X	X
5. Improve access			x	x	x		x	x	x						X					X
6. Manage nutrients on improved grassland			x	x	x		x		x	X	X			X				X		X
7. Improve biodiversity of valley habitats				x			x	x	x	X	X	X	X			X				X

4.5

Shared outputs - opportunity mapping

Opportunity mapping doesn't say what *will* happen where. Instead it shows where it would be good to undertake an action or intervention. There can be, for example, more than one opportunity on an area of land. It will be the decision of a land owner or land manager which opportunities (if any) are put into action.

In terms of natural capital, opportunity mapping is a tool that helps make the most of the proposed interventions:

- The location of natural assets can be critical for the provision of some ecosystem services. For example, location is important for flood regulation, the reduction of flood risk and recreation but less important for carbon sequestration;
- Some areas are already important for biodiversity and ecosystem services. Opportunity mapping helps reduce the risk of unintended losses by highlighting areas to avoid as well as identifying opportunities for multiple benefits;
- Opportunity mapping identifies where it might be feasible to implement the interventions that have been agreed by the partnership and helps consensus to be reached.

Natural England's Natural Capital Atlas maps can provide a good starting point for opportunity mapping. The 5 km^2 County and City Region Atlases are especially helpful at that scale. They show the current state of natural capital and therefore help identify where to target actions to enhance and extend it. They show where the best existing areas are, providing a starting point for discussion about whether there are opportunities to make them better. They also show where the gaps in provision are, these might be places where there are opportunities for new nature-based solutions such as tree planting or wetland creation.

Opportunity mapping is also an effective engagement tool and can be part of the iterative decision-making process. The outputs can also be incorporated into a shared delivery plan, such as in the Bassenthwaite Pilot (Natural England 2011b). In combination with your mapped evidence you are likely to have a wealth of local knowledge amongst your partners about opportunities on the ground. Opportunity mapping may be a tool you use at a range of scales, and at different stages of the process. For example:

- In the Bassenthwaite Pilot (Appendix A), a series of workshops used the mapped evidence base to enable stakeholders to talk about interventions and use their local knowledge to identify opportunity areas for key actions.
- The OxCam Local Natural Capital Plan (LNCP) Project brought stakeholders and users of the LNCP outputs together around opportunity mapping. The aim was to collate the variety of environmental improvement opportunity areas and projects already identified across the Arc together in a single location (OxCam LNCP 2020).

Bassenthwaite Lake
© Natural England/Peter Wakely

4.6

Assess and appraise options

When making decisions about what interventions to take forward we often have to consider trade-offs between alternatives with different costs and benefits. Some kind of cost-benefit analysis (CBA) should therefore be part of the dialogue at this stage, even if it is just at a scoping level.

CBA works by comparing a situation without an intervention, called the counterfactual, to scenarios with specific interventions. It then considers all the benefits supplied by the project and assigns an economic value in monetary terms. This is compared to the value of all the costs. When businesses carry out a CBA they are likely to do so in terms of market benefits only. When we talk about CBA in the context of natural capital planning we want to include non-market benefits too. This is called Social Cost Benefit Analysis. This type of analysis provides a specific value for monetary assessment of all the benefits which can be valued and can support decision-making about options. **HM Treasury's The Green Book; Central Government Guidance on Appraisal and Evaluation** provides detailed guidance on project and policy appraisal for public (government-funded) investments.

Full CBA requires significant resources in terms of data and analysis and is likely to require the services of an economist. As a result it tends to be used to appraise finalised project proposals rather than being part of the development and decision-making dialogue. This was the case where it was used in the Upland Ecosystem Services Pilots (Harlow and others 2012).

The resource requirements of a full CBA shouldn't prevent a high-level scoping assessment of options at this prioritisation stage of the dialogue. At its simplest this might be just getting to the point of comparing an estimate of the costs of the identified problem (eg poor water quality) with the estimated costs of the prosed interventions. Box 5 provides links to ENCA (Enabling a Natural Capial Approach) which is a suite of resources assembled by Government to support valuation and the incorporation of natural capital into appraisal.

Box 5: ENCA – additional resources to support a natural capital approach

Enabling a Natural Capital Approach (ENCA) is Government guidance that assembles resources to help take natural capital into account. It brings together information and resources that help the application of natural capital, economic valuation of the environment and incorporation of natural capital into project and policy appraisal.

ENCA includes:

- Guidance: information and resources for natural capital including economic valuation and appraisal
- Assessment template: to assess the potential effects of a policy or project on natural capital
- Services databook: selected biophysical and valuation evidence for ecosystem services and environmental impacts
- Assets databook: sources, tools and studies relating to natural capital asset categories
- Featured tools: summaries of tools developed or supported by Defra and its agencies
- Case-studies: examples of natural capital approaches and applications.

