Natural England Research Report NERR077

# Evaluation of the Upland Ecosystem Service Pilots: Annex 1. Bassenthwaite

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# Bassenthwaite Ecosystem Services Pilot Project Evaluation

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# Project details

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# Executive Summary

## Introduction

The Bassenthwaite Ecosystem Services Pilot project is one of three national pilot projects initiated by Natural England in 2009 to demonstrate the implementation of the ecosystem approach in a place. This is an integrated approach to the sustainable management of land and sea for the benefit of people, which seeks to combine ecological, social and economic understanding into holistic decision-making. The principles of the ecosystem approach, as defined by the Convention on Biological Diversity 2000 are given at Appendix 1. The Bassenthwaite pilot applied this approach on the ground through collaborative working with partners, developing a shared evidence base and a delivery plan to enhance multiple ecosystem services. This evaluation is intended to understand how effective the Bassenthwaite pilot project has been in achieving its original aims and to understand in more detail the outcomes and impacts of the project. Quantitative assessments of ecological impacts are generated through Geographical Information Systems (GIS) analysis, to understand the implementation of delivery plan actions and their uptake in agri-environment agreements. These data are supplemented with qualitative insights from semi-structured interviews with a selection of partners involved in the project (eleven interviews in total were carried out). These were intended to provide additional insight into the project process as well as any behavioural and attitudinal outcomes.

### Approach to the evaluation

This evaluation builds on the lessons learned from implementing the first phase of Natural England's three upland ecosystem services pilot projects (Waters and others, 2012). Specifically, it seeks to evaluate the outcomes and impacts of the Bassenthwaite pilot project and was carried out in-house by Natural England staff, with objectivity being assured through the close involvement of a steering group made up of both Natural England and Defra staff. The evaluation was guided by a logic chain developed by the steering group, which highlights the causal links between project inputs, activities, outputs, outcomes and impacts. The logic chain can be found at Appendix 3. Secondary data sources were examined to draw out key data regarding the project inputs and process and further data was generated via interviews with a small sample of project participants, who agreed to take part in the evaluation, and also via assessments of GIS maps to show environmental impacts.

## Summary of key findings

1. Project outcomes

    - A significant value of the project was found to be in its ability to galvanise partners around an innovative agenda and new ways of thinking, which motivated people to try different ways of working and engage with a range of people in the process. Strong partnerships which are pulling in the same direction provide powerful messages and help to achieve shared and integrated objectives.

    - Interviewees (participants in the pilot project) articulated the role of this project in moving thinking forward, in terms of developing understandings of an Ecosystem Approach to land management, which was identified as an important legacy. It was

noted for example, that this project has been the catalyst for further, related projects as well as a pioneer in terms of directing thinking around an ecosystem/natural capital approach.

- Interviewees also identified that the maps created and discussions through the participatory processes did help to facilitate further discussions with farmers during subsequent one to one meetings around potential land management decisions.

2. Project impacts
    - Substantial land management change has occurred in the Pilot area since the initiation of the Pilot. However, it is not known what would have occurred without the influence of the pilot. A participatory approach identified key land management actions, to enhance multiple ecosystem services. The GIS analysis showed that the key actions delivered in the pilot project area (2011-6) through agri-environment scheme options, include: 215 ha of woodland creation; 16193 ha of sustainable grazing on the uplands; restoration of 515 ha woodland, 152 ha of species rich grassland, 65 ha of fen and 6 ha of raised bog, as well as 899 ha of nutrient management on improved grassland. This meets or exceeds a number of the key action targets identified in the pilot's delivery plan. 16,193 ha of Priority Habitats were maintained or improved and 944 ha restored or created. This is much greater than the Nature Improvement Areas, which were of a similar size, and over a three year period maintained or improved 1,139 ha of Priority habitat and restored or created 385 ha (mean amount per NIA, Collingwood Environmental Planning Limited, 2015).

    - Through the delivery plan, pilot partners mapped opportunity areas and priority holdings for delivering the key actions. The opportunity areas and priority holdings generally support a substantially larger proportion of the key actions, than the proportion of the catchment they cover.

3. General lessons around the Ecosystem Approach
    - The inclusion of multiple stakeholders as set out in the ecosystem approach principles enabled input from a wide range of disciplines which facilitated the development of knowledge and learning from different perspectives (for example, flood management modelling (Atkins, 2012), GIS mapping etc).

    - Important questions were raised around the reality of adopting an ecosystem approach to land management which may involve different ways of working than have previously been practiced. Working collaboratively may not always be easy or a preferred method of working for example. The need to develop social capital and to more explicitly link environmental and social outcomes to more fully embed these ways of working were articulated through interviews.

    - Considering environmental management in an economic context was incorporated in the pilot through working with stakeholders from farming, tourism, the water-company, forestry and economic development sectors. In addition, the shared evidence base developed included reports on the economic benefits of the Bassenthwaite Catchment (Rebanks Consulting Limited, 2010) and a report on the development of Visitor Giving (Nurture Lakeland, 2011) as payment for ecosystem services. An economic valuation of changes in future ecosystem service provision, under different management

scenarios, was completed after the deliberative phase of the project had ended. It thus did not form part of the decision-making processes of this pilot. One lesson learned from the valuation however, is that modelling techniques as applied in this pilot area, can be limited by the availability of suitable ecological evidence to parametise the model. In particular there were found to be a lack of coefficients related to changes in habitat condition.

4. Success criteria and lessons for future evaluations
    - The strength of the existing partnership in this area (the Bassenthwaite Lake Restoration Programme, BLRP) and the additional resources put into this project appear to have made the biggest impact in terms of getting the project going and getting people around the same table to talk through new ways of working.

    - Timescales involved in evaluation: discussions around this project often moved away from the specifics of Bassenthwaite and onto more general and related points. This was because of the difficulties of recalling specific memories due to the time lag involved in this evaluation. Because of this, it was sometimes difficult to attribute specific outcomes directly to the project. This highlights the need to undertake process evaluation during or soon after delivery, whilst the evaluation of impacts may be suited to a longer time-frame (such as years after the officer-led phase has ended).

    - Timescales were also discussed in terms of the tension between typically short-term funding streams and the time required for partnerships to develop and mature. Finding ways to continue momentum when the intensive resource phase ends was highlighted as a challenge to be addressed for future work.

    - The lessons learned from this pilot project are currently being synthesised with other learning from the two other upland ecosystem services pilot projects initiated at the same time (South Pennines and the South West Uplands). This will provide a good overview of what worked in these pilots and for whom and why. These insights will inform policy and delivery and enable future projects to be rolled out using better understandings of both methods and outcomes, and the links between the two.