It is a platform that will allow updating of tools and guidance as knowledge progresses. ENCA includes a number of the Natural England evidence products explained in this report.

Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 3 Evaluation of the Upland Ecosystem Service Pilots EIN053
- Appendix 4 Natural Capital Indicators EIN054
- Appendix 5 Natural Capital Atlases: Mapping Indicators EIN055
- Appendix 9 North Devon Landscape Pioneer EIN059
- Appendix 10 Managing Ecosystem Services Evidence Review (MESER) EIN060

Stage 5:

ACT

Make it happen

5.1

Overview

In order for your plan to make a difference the actions identified need to happen on the ground. This is one reason why taking partners and stakeholders with you through the whole process is so critical.

We have learnt that the following are key components of continuing this collaboration into the action phase:

Create an integrated and prioritised action plan

An integrated plan is one that all stakeholders can use and where actions deliver multiple benefits. Integration is about how the actions identified are delivered as well as the outcomes. A collaborative approach to prioritisation will help ensure all partners can buy into the final actions and means of delivery.

Identify delivery mechanisms

Identify which existing mechanisms can deliver which actions, but also challenge existing roles and delivery methods. Which actions need joint delivery across partners? Knowing which partners have the skills and existing resources to work together to deliver joint objectives is a good place to start.

Establish funding and resource package

Consider both public and private funding, existing mechanisms and new sources and investors. The use of existing mechanisms can be important for embedding delivery, by ensuring ownership and longevity. Securing new and additional investment is also a desirable goal of a natural capital approach. To attract new funds and investors we need to make a case that relates to the goals of those whose investment you are trying to attract and be clear what benefits you can deliver. This is one reason why it is important to involve potential investors and land managers in the whole planning process from the outset;.so that their goals are embedded in a co-created and shared plan.

Embed actions in partner delivery, local plans and strategies

This brings us full circle from the buy-in generated by collaboration and co-creation. Collaboration and co-creation can help ensure commitment from partners and stakeholders. Pulling in the same direction strategically and practically can achieve more effective intervention on the ground. A co-created and shared plan will make organisational approval from partners and a commitment to deliver their contribution to the plan, much more likely.

Return to overview diagram

5.2

Create an integrated and prioritised plan

Integration is about how the actions identified are delivered as well as the outcomes. In the Bassenthwaite Pilot (Appendix A) the matrix introduced in section 4.4 became part of the delivery plan (Natural England 2011b). In Natural England we have used this matrix approach to help a range of partnerships prioritise interventions right through to the delivery plan. An example from the South West Peak Landscape Partnership (Box 6) shows how this approach is adaptable.

Box 6: South West Peak Landscape Partnership

The South West Peak Landscape Partnership is a group of organisations working to restore, protect and improve the landscape of the South West Peak. With a strong focus on enhancing the benefits people get from the environment, the partnership used the matrix approach at a number of stages in project plan development:

A matrix of activities and interventions mapped against ecosystem services and benefits was used to scope and prioritise projects for a successful Heritage Lottery Fund (HLF) bid.

The matrix was used again at a project-planning workshop to map project outcomes against benefits to people and identify synergies between individual projects.

Projects and ecosystem services were mapped against HLF outcomes to show how each project delivered across a range of outcomes.

The resulting strong links between landscape partnership outcomes, HLF outcomes and projects delivering benefits for both people and nature in the South West Peak landscape was highlighted in: the South West Peak - a Landscape at a Crossroads Landscape Conservation Action Plan (July 2016).

5.3

Identify delivery mechanisms

Collaboration and co-creation can help ensure commitment from partners and stakeholders. Pulling in the same direction strategically and practically can achieve more effective intervention on the ground and it is valuable to consider how existing delivery mechanisms can be better used.

In the North Devon Landscape Pioneer one of the first things that was done was financial mapping to generate a partnership-level picture of existing investment in the environment (eftec 2021). This showed that different partners were investing money to achieve similar outcomes in the same locations but only 8% of spending in North Devon was spent collaboratively (Lord and others 2020). This suggests that a shared delivery plan including better-coordinated investment could improve the impact of existing investment.

The main funding mechanism for the Upland Ecosystem Service Pilots was voluntary uptake of the existing Higher Level Stewardship (HLS) agri-environment scheme. Where possible this was combined with other public funds (eg woodland grant schemes), water company funding for catchment management and other partner projects. The Bassenthwaite Pilot brought these mechanisms together in an integrated plan for delivery (Natural England 2011b).

5.4

Establish funding and resource package

In order to attract funding, whether from private investors or government, it might be necessary to make a business case. Making a business case for private investment in nature is particularly challenging. Investors will want to see some form of return or impact based on their financial or non-financial goals and risks they are willing to accept (Ozdemiroglu 2019). The Valuing Nature Network's **Demystifying Green Finance Paper** (Ozdemiroglu 2019) provides a useful introduction to the challenges and opportunities in this area.

To encourage private investors whose goals are affected by natural capital, a case for investment needs to be made that reflects these goals. This needs to link the result of investment to benefits such as: reducing the cost of operations, reducing business risk by increasing long term resilience and security of supply, creating revenues through new or increased economic activity, and fulfilling delivery of regulatory requirements or corporate and social responsibility obligations. Involving potential private investors in collaborative strategic planning in places helps ensure their goals are recognised and could build required demand that encourages local investment.

Making a business case for investment has a number of requirements, including a Cost Benefit Analysis (summarised in Section 4). Business cases need to provide evidence across five interdependent areas. This is known as the Five Case Model (HM Treasury 2018) and is summarised in Figure 10. To actually happen, most proposals would need to tick these five boxes in one way or another. The natural capital process outlined in this report focuses on building the case strategically and economically, especially in terms of demonstrating non-market benefits.

Not all investors require a demonstrated financial return on investment. Corporate responsibility is a valid driver for many. If CBA and a full business case are too complex, specific and resource-intensive for your needs then an evidenced-based case for investment can be made more broadly.

Natural England produced an evidence review called **The Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2)** (Rolls & Sunderland 2014). MEBIE2 is an evidence package designed to help you make robust, evidence-based arguments for the benefits offered by the natural environment. It demonstrates that investment in the environment represents a rational use of limited funds. It uses a simple evidence chain (Figure 11) to link an environmental improvement with a benefit to society. MEBIE2 and its potential uses are summarised in **Appendix 11**.

Figure 10: Summary of the Five Case Model (Source: http://fivecasemodel.co.uk/the-five-case-model/)

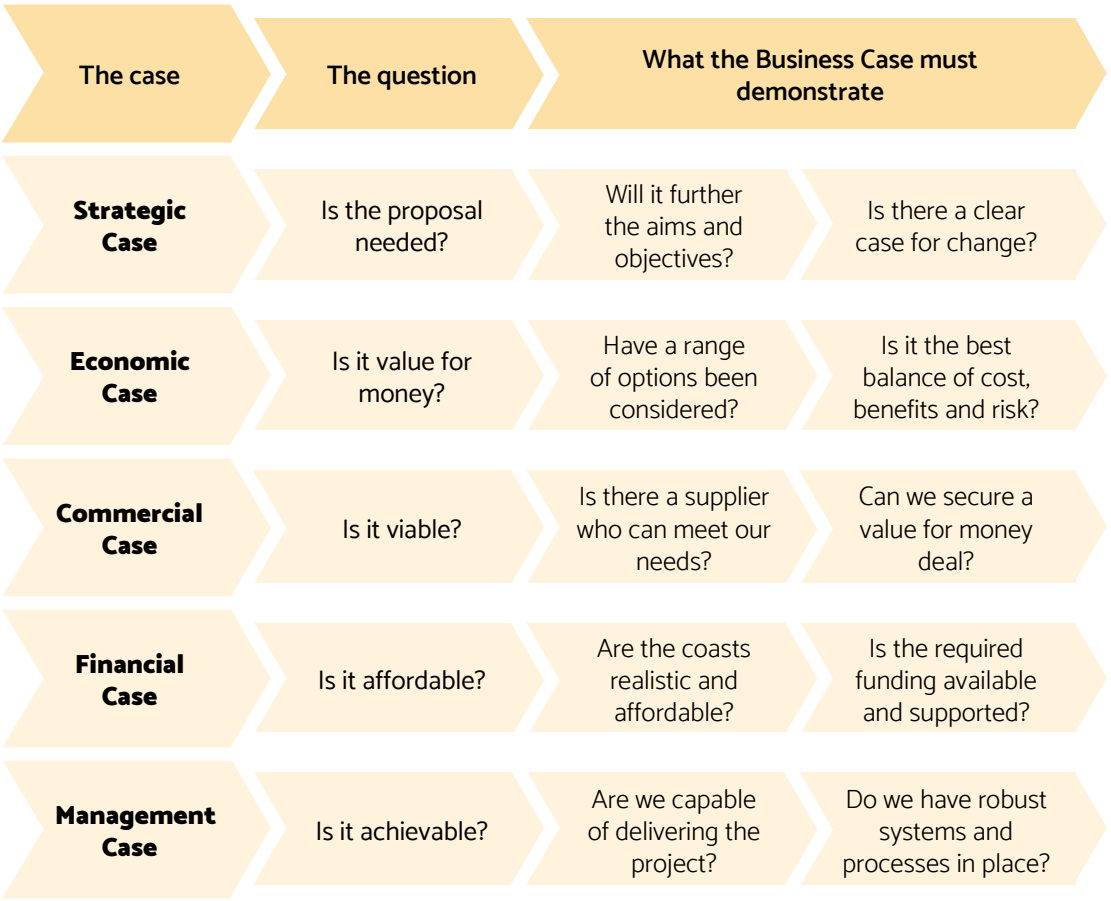
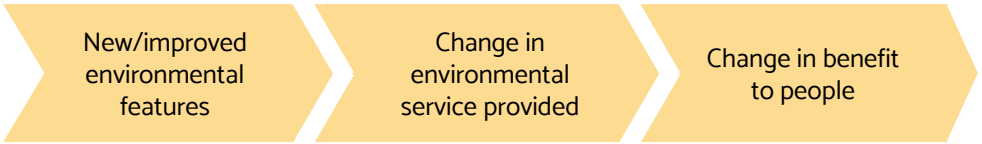