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# Contents

# Appendices

# List of tables

# List of figures

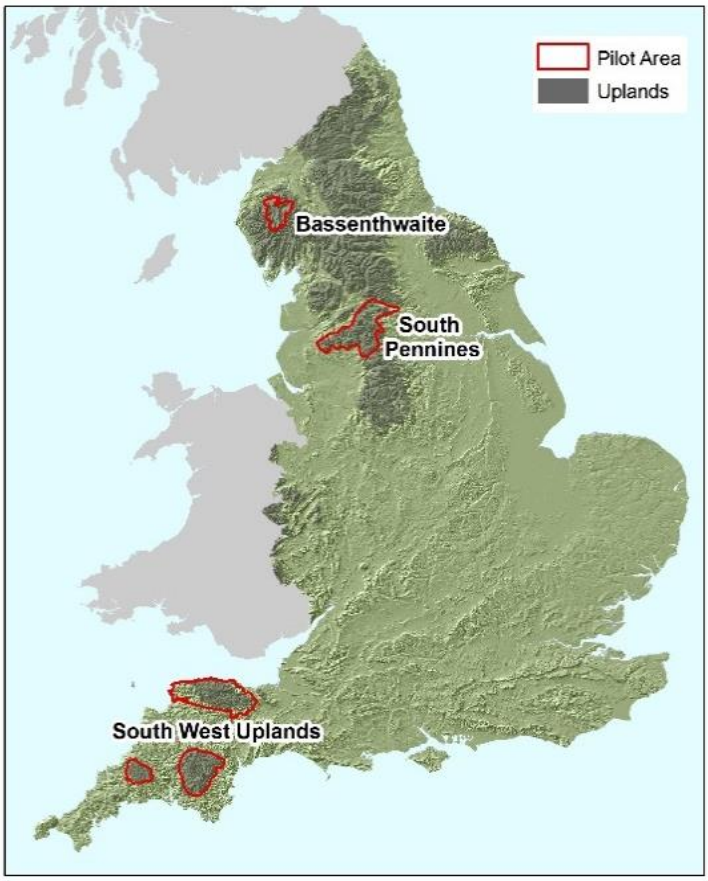
# 1. Introduction

## 1.1. Introduction to the Bassenthwaite Ecosystem Services Pilot Project

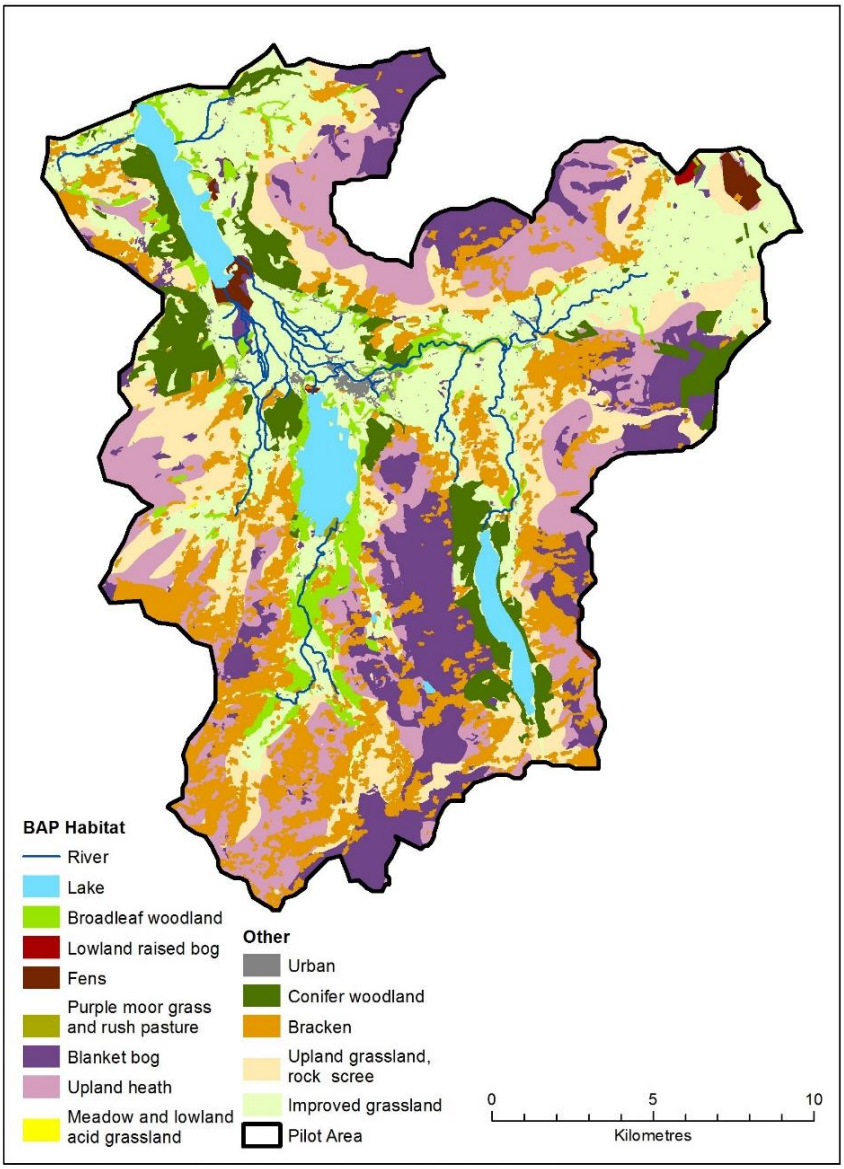
The Bassenthwaite Ecosystem Services Pilot project is one of three national pilot projects initiated by Natural England in 2009. The pilot areas were chosen by the Natural England national project staff, from proposals put forward by Natural England Area Teams. This work continues and builds upon previously published experiences gained from implementing the first phase of Natural England's three upland ecosystem services pilot projects (Waters and others, 2012). Although the pilots aimed to demonstrate the implementation of the ecosystem approach in a place, they were called ecosystem services pilots as this was a more commonly used term at the time. The Ecosystem Approach, defined by the Convention on Biological Diversity has emerged as a driver of environmental policy which seeks to implement an integrated approach to the sustainable management of land and sea for the benefit of people, combining ecological, social and economic understanding into holistic decision-making. There are twelve ecosystem approach principles presented by the Convention on Biological Diversity which sets a framework for achieving the aims of the approach (given at Appendix 1).