Figure 11: Evidence chain used in MEBIE2 to link an environmental improvement with a benefit to society. (Source, Rolls & Sunderland, 2014)



5.5

Embed actions in partner delivery, local plans and strategies

A co-created and shared plan will make organisational approval from partners and a commitment to deliver their contribution to the plan, much more likely. This is why it is so important to begin with a range of partners on board at the outset as set out in Section 1 of this report.

Our work with partners developing a Natural Capital Strategy for the North Devon Landscape Pioneer allowed us to identify some changes to the way we work across the public and private sectors. If we were to work in this way we could effectively embed the transformational change required to improve the natural environment at scale (Sunderland and others 2020). These changes to governance to improve embedding are summarised in Box 7.

Box 7: Making it happen, what governance changes are needed? (Sunderland and others 2020)

- **Institutional responsibility:** Environmental problems need to be clearly owned by an institution or partnership. This institution needs to be politically legitimate, have the right expertise and, critically, sufficient 'levers' to change the outcome.
- **Adaptive management:** We are dealing with complex systems which are not fully understood. We need to carry out actions that make strategic sense, notwithstanding uncertainties. Results are then assessed and new action plans developed in an adaptive cycle.
- **Localisation:** Ecosystems and benefits are inter-related. They need addressing as part of a single planning system, rather than separately. In practice this requires significant responsibility at sub-national or local scale. National governance has to split things up into issues to make them manageable, so it loses this interrelatedness and complexity. Issues should we dealt with at the lowest level possible.
- **Shared Commitment:** A wide range of changes need to come together, in a mutually reinforcing way, to support the changes we are seeking. A wide group of partners need to share commitment to improving the issues.

Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 9 North Devon Landscape Pioneer EIN059
- Appendix 11 Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2) EIN061

Stage 6:

CHECK AND IMPROVE
Evaluation and monitoring

6.1

Overview

Although evaluation and monitoring comes at the end of this report for ease of presentation, we have learnt that building it in at the outset, when you establish your partnership, vision and goals, is really important. This is because it enables you to collect the right data throughout. Thinking about it at the outset also helps you clarify your objectives so that they are measurable.

There is no standard guidance on the level of resource that should be spent on monitoring and evaluation. It should be proportionate and pragmatic to the scope of the plan or project and can be tailored to fit. Be really clear about the purpose of your evaluation at the outset and who your audience is. Is it mainly to help inform delivery? Is it about demonstrating to partners and stakeholders the value of your work? Is it about how effectively you are enhancing natural capital? Clarity on the purpose of your evaluation will help determine the overall approach and level of resource needed.

We have learned that the following are key components of a monitoring and evaluation approach established at the outset:

Monitor and report progress

Monitoring is about understanding trends and changes over time and is often used as part of project management to assess progress towards targets. It helps us know if we are on track to deliver. Regular reporting means that feedback can be used to adapt your overall approach and is a great way of engaging partners and building ownership. Building in a monitoring framework at the outset with proportionate and appropriate indicators makes this possible.

Evaluate effectiveness of plan

Evaluations will usually use monitoring data, alongside other forms of evidence, to understand what is working and how. Process evaluation is about understanding how well something is being delivered and needs to happen at the time. Impact evaluation is about understanding what difference your plan has made so comes later. A Theory of Change (see Section 1.5) will enable you to link your monitoring framework to the desired impacts.

Adapt and refine from lessons learned

Evaluation tells us whether something is working or not, and why that is. Monitoring data on its own can't do this. Evaluation gives us really important information on how delivery can be improved, as an adaptive management approach, so that we have a better chance of succeeding.

Embed best practice

Communicating the findings of evaluation is an effective way of engaging partners and building ownership. It helps demonstrate to others what has been achieved.

Return to overview diagram

6.2

Monitor and report progress

A monitoring framework sets out what information needs to be collected to provide evidence against the overall aims of the plan. When developing your monitoring framework consider the following:

- Establish the start point or baseline from which you wish to measure progress. It may be helpful to include historic data;
- Select indicators that most closely align with your Theory of Change;
- Don't look for evidence of impact too early. Many impacts will take a long time to realise – for instance habitat creation, or improved health and wellbeing outcomes;
- Use existing frameworks to select indicators from or inform your approach. Examples of potentially helpful indicator frameworks are signposted in Box 8 and Box 9;
- Include qualitative indicators as well as quantitative and indicators. These will be particularly helpful in the early stages of the evaluation when feedback on how the plan is being delivered would be most useful;
- Consider the use of proxies if data is not currently available.

Inspecting a soil pit
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In order to use indicators to monitor change in natural capital it is important that the data used is updated frequently and consistently enough to measure change. This is not always the case. Data availability, frequency of updates, coverage and relevant scale are all important factors to consider. Natural England have partnered with Simomics and The University of York to produce the **Natural Capital Indicators and Metrics Evidence Review (2020)**. This is a searchable literature review of the environmental properties which support the provision of ecosystem services and the metrics used to measure them and is based on Natural England's Natural Capital Indicators.

Box 8: Principles for defining robust indicators (Lusardi and others 2018)

Natural England's Natural Capital Indicators (Lusardi and others 2018) have been introduced in Section 2.3.2 and are summarised in **Appendix 6.** They establish a framework that you can use for identifying key indicators for measuring and monitoring change. A series of principles were applied to ensure that we selected indicators that were fit for purpose.

Transparent – the indicator should be open and understandable.

Relevant – the indicator should tell you something about what you want to know and be sensitive to change.

Meaningful – the indicator should reflect a logic chain that demonstrates how changes in the state of the system link to changes in the indicator.

Knowable – the indicator should be based on robust data capable of being measured or modelled.

Actionable – the indicator should be practically applicable within the context it is being used.

Scalable – the indicator should be applicable at the range of scales required for the relevant issue.

Box 9: Nature Improvement Areas Monitoring and Evaluation Framework

A monitoring and evaluation framework was established for Defra and Natural England's Nature Improvement Areas (funded 2012-2015). The framework includes a selection of indicators under the themes of biodiversity, ecosystem services, partnership working, social and economic (Collingwood Environmental Planning 2014). Accessible at: **Monitoring and Evaluation of Nature Improvement Areas (WC1061)**

6.3

Evaluate effectiveness of plan

The evaluation of the Upland Ecosystem Service Pilots (Appendix 3) provides an example evaluation of place-based strategic projects centred on ecosystem services and delivering both benefits for people and environmental outcomes. Much of what we have learnt about process and impact evaluation in the natural capital context has come from the development and delivery of these projects. Appendix 3 provides a summary and links to the evaluation publications with the Synthesis Report a good place to start (Kirkup & Maiden 2018).

We have learnt that to design an effective monitoring and evaluation framework you need to know what questions you want to answer and then identify indicators and/or data that will help do that. As seen in Section 1, completing a collaborative Theory of Change at the outset helps you clarify the logic behind the measures you are going to take. It enables you to design a monitoring and evaluation framework that will provide baseline information and enable you to track progress. Think about the following when planning your evaluation:

- Purpose: it helps to be really clear about the purpose of your evaluation from the outset. Is it mainly to help inform delivery? Or it is about demonstrating to partners and stakeholders the value of your work? Clarity on the purpose of the evaluation will determine the level of resource and overall approach;
- Audience: having a clear understanding of your audience and what they want from an evaluation is really important as this will help guide some of the decisions you need to make. The first audience is yourself: what do you need to gain from the evaluation? Then consider other audiences, for example partners, stakeholders, government departments. Knowing who the audience is will help to clarify timescales, the level of rigour that is needed and how to communicate the findings from the evaluation;
- Resources: there is no standard guidance on the level of resource that should be spent on evaluation, but resources should be proportionate to the scope of the plan, should include staff time and skills, and potentially financial resources;
- Sources of evidence: think about what sources of evidence are needed to answer your evaluation questions. This can include monitoring data (see above) but could also include things such as documents (projects plan) as well as qualitative evidence such as interviews with project partners.

Box 10 highlights further sources to help you plan your approach to evaluation and monitoring.

Box 10: Further sources for evaluation and Theory of Change approaches

Magenta Book (2020) – Detailed Government guidance on evaluation.

PRISM - Toolkit for evaluating the outcomes and impacts of small or medium-sized conservation projects.

Better Evaluation – useful website with a range of information on how to do evaluation.

Ecosystem Approach Handbook – Chapter 5 contains advice on proportionate monitoring and evaluation of both the delivery of a plan and processes of the partnership.