During the Bassenthwaite pilot project, the initial officer-led phase ran for eighteen months from September 2009 to March 2011. In this first stage, the pilots were intended to work in partnership to develop integrated delivery plans for the period 2011-2016, and to then implement actions arising from the plans during this time, with the aim of enhancing multiple ecosystem services. The development of shared evidence bases and the economic valuation of ecosystem services for potential future scenarios, were also planned to inform the delivery plans.

Geographically, the Bassenthwaite Ecosystem Services Pilot Project covers the Bassenthwaite catchment in the north Lake District (see maps 1 and 2). The catchment, around a fifth of the Lake District National Park, has an area of 361.3km$^2$ and includes Bassenthwaite and Derwent Water lakes as well as Thirlmere reservoir. Bassenthwaite catchment is located within Cumbria High Fells National Character Area.




**Map 1** Location of the three Upland Ecosystem Service Pilot Projects

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**Map 2** Habitats in the Bassenthwaite Catchment

## 1.2. Aims and objectives of the pilot projects

The aims of the pilot projects were:

- To provide a practical example demonstrating how the ecosystem approach can be applied on the ground.
- To use an ecosystem approach to define land and water management based upon consultation with stakeholders and their perceptions of the best options.
- To demonstrate that investment in the natural environment can result in multiple benefits (carbon, water, food, biodiversity, recreational and landscape benefits).
- To work in partnership to deliver a range of ecosystem services in a cost effective way and link these services to the beneficiaries

## 1.3. Pilot project activity

Natural England anticipated that the upland pilots would evolve in line with local circumstances and priorities, but initially expected that they would follow a similar development path – as shown in Figure 1.

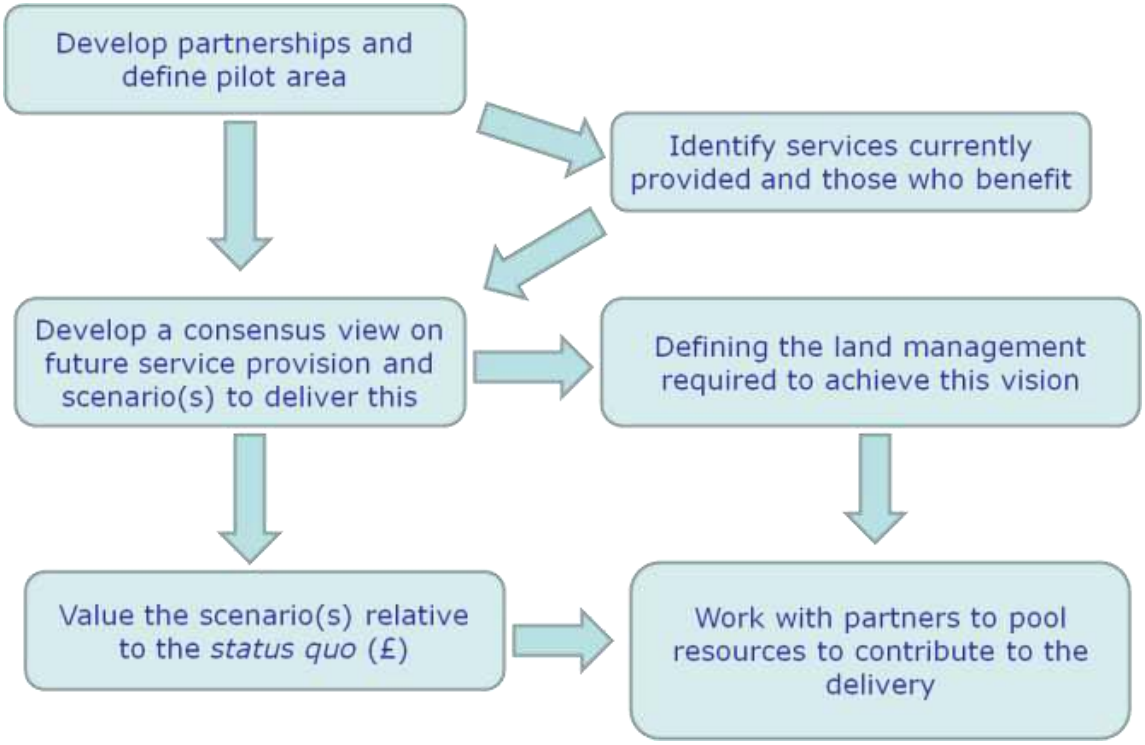


**Figure 1** The project steps that each pilot was expected to follow[1]

Table 1 below provides an indication of the intended activities in the Bassenthwaite pilot. The third column summarises our understanding of the action that was taken.

**Table 1** Milestones and actions for the pilot

| Milestone | Action required | Action taken |
|---|---|---|
| Regional partnerships established with governance structure | Secure commitment from partners to projects | All actions completed: steering group formed as new task group (with Terms of Reference and regular meetings) within existing Bassenthwaite Lake Restoration Programme. New partners joined steering group and wider stakeholders were involved through a series of workshops |
| | Agree terms of reference and governance structure | |
| | Identify regional stakeholders and potential collaborators (beyond partnership) | |
| | Establish regular meetings/communications | |
| | Review partnership composition | |