6.4

Adapt and refine from lessons learnt

In natural capital terms and if we are designing and implementing nature-based solutions, adaptive management is particularly important. This is because the environment is a complex system and so there are many uncertainties that mean we can't know if something will work, or to what extent. These uncertainties may relate to the impacts of pressures such as climate change or whether the measures we put in place will be effective. They can also be socio-economic, political or social, all of which can affect the natural environment and our interventions (GIZ, UNEP-WCMC & FEBA 2020). Because of this we have to try the things that we think are the most likely to work.

Adaptive management means that we can take actions even though we are uncertain they will work. If we have monitoring, reporting and evaluation in place we can work towards a target, track progress against it, assess the results and then adjust or make new plans to keep us on track. It is a way to manage uncertainty and risk.

6.5

Embed best practice

There is little point in doing monitoring and evaluation unless the findings are used and acted upon. It may be helpful to think about:

- Regular reporting – a more frequent reporting cycle early on in the delivery of the plan means that feedback can be used to adapt your overall approach.
- Sharing progress with partners – this can be a great way of engaging partners and building ownership.
- Consider your audiences – think about the different audiences for the evaluation and how you can adapt your communications to suits their needs.

Additional resources helpful for this section can be accessed using these appendices:

- Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051
- Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052
- Appendix 3 Evaluation of the Upland Ecosystem Service Pilots EIN053
- Appendix 4 Natural Capital Indicators EIN054
- Appendix 9 North Devon Landscape Pioneer EIN059

Appendix A - Applying it on the Ground:

The Upland Ecosystem Service Pilots

Natural England's Upland Ecosystem Service Pilots (2009-2011) were designed as demonstration projects to apply the Ecosystem Approach on the ground. The pilots were located in Bassenthwaite Catchment in the Lake District, the South Pennines and South West Uplands. The projects were evaluated in 2018. Appendix 2 and Appendix 3 provide a summary of the Bassenthwaite Pilot and the evaluation of the three pilots respectively, with links to help you explore the outputs in more detail. Here, we outline more broadly how what we did and what we learnt has particularly informed the best practice and evidence set out in this report.

Define partnership and vision

The pilots were specifically designed to be collaborative and participatory. Our evaluation of the three pilots in 2018 (Appendix 3) told us that key learning points for success were:

- Building on existing partnerships but also broadening membership to include new partners. This included widening beyond environmental partners to include, for example the tourism and farming sectors (including individual farmers through workshops);
- A geographical scale which was both appropriate for planning and was a boundary already accepted by the partnership. A focused geography ensured the ecosystem services and benefits were understood;
- Embedding multiple benefits in decision-making was possible where a collaborative approach was adopted throughout all stages of the process;
- A Project Officer was an important catalyst in establishing the project and driving it forward with the partnership.

Establish a shared evidence base

In the pilots we trialled assembling a mapped evidence baseline and used it to inform opportunity mapping. The learning has directly informed the development of the tools included here. We also undertook economic valuation in two of the pilots (Harlow and others 2012, Lusardi and others 2019). The evaluation of the pilots found that this was one of the significant direct legacies of the South Pennines Pilot. However, we also found that economic valuation was not always required to inform the participatory decision-making.

The pilots aimed to provide an evidence baseline from which future land management options could be considered. It included the context and character of each pilot area, a series of maps that depicted individual ecosystem service provision, plus additional background data and location of beneficiaries where that was possible. This was an ecosystem services-led approach to enable the consideration of all benefits. In the case of the pilots, partnership collaboration was essential in pulling together both nationally and locally available data for this purpose. The pilots demonstrated that it is possible to assemble a pragmatic evidence base for land management decision-making without the need for resource-intensive generation of new data.

The Pilots showed that the mapped evidence base became a useful communication tool for partnership working, allowed a range of stakeholders to contribute evidence and enabled the collaborative targeting of action where needed later in the process. The partnership working was also a catalyst for the development of other shared evidence, to fill specific needs in a place. Examples include in the South Pennines, an assessment of the cultural services (Fleming & Inwood 2013) and in Bassenthwaite, modelling of woodland creation to reduce flood risk (Atkins 2012).

Decide and plan for multiple benefits

The Upland Ecosystem Services Pilots demonstrated that a collaborative approach can lead to shared, integrated actions for multiple ecosystem services in a strategic land management plan. Led by the local partnerships, each pilot took a slightly different approach to developing a plan. The key stages in developing the plan for the Bassenthwaite Pilot were as follows:

- Develop integrated objectives - Facilitated by the partnership steering group assessing how the shared objectives of the project contributed to existing strategies and objectives;
- Develop shared integrated actions - Integrated actions are those that deliver for a range of ecosystem services and benefits. For example, woodland creation to help flood regulation as well as biodiversity and carbon sequestration. They were developed with partners through a series of workshops. Opportunity mapping was used as a tool in this process, to identify where actions could happen on the ground. This worked positively to help generate new ideas, find synergies and opportunities, and open up discussion about conflicts;
- Agree priority actions - A number of key, strategic actions that deliver outcomes for more than one issue and more than one ecosystem service were agreed in an iterative process by partners. They were land management focussed as this fit the overarching goal. The matrix table, described earlier and shown in Figure 9, was a useful tool that facilitated this decision-making and agreement.

Making it happen

The Upland Ecosystem Service Pilots demonstrated how existing funding and initiatives could be used to enable an ecosystem service-led delivery plan. The main funding mechanism for the pilots' delivery plans was voluntary uptake of the Higher Level Stewardship (HLS) agri-environment scheme by farmers and other land managers. These incentives proved to be the main mechanism for engaging farmers and implementing the agreed management. This was combined with other public funds, (eg woodland grant schemes, Water Framework Directive funding) along with other existing mechanisms and partner projects as part of an integrated package for delivery. In each of the pilots Water Companies had also secured some funding for catchment management and capital works.

The use of existing mechanisms can be important for embedding delivery, by ensuring ownership and longevity However, in the pilots it was apparent that the existing mechanisms weren't designed for multiple farm agreements at a landscape scale; an approach that would enhance delivery strategically.

Evaluation

An evaluation of the Upland Ecosystem Service Pilots, 6-7 years after the close of the project, explored questions about the extent to which a participatory process influenced the development of a delivery plan, and subsequent environmental outcomes. The evaluation concluded that evaluation of process needs to be done soon after a pilot, whilst a longer period of time is needed to evaluate the impact. We learnt a lot about evaluation from doing this that has directly informed the further development of Natural England's evaluation work and is reflected in Section 6. Specifically, we learnt that the Theory of Change approach (Section 1) and the explicit consideration of assumptions in that process, is a valuable tool to use at the outset.

Appendix B - Applying it on the Ground:

The North Devon Landscape Pioneer

The North Devon Landscape Pioneer (2017-2020) one of Defra's four Pioneer Projects for the 25 Year Environment Plan. It was an experiment to see whether a natural capital approach, using economic evidence of the benefits that the environment was providing in North Devon, could be embedded within a participatory and deliberative process. Natural England worked in collaboration with the UNESCO North Devon Biosphere partnership to identify natural capital priority issues, strategic solutions and new sources of investment for natural capital in North Devon. Appendix 9 summarises the project and outputs. Here, we outline how what we did and what we learnt has informed the best practice and evidence set out in this handbook.

Define partnership and vision

We involved partners and stakeholders in decision-making throughout the process of developing a natural capital strategy. We did this through a series of deliberative workshops and regular feedback opportunities. This was an experimental process and was consequently very adaptive; we changed and evolved our approach throughout. We also learnt a number of key lessons about meaningful collaboration and participation.

- Partner engagement, communications and commitment including continuity of attendance are critical for productive collaboration.
- It is important to include a broad range of economic partners from both the demand and supply sides when considering natural capital. This includes those that might potentially become investors as well as landscape managers and owners. Whilst we began our work with the UNESCO North Devon Biosphere partnership we were able to broaden it to include stakeholders from other sectors such as planning and economic development, tourism, health and business.
- Listen to your stakeholders about their aspirations for natural capital. Begin with a vision for the future of natural capital in your place that is guided by stakeholders. Doing this brings different values into the discussion which is essential to build trust. The high-level vision needs to be extended to form a practical vision based on sound principles and defined environmental outcomes, so that the goals and what you are trying to achieve is clear.
- Partnership working requires good record keeping and transparency to document difficult issues and decision-making during the process.
- Securing a suitable budget to facilitate the work is essential, along with investment in project officer time.

Establish a shared evidence base

We brought together our evidence base to understand the state of natural capital, in a participatory way. Our partners and stakeholders brought their own evidence and expertise so that they were able to check and challenge the evidence that was included and come to a shared agreement. This helped generate considerable buy-in early in the process.

The North Devon Landscape Pioneer also included financial mapping (eftec 2021) as part of the shared-evidence base. An innovative addition to the context, eftec created a heat map that showed the spatial distribution of public spend across the area allowing discussion of how joined up spending really is in relation to environmental outcomes. This work was particularly helpful in bringing partners to a strategic conversation about their place early in the process.

Decide and plan for multiple benefits

In North Devon we experimented with a decision-making process that directly used the shared evidence base as a tool to launch a process of agreeing the strategic priorities to focus on.