[1] Ibid, p.5

| | | |
|---|---|---|
| Regional project scale and geographical scope agreed with partnership | Define potential project area | All actions completed. The steering group agreed that the existing partnership boundary of the Bassenthwaite Catchment would be used for the Pilot. |
| | Review area with partners (with reference to services targeted) | |
| | Share boundaries among partners (GI shape files) | |
| Assessment and mapping of existing ecosystem services | Identification of current service provision | All actions completed. A detailed baseline assessment document was produced in March 2011. A generic mapping approach was agreed across all 3 pilots. Initially pilot area maps were produced from the data and maps in Mapping values: the vital nature of our uplands – an atlas linking environment and people - NE209. This was added to by collating local data sets, mapping it all onto GIS. Gaps in the available data were assessed in the baseline. With limited data available to directly map ecosystem services, proxies were used where needed. Quality control was through the national Project Manager and NE's Principal Specialist in the Ecosystem Approach. |
| | Collation of geographical information on each service identified both within NE and with partners | |
| | Assessment of suitable proxies for services with no current data | |
| | Agree generic mapping approach across three projects | |
| | Gap analysis of missing data (is there something crucial missing? - how can we fill that gap) | |
| | Mapping the information onto GIS | |
| | Quality control of mapping information (is what it's showing us sensible?) | |
| Assessment and agreement of favoured option | Agree suite of services sought | All actions completed, with agreement sought with partners through workshops and one-to-one meetings. Opportunity mapping of key actions (from mapping workshop) for land management captured in delivery plan.<br><br>Scenarios for future service provision were not defined until the valuation exercise, which was after the Project Officer led phase. |
| | Define land management options linked to service provision | |
| | Identify 'reference' areas where these exist (where the service is already being provided) | |
| | Define scenarios for future service provision | |
| | Work with partners to agree option to take forward | |
| Identification and mapping of service beneficiaries complete | Identify (current and potential) beneficiaries for each service | All actions completed. An assessment of service beneficiaries was included in the baseline assessment, including type of beneficiary, their location and type of payment linkage. Maps of beneficiaries were produced for flood risk and visitor origin. |
| | Develop approach for mapping these beneficiaries | |
| | Map the beneficiaries | |
| | Categorise beneficiaries (by location, group etc) | |
| Land/water management delivery plan agreed | Define land management options linked to service provision | All actions completed except the identification of reference areas. Developed through participatory workshops with partners, a delivery plan was produced in March 2011. This identified and provided opportunity maps for 7 key land management actions, to enhance multiple ecosystem services. It explains why action is needed, which partners could deliver it and potential sources |
| | Identify 'reference' areas where these exist (where the service is already being provided) | |
| | Identify land management changes required at relevant scale in each pilot | |
| | Identify mechanisms to deliver land management changes | |

| | | |
|---|---|---|
| | Develop delivery plan for project area (including opportunities and constraints) | of funding. It also identifies how the key actions contribute to partners' objectives. |

## 1.4. Approach to Bassenthwaite pilot project

One of the principles of the ecosystem approach is to devolve decision making to a local level. Although the national project provided a suggested steer, the Bassenthwaite pilot identified its own local objectives to:

- Demonstrate how multiple public benefits can be delivered through integrated partnership working.
- Provide tools that help demonstrate and value the public benefits that the catchment's environment provides, including detailed mapping and economic valuation.
- Develop a delivery plan with partners and farmers for a full range of environmental, economic, social and cultural benefits.
- Explore innovative funding mechanisms to pay for ecosystem services.

Effective partnership working was considered at the outset to be critical to the success of the project, given the emphasis on the diversity of input in the ecosystem approach principles. The project therefore, built on the strong foundation of the existing Bassenthwaite Lake Restoration Programme (BLRP) partnership in which a variety of partners were already involved. Partners included the Environment Agency, Lake District National Park Authority, United Utilities, Cumbria County Council, the National Trust, the Forestry Commission, with new partners the National Farmers Union (NFU), Nurture Lakeland and Cumbria Tourism.

The Bassenthwaite Ecosystem Services Pilot project was accepted as a new task group within the existing BLRP which saved time and effort in establishing a new partnership. In addition, the BLRP was already used to hosting a number of other pilot projects, including one of the original four Catchment Sensitive farming projects, and was thus open to new ideas and ways of working. The pilot project fitted into the existing governance structure of the BLRP, with task groups reporting back to the BLRP management group. The project officer acted as Chair of the task group and meetings ran an hour prior to the timetabled management group meetings. Terms of reference were written to the existing BLRP format.

Natural England's role has primarily been one of a facilitator, through the provision of a project officer who co-ordinated partner activity and developed project activity and outputs. Project outputs for the catchment have included:

- A mapped baseline assessment of ecosystem services (Natural England, 2011a).
- An integrated and mapped delivery plan (Natural England, 2011b).
- A qualitative report on farmers' views on ecosystem services (Mansfield, 2010).
- A hydrological modelling study on the potential effect of woodland creation on flood reduction (Atkins, 2012).
- A report on work with 35 tourism businesses, assessing the potential of Visitor Giving to pay for ecosystem services (Nurture Lakeland, 2011).
- A report on the existing economic benefits derived from the natural environment of the area (Rebanks Consulting Limited, 2010).

Partners were actively engaged throughout the duration of the officer-led phase of the project, particularly in the development of the land and water delivery plan and in identifying mechanisms for its delivery, through the task group, workshops and individual meetings. In addition to the regular task group meetings, the pilot project ran a series of wider partner workshops with over seventy participants from more than twenty different organisations. The workshops enabled partner dialogue and ultimately, the development of the integrated delivery plan. Stakeholder participation in steering group meetings and workshops is given at Appendix 2**.** Workshops details are as follows:

*Workshop 1 (22.1.10): Participants identified: key ecosystem services; the level of service already provided; data sources to measure services and three top actions for each key ecosystem service. A number of these actions were progressed further by the project and ultimately contributed to five of the seven key actions in the delivery plan. Three actions identified by this workshop were progressed through further reports or studies: the baseline assessment of ecosystem services (Natural England, 2011a) (pulling together existing data); the hydrological study modelling woodland creation to reduce to flooding (Atkins, 2012); the Visitor Pay-Back Pilot (Nurture Lakeland, 2011).*

*Workshop 2 (23.3.10): At the mapping workshop participants identified actions that could enhance key individual ecosystem services. A matrix was then developed to show how the actions identified contributed to multiple ecosystem services. Participants also used existing map data and their local knowledge to identify opportunity areas for land management actions to enhance ecosystem service provision (this workshop was one of a series on priorities for the new Higher Level Stewardship agri-environment scheme). This workshop formed the basis of the delivery plan (Natural England, 2011b)*

*Workshop 3 (30.3.10): At the regional economic benefits workshop participants identified key actions, opportunities and constraints for: tourism and access; health benefits; farming and food produce. These were not included in the integrated delivery plan as they were not land management actions. However a key action identified for tourism was taken forward in the Pilot's work with thirty five tourism businesses (Nurture Lakeland, 2011), examining how visitor giving can be developed to pay for ecosystem services. A subsequent farmer-led project in the catchment, Cumbria Connections, focussed on bringing together social, economic and environmental outcomes.*

*Workshop 4 (7.12.10): The matrix and opportunity mapping from workshop 2 were refined through one to one meetings with the project officer and during the fourth partner workshop. This included identifying how key land management actions could contribute to individual partner's objectives and initiatives. The matrix and opportunity mapping formed the basis of the mapped delivery plan of seven key actions. The fourth partner workshop also produced a matrix of delivery and funding mechanisms for the seven key actions, which was included in the delivery plan.*