We trialled an approach that aimed to show stakeholders where the biggest gains in potential benefits could be made to drive their prioritisation. The biggest gains reflected those habitats and ecosystem services where the assets could provide high value benefits but were in poor or deteriorating condition. Stakeholders had the opportunity to challenge and change this decision making in order to arrive at a set of eight agreed priorities to address in the next stages.

This deliberative process did result in a set of stakeholder-agreed priorities for targetting improvements in ecosystem services from specific habitats. However, we learnt that our stakeholders found it difficult to recognise or trust the economic evidence due to the way it had been transformed and presented and were not comfortable using it in this way. Because the economic evidence is only partial it also resulted in those habitats and benefits where monetary values were unavailable being regarded as a lower priority. Some of these were highly valued by stakeholders and although subsequent discussion resulted in them being included as priorities, it reduced the engagement and confidence stakeholders had in the evidence and process itself.

Section 4 in this report summarises the use of Root Cause Analysis (RCA) to understand the causes of the problems stakeholders and partners have identified. We used the RCA approach in the Pioneer once the priority issues had been agreed. Stakeholders engaged well with this approach and found it a helpful way of examining the causes and pathways of problems affecting their natural environment. We found it worked best when the problems could be clearly defined. This would have been made simpler if we had agreed a practical vision that we were working towards because we would have been able to better articulate the problems we were trying to solve. We found RCA to be an effective method for drawing out a wide range of interventions that would help address the problems identified, including those close to the root cause.

Distinguishing the interventions in three broad ways proved critical to enabling their strategic development: These were:

- Physical changes to the landscape – land use and land management interventions applied strategically and at scale;
- Incentives, motivations and capabilities – of those groups and organisations who were essential to the success of the strategy;
- Governance and decision-making – which covers the way responsibility is taken, decisions are made and resources are allocated.

Act – Make it happen

Through this process our stakeholders identified strategic solutions to help recover nature in North Devon. The resulting North Devon Landscape Pioneer Natural Capital Strategy (Sunderland and others 2020) also summarises some changes to the way we work across the private and public sectors that are needed in order to effectively improve the natural environment.

One of the aims of our approach in North Devon was to identify new sources of investment to meet our goals for natural capital. In practice we found it very difficult to achieve this. This was largely because environmental improvements tend to provide a wide range of public goods rather than specific opportunities for financial return for investors. It would be helpful to include potential investors at the very start of the process, so that their goals (and hence cost savings or benefits) will be better integrated into the decision-making process. Our partners and stakeholders identified a long list of ideas for potential private sector investment. Eunomia (2020) developed four of these into investment opportunities for North Devon:

- Developing and marketing local food networks to promote sales of produce from farms that maintain and improve natural capital;
- Creating a new carbon-offsetting standard for priority North Devon carbon storage habitats;
- Creating a woodland management support hub;
- Developing an ecotourism standard that will promote habitat restoration on the River Torridge.

All require further work to provide sources of new funding. The North Devon Landscape Pioneer Natural Capital Strategy has been formally adopted by the North Devon Biosphere Partnership, who were involved collaboratively throughout. This provides ownership and governance to take the ideas forward and join up with local and national priorities to make best use of funding for environmental improvements in North Devon.

Small fields and hedgerows, North Devon
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List of Additional Appendices

A set of Evidence Information Notes have been created and published as appendices to the Handbook. Along with the Handbook they facilitate access to the evidence and resources Natural England has produced to make the application of natural capital easier. Each appendix is a gateway to the individual publications; they briefly summarise the evidence, resource or project, it's method, what it can be used for and key lessons learned. The stages where they are particularly relevant are indicated with numbered symbols (1 2 3 4 5 6).

Appendix 1 Natural Capital and Ecosystem Approach Checklist EIN051 1 2 3 4 5 6

Appendix 2 Bassenthwaite Upland Ecosystem Service Pilot EIN052 1 2 3 4 5 6

Appendix 3 Evaluation of the Upland Ecosystem Service Pilots EIN053 1 4 6

Appendix 4 Natural Capital Indicators EIN054 2 4 6

Appendix 5 Natural Capital Atlases: Mapping Indicators EIN055 2 4

Appendix 6 Accounting for National Nature Reserves EIN056 2

Appendix 7 Natural Capital Account for the Tees Valley EIN057 2

Appendix 8 People and Nature Survey EIN058 2

Appendix 9 North Devon Landscape Pioneer EIN059 1 2 3 4 5 6

Appendix 10 Managing Ecosystem Services Evidence Review (MESER) EIN060 4

Appendix 11 Microeconomic Evidence for the Benefits of Investment in the Environment 2 (MEBIE2) EIN061 5

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Natural Capital Evidence Handbook: to support place-based planning and decision-making

Natural England Research Report 092

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Back cover photo: NCA 50 Derbyshire Peak Fringe - River Derwent at Cromford