*Workshop 5 (25.1.11 & 3.2.11): At the farmers' workshop, participants identified key ecosystem services provided by their management and considered how the key actions of the delivery plan could fit with farm businesses. This was incorporated into the sections of the delivery plan on how the action fits with farm businesses, as well as being included as an annex to the plan. The farmers workshops were framed around the new Higher Level Stewardship Scheme and designed to not*

*take too much of their time (two hours followed by lunch), as they were voluntarily contributing to the Pilot.*

*Workshop 6 (12.3.11) was a public conference which consisted of a series of presentations on the ecosystem services provided by the catchment. Participants undertook an exercise to identify the multiple ecosystem services and benefits provided by the catchment and how far these benefits extend, from locally to globally. An assessment of the geographical extent of benefits arising from the catchment was included in the Baseline Assessment of Ecosystem Services for the Pilot (Natural England, 2011a), part of the shared evidence base.*

## 1.5. Aims of the evaluation

The aim of the evaluation is to assess how effective the project has been in achieving its original aims and specifically, how effective it has been in applying the ecosystem approach, both in terms of ways of working and also in terms of outcomes and impact. The evaluation approach is based on the statement of the project's underlying logic and stated objectives which was articulated by the evaluation project steering group and developed into a logic model (explained further at 2.1). The evaluation is across all of the twelve Convention on Biological Diversity's (CBD) ecosystem approach principles (full version at Appendix 1) however the steering group decided to focus on five of the principles to guide the research questions. The evaluation aims to capture what has been done, and how effective this has been, with respect to these 5 principles:

1: The objectives of management of land, water and living resources are a matter of societal choice.
2: Management should be decentralized to the lowest appropriate level.
4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.
7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

# 2. Methodology for evaluation

## 2.1. Theory based approach

Using guidance based on the UK Treasury 'Magenta Book, Guidance for Evaluation', the evaluation is based on a model of project logic. The logic model provides a framework for evaluation by articulating the relationship between the project inputs, activities, outputs, outcomes and impacts. The logic model for the Bassenthwaite pilot project evaluation was developed by the project steering group by looking retrospectively at the aims of the project and the activities which were considered to have contributed to achieving these aims. The evaluation questions were then identified from this logic model to test these causal links and assumptions. The logic model is at Appendix 3.

## 2.2. Evaluation questions

The overarching question of the evaluation is to assess 'to what extent has the project applied the ecosystem approach'. The ecosystem approach refers to 'a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way'. Beneath this there are a number of sub-questions, which are drawn from the key links on the logic map. These have been grouped to provide a more coherent structure for discussion in this report. The most relevant ecosystem principles to each sub-set of questions are also identified.

1. Spatial and Temporal Scales (ecosystem principle 7):
    a. Has the ecosystem approach and decision-making been applied at appropriate spatial scales?
    b. Did the pilot take into account the timescales needed for processes to implement the ecosystem approach?

2. Partnerships and Participatory Engagement (ecosystem approach principles 1, 2 & 12):
    a. What were the inputs to the pilot in terms of staff time and funding for both Natural England and other partners
    b. What aspects of partnership and governance enabled agreement on a shared delivery plan?
    c. To what extent did the participatory approach involve a range of stakeholders' perspectives?
    d. To what extent did the pilot include evidence from a range of disciplines?

3. Economics (ecosystem approach principle 4):
    a. To what extent did the pilot consider the need to understand and manage the ecosystem in an economic context?
    b. To what extent did the economic valuation inform decision making?

4. Outcomes
    a. To what extent did the participatory process result in attitudinal and behavioural change?
    b. To what extent did the participatory process influence the development of the integrated delivery plan?
    c. To what extent did the delivery plan influence the environmental impacts and deliver multiple benefits?

## 2.3. Qualitative research

Qualitative data were collected through this evaluation in order to more fully understand the perceptions and experiences of a range of stakeholders. This approach was used to gain insight into how the ecosystem approach has been applied in the context of this pilot project and if any behavioural and/or attitudinal changes have resulted from this approach and any learning around the consequences of different management approaches for the local environment. Qualitative data are particularly well suited to evaluations of both the project process as well as stakeholders' perspectives, expectations and experiences (Patton, 2005). This method is also suitable for exploring the links between activities, outcomes and impacts in a project of this scale when quantitative approaches may not be feasible.

Specifically, participants in the Bassenthwaite pilot project were contacted to ask if they would be willing to take part in a semi-structured interview to discuss the project in more detail, including the involvement of the participant and their thoughts on the project process and outcomes. Following the aims and the underlying logic of the pilot project, a series of questions were developed to interrogate the issues being considered through the evaluation. A guiding question matrix is at Appendix 4 and from this, a series of individual interview schedules were developed, tailored for each interviewee as it was recognised that not all of the questions would be relevant for each participant. The semi-structured format also enabled interviewees to direct the discussion as they wished and to elaborate on any points of particular relevance to them.

Throughout the qualitative research phase, every care was taken to ensure the highest standards of ethics were adhered to. Each interviewee was contacted in advance of the interview to explain in detail the objectives of the research and to arrange a suitable appointment for the interview. It was explained at the outset that interviews would be, with permission, recorded on a voice recorder and deleted once the main ideas of the interview had been captured via transcription. Assurances of anonymization of any quotes were given and that relevant sections of the report would be sent for approval to any interviewee where the origin of any quote may be apparent. In total, eleven interviews were carried out, mostly face to face, with three conducted over the telephone. Interviews took place between 2-12th June 2017 and lasted between thirty and sixty minutes each.

Interviews were conducted with a variety of organisational stakeholders who were involved with the project – these included the Environment Agency, the Lake District National Park Authority, the National Trust, United Utilities, Cumbria Wildlife Trust and Cumbria Woodlands. In addition, three advisers from Natural England who were involved in the project were interviewed as well as two farmers who were involved to some extent in the project.

## 2.4. Review of project documentation

Secondary data from project reports, notes of workshops and progress updates were analysed in the development of this report, such as project reports, the terms of reference, progress updates and notes of workshops. Agri-environment scheme data, for the period 2011-2016 were also used through Geographical Information System (GIS) analysis, and comparison with targets and opportunity maps in the pilot delivery plan. Data collected through project documentation are used throughout this evaluation as evidence in relation to the research questions.

## 2.5. Data analysis

**Interview data**

Transcribed interviews were imported into NVivo 10 for analysis. Broad themes were developed from the project aims and objectives as well as the logic model and evaluation plan. Fourteen such themes were created (nodes) which were sufficiently broad in the first instance to enable interrogation of the data. Themes included ecosystem approach principles, partnership working,

participatory approaches, the counterfactual and outputs and learning points from the project. Each interview was coded using these themes which were then used to interrogate the research questions. Analysis of these data showed a good fit with the a-priori themes identified as evaluation questions and the broad set of nodes were collapsed into the four broad areas of enquiry, namely; spatial and temporal scales, partnerships and participatory engagement, economic considerations and outcomes. Detailed discussion of interview findings is at section 3.

**Geographical Information System Analysis of Agri-environment scheme Uptake**
The main way in which the delivery plan influenced the environmental impacts was through the uptake of agri-environment schemes. The Pilot was undertaken at a period of planning for a change from the Environmentally Sensitive Area (ESA) scheme to a new Environmental Stewardship scheme. Over 90% of farms in this catchment were in the ESA scheme with significantly less expected to go into the Higher Level of the new scheme.

In the project officer-led phase of the pilot, Geographical Information System (GIS) analysis of the delivery plan opportunity maps was used to identify forty priority land holdings for achieving the key actions. This list of Priority holdings was then compared to the Higher Level Stewardship planning "pipeline" of farms to be targeted for this scheme. This resulted in twelve additional land holdings, identified as a priority by the pilot, being put into the "pipeline" in 2011 (the pipeline holdings).

For this evaluation, GIS analysis has been undertaken of the uptake since April 2011 of Environmental Stewardship options that deliver five of the seven key actions in the delivery plan: increasing woodland; achieving sustainable grazing; nutrient management on improved grassland; restoring Scheduled Monuments at risk and improving valley biodiversity. Sustainable river management was not analysed as there were no river restoration projects in this catchment during this period. As the Environmental Stewardship scheme does not include options that could deliver the Rights of Way Improvement Plan, this was also not included in the analysis.

## 2.6. Challenges and limitations

The time which had elapsed between the intensive officer-led phase of the work and the evaluation of the project is a challenge in terms of faithfully capturing the detail of the project process and outcomes. Similarly, it was difficult to capture the breadth of opinions of participants which would have been desirable since some had inevitably moved onto other positions/organisations since this time. Retrieving project documentation after a number of years is also challenging and again, more of the detail of the process might have been captured if this had been possible. However, for analysing the environmental impacts of the project, such a long timescale may be more appropriate as such impacts inevitably take longer to be realised.

This analysis shows uptake of Environmental Stewardship options, rather than definitive environmental outcomes on the ground. The aim of these options is to deliver environmental outcomes, however, without ground checking it is not known that these will have been achieved. As an example, whether the Environmental Stewardship options chosen to provide sustainable grazing deliver this on the ground, will depend on the stocking calendars agreed with farmers, whether the agreed levels deliver the desired outcome and whether farmers comply with the agreed levels under the scheme. The analysis is undertaken in relation to the key actions, as these relate to the agri-environment options. Changes in ecosystem service provision were not assessed as the Baseline Assessment of Ecosystem Services used data from a range of sources and dates, including proxy-data, which was not all updated within this timeframe.

A minor challenge to understanding fully the context of the interview data is that comments are unattributed to individuals or organisations. This is due to the small number of participants in this study and because anonymity was assured to those who did take part.

# 3. Findings

## 3.1. Spatial and temporal scales

This section addresses the following research questions:

- ***To what extent did the pilot take into account the timescales needed for processes to implement the ecosystem approach?***
- ***To what extent has the ecosystem approach and decision making been applied at appropriate spatial scales?***

**Key lessons:**

- Identifying appropriate timescales can be challenging as partnerships may take time to develop and agree shared priorities and goals. This may be at odds with certain funding stream timings.
- Using opportunities to tap into existing timescales, such as the introduction of new processes/funding streams can be beneficial in focussing attention on new messages and ways of working.
- There is a need to recognise that land managers work at differing time scales depending often, on their individual, social and economic situations. Similarly working across spatial boundaries may not be an easy transition for some land managers.
- Using existing, recognised spatial boundaries can be beneficial in gaining buy-in from partners.

The timescale for this pilot was originally set to be six months but this was later extended to eighteen months as the time required for the project officer-led phase was more clearly recognised. This greater timescale enabled the participatory process to be extended which meant that more time could be spent on the development and agreement of the shared plan by all partners. An economic valuation was originally envisaged to be part of this process however, this took much longer than expected due to resources being diverted elsewhere. The economic valuation for the Bassenthwaite pilot was therefore completed after the initial participatory phase of the Pilot. This meant that decisions on key actions for the delivery plan were made by partners without reference to the economic valuation.

The delivery phase of the pilot followed on from the participatory phase, and was not led by a project officer. The timing of the pilot delivery phase fitted with a period between 2013-4 when the majority of the existing agri-environment agreements expired and new agreements, under the new Environmental Stewardship scheme were negotiated. From the outset, this was identified by the pilot as an opportunity to potentially negotiate changes in land management with farmers. Although Environmental Stewardship schemes and options have been set up with farmers, further time is needed for this management to result in changes in habitat type and condition. There is also a further time lag expected between changes in habitat condition and type and changes in the provision of ecosystem services.

The pilot boundary was the catchment of Bassenthwaite Lake, an area of 361.3Km$^2$. This boundary had already been accepted by the existing Bassenthwaite Lake Restoration Programme, so had buy-in and agreement from partners for joint working. It had already been established as a manageable size for effective partnership working. The use of a catchment boundary was important for addressing water-focussed ecosystem services. The catchment boundary was less relevant to cultural services or other provisioning services such as food from livestock. It also cuts

across common land units, areas of blanket bogs and other ecosystems at the top of the catchment.
It was recognised through the process that a number of the benefits of ecosystem services were received outside of the catchment. In this area, this is particularly important as visitors to the Lake District National Park come from across the UK and indeed, the world. This was captured in a table in the baseline assessment report (Natural England, 2011a) identifying the location of beneficiaries for individual ecosystem services. Representation of visitors in decision making for the pilot was through the inclusion of tourism representatives on the steering group and the Visitor Giving study (Nurture Lakeland 2011) which worked with 35 tourism businesses in the catchment. Drinking water from the catchment is another ecosystem service which benefits people outside of this boundary, including the populations of Greater Manchester. The water company, United Utility was actively involved in the Pilot but water company customers were not directly involved.

**Evidence from interviews around spatial and temporal scales**
The ecosystem approach principle of taking an appropriate scale is addressed through a landscape-scale approach, which seeks to encompass a wide range of stakeholder groups and issues, and to demonstrate the interconnections between them. For some, this presents quite a shift in thinking about benefits beyond land managers' immediate land interests. From interviews, it is apparent that for many, the project provided a useful way to think about these issues whereas, others appear more sceptical about how much this approach and these messages would have been taken up by farmers in particular:

'*Because we took a whole catchment approach to the work, I like to think they saw how they fitted into the bigger picture but I'm not sure how much they would have seen or appreciated that really'*.

Despite the difficulties of engaging people on a landscape-scale and having to be mindful of so many interests, this was still considered worthwhile by all participants as seeing the bigger picture was considered key to delivering multiple benefits in a location;

*'It's challenging to work at a landscape-scale but that shouldn't put us off, you have to think about the opportunities of doing this also'*.

Similarly, there is evidence from the interviewees that ideas around landscape-scale thinking is '*starting to bed in'* and that conversations are now happening with land owners and managers to support understanding that land management practices upstream do have an impact downstream. There was a general feeling that there had been an overall improvement in understanding amongst partners of the multiple benefits of taking a landscape-scale approach to land management. Landscape-scale is of course subjective as it is not well defined but participants did agree that working at such scales made most sense in the Lake District as the physical terrain lends itself well to working at whole catchments and even beyond '*so spatially, it makes sense to make decisions about ecosystem services on a catchment scale'.*

Temporal scales are also captured in the ecosystem approach principles and they are challenging to consider also, not least because of the inevitable tensions that exist around short-term economic gains and long-term sustainability. This was noted as a difficult concept to think through as '*we are all a victim of our own lifespans'* which recognises that time horizons may be limited. This may be especially true with farmers who have understandable reasons for concentrating on the day to day and working within the immediate seasons. Timeframes of course will differ between different individuals and their own interests; whether farmers are land owners or tenants, for example, may affect their thinking. The potential impacts of Brexit may also loom large in people's minds and it is difficult for some to plan long-term in times of such uncertainty; '*the government has its 25 year plan but I bet they don't come up with payment schemes that last for 25 years'.*

The time required in general to develop a project was discussed by all participants as something important which is rarely considered because of the typically short-term nature of funding streams for projects. It was noted for example, that partnerships need time to mature and to agree collective terms of reference and shared aims and objectives. In addition, when the resource-

intensive phase of project delivery inevitably comes to an end, momentum can often be lost and for the Bassenthwaite project, there appeared to be a sense that people were beginning to understand the concepts and that momentum was lost after the short time of officer-led involvement ceased;

*'It feels like some things are parachuted in and its takes a while to get off the ground. There are early adopters that you know will attend meetings and get involved, but it's the other ones you want to get involved and it take a while for them to get revved up. Other things have gone on the back of this project but it's a shame when the momentum was just getting going'.*

## 3.2. Partnership and participatory engagement

A number of the CBD ecosystem principles refer to the need for decision-making to include a range of perspectives and disciplines and to be taken at appropriate levels. These principles relate largely to ideas of partnership work and the benefits of participatory ways of working. The project research questions which are appropriate to be considered under these principles are addressed in this section and are as follows:

- ***What were the inputs to the Pilot in terms of staff time and funding, for Natural England and other partners?***
- ***To what extent did the pilot include evidence from a range of disciplines?***
- ***To what extent did a participatory approach involve a range of stakeholders' perspectives?***
- ***What aspects of partnership and governance enabled agreement on a shared plan and achievement of project outcomes?***

**Key lessons:**

- Building on solid foundations of existing partnerships is effective in avoiding additional preparation and buy-in time often required at the start of a project. Succession planning for the end of project funding is essential in sustaining the partnership.
- Involving a range of actors enables the sharing and cross fertilisation of ideas. Understanding the social and business circumstances of those you are trying to involve is important when identifying the best methods to engage them. This will enable better understanding of what issues are relevant and important to them.
- The messages being delivered and how they are framed are also important. In some situations, messages from those considered 'experts' may be well received, whereas for others, working through trusted networks may be more effective.
- Despite the advantages identified of partnership working and engaging differing perspectives, the reality of trying to put theory into practice was sometimes considered difficult (e.g. collaborative working and working at landscape-scales).
- Taking time to develop social capital and the bonds which galvanise people and foster effective collaborative working was considered an important step in effective partnership working and participatory engagement processes.

### *Project input*

Natural England staff time input, for the first eighteen months of the Pilot consisted of: 0.5 Full Time Equivalent (FTE) Project Officer; 0.33 FTE National Project Manager and 0.33 FTE National Programme Manager. In addition to this the Natural England Cumbria team provided functional management of the project officer. In terms of direct financial input, Natural England contributed £29k which funded the Visitor Giving pilot (Nurture Lakeland, 2011) which was carried out with thirty five tourism businesses, a study on the use of woodland to reduce flooding (Atkins, 2012, this was managed by Cumbria Woodlands, with staff time input from Forest Research), the production of a report on regional economic benefits (Rebanks Consulting Limited, 2010) and the facilitation of

three workshops. The Environment Agency also co-funded the research around woodland to reduce flooding.

Steering group members, shown in bold in the table in Appendix 2, were also invited to quarterly meetings of an hour's length over the course of the project. These meetings were immediately before the Bassenthwaite Lake Restoration Programme management group meetings, as a number of members were on both groups. Other partner input included attendance at the workshops detailed in the table (Appendix 2) as well as one to one meetings with the project officer.

The input in terms of time and funding is testament to the commitment to partnership working and demonstrates the value of this to each partner involved. There appears to be agreement from stakeholders that the project made some good progress as a result of the resources committed to the project. However, as the intensive project-officer led phase ended, there seems to have been a decline in momentum. This was noted too of the BLRP partnership and is perhaps a pertinent lesson about the need for succession plans in order that strong partnerships remain after the initial resources have been used so that momentum is carried forward;

*'In the end, the group around the table was really very strong, but as people drifted and roles changed, they were asked to focus on other topics, that was when the weaknesses crept in because we had ambition but we didn't then have the resources to deliver on those'.*

***Evidence from a range of disciplines***

The pilot included natural science, social science and economic evidence in the baseline assessment (Natural England, 2011a), the economic benefits report (Rebanks Consulting, 2010), farmers' views on ecosystem services (Mansfield, 2010), Visitor Giving pilot scheme (Nurture Lakeland, 2011) and hydrological modelling study of where to create woodland to reduce downstream flooding (Atkins, 2012). The baseline assessment (Natural England, 2011a) indicates that a large body of evidence from a range of disciplines was drawn upon to establish the existing ecosystem service provision within the pilot area (Appendix 6). Local knowledge and practitioner evidence was collected through the Farmers' workshop and the mapping workshop. At the mapping workshop partners used existing mapped data, from the baseline assessment (Appendix 6) and their local knowledge to identify opportunity areas for the key management actions to enhance multiple ecosystem services. The existing mapped data also related to a range of disciplines including, for example: soils at risk of erosion from a geomorphological and empirical data study by Lancaster University (Orr and others, 2004); sites of inspiration for art, from World Heritage Site data; locations of tourism business in the catchment. Evidence collected by other projects and initiatives also informed the delivery plan, such as the Rights of Way Improvement Plan used to produce the map for improved access; the River Derwent and Tributaries Site of Special Scientific Interest River Restoration Strategy informing the sustainable river management action and the Catchment Sensitive Farming Officer identifying opportunities for improving nutrient management on improved grasslands.

It is important to note that despite the inclusion of a range of disciplines in this project, that significant gaps in evidence still exist. This was noted also by Waters and others, (2012) in documenting the lessons learned from implementing the first phase of Natural England's three Upland Ecosystem Services Pilots. Waters and others (2012) note:

"*In many cases the baseline assessments have relied on indirect measures or proxies for ecosystem services, for example the extent of peat soil has been used as a proxy for soil carbon storage. If we are to undertake accurate ecosystem services assessments in future it is likely that new data will need to be collected or existing data will need to be interpreted with new analytical approaches. However the use of a combination of locally and nationally available direct and proxy data, enabled us to produce baseline assessments without the resource intensive generation of new data".*

With these limitations in the baseline assessment of ecosystem services produced by the pilot, this evaluation has focussed on the uptake of agri-environment scheme options, rather than attempting to assess change in ecosystem service provision.

**Involving a range of stakeholder perspectives**
Table A (appendix 2) shows the stakeholders' involvement in the workshops. As well as existing BLRP partners, the steering group included the National Farmers' Union, Cumbria Tourism and Nurture Lakeland as new partners to the group, representing the farming and tourism sectors. Farmers' views were also captured through the farmers' workshop. There were 156 farmers in the catchment, of whom 108 were invited to the workshops, and nineteen attended. The regional economic development workshop was specifically run to encourage new partners with different perspectives to participate in the project. Attendees included farming, tourism, economic development and health sectors. For many of the attendees at this workshop, this was their only involvement with the project and so some stakeholders may have had limited on-going contact with or understanding of the project as it developed.

The Visitor Giving Pilot (Nurture Lakeland, 2011), funded by the ecosystem services pilot project, involved 35 tourism businesses in the catchment and captured their views on how Visitor Giving could be developed to pay for ecosystem services. In addition, approximately forty local residents who had an interest in the project and/or the work of the Bassenthwaite Lake Restoration Project, attended the public conference (12.3.11).

**Enabling agreement on a shared plan and achievement of project outcomes**
The steering group of the pilot sat as a task group within the existing Bassenthwaite Lake Restoration Programme (BLRP) catchment partnership, working to agreed Terms of Reference that were drawn up for the Pilot. The BLRP was set up in 2002 and individuals from the organisations in the partnership had been working actively together for a number of years. The steering group also included new partners, representing the key local economic sectors of farming and tourism. The development and agreement of the shared plan was through the series of workshops (see section 1.3), especially the mapping workshop, and one to one meetings with the project officer. The project officer was proposed by Natural England to be a catalyst for the pilot, rather than leading it. An independent facilitator was used for three of the workshops. It was through these successful partnership arrangements that agreement was gained on a shared, integrated delivery plan.

**Evidence from stakeholder interviews around partnerships and participatory engagement**
Through interviews, the fact that the project sat beneath the existing Bassenthwaite Lake Restoration Programme (BLRP), with its established partnership was noted. This was considered a particular strength of the project since it built on these solid foundations and less time and effort was required to establish acceptable governance arrangements at the outset. Furthermore, it was also continuing an established ethos of working with a range of stakeholders and partners, an aim the pilot continued to strive towards. For many partners involved in the project, partnership working was a familiar and even a necessary part of how they achieve their own outcomes in any case, which perhaps also contributed to the identified successes of this project; as one respondent commented; '*there was fertile ground amongst partners to take this forward'.* Another comment echoes this sentiment; '*this (the pilot) landed in the place at a good time for us to pick it up and run with it as a new way of thinking about how we manage the place'.* The approach taken was generally agreed to be an inclusive one as the BLRP was also very aware of the *'need to be inclusive and to bring people with us'*. The BLRP was also considered to be ahead of its time in some ways as it was involved in some advanced (for the time) thinking around catchment management approaches so '*it was logical that this project was nested in there to enable that crossover of information'.*

Participants generally agreed that involving a range of partners in this pilot was key to being able to develop and agree a shared plan. It was felt generally, that real impetus for moving forward was achieved by taking the time to understand different perspectives and approaches and to learn something from them. Interestingly, one participant noted that the value of this approach was about involving those outside of the 'usual suspects' but also involving these usual suspects and engaging with them on a range of issues which may be outside of their usual interests.

A message echoed through many interviews was of the increased interest in the ecosystem approach at the time of the pilot project and also since that time. This can also be seen reflected in recent management plans (for example, National Trust). Apart from raising awareness of the theory around the ecosystem approach, this pilot also highlighted the real linkages between land management practices and environmental outcomes in practice; something which interviewees also commented has become more apparent in recent years through flood events. One participant for example, noted that for the first time, communities are beginning to question the wisdom of simply '*patting the environment back into place'* following a major flood event and now people are beginning to ask about land use and impacts at a landscape scale. The principles of the ecosystem approach, including inclusive ways of working and understanding views from a range of perspectives, appears now to be much more at the forefront of partners' agendas.

As a way of working, the ecosystem approach advocates inclusive and holistic thinking about environmental management from a variety of perspectives. In general, the project was deemed by participants to be a good example of this;

*'The ecosystem approach helps because it feels like a holistic approach to a place which is the sort of business we are in as National Park Authority'*.

With a directive from the CBD ecosystem approach principles to take an inclusive approach, this project sought to include farmers in discussions as well as a wide range of partner organisations. The farmer workshops were reasonably well attended, with nineteen farmers attending and it was noted through interviews, that their participation was useful to gain insights into how they felt the ecosystem approach could be applied in practice. In addition, because engaging farmers is often difficult due to time pressures, as one interviewee noted; '*at certain times of the year, it is impossible to get them to come to anything'*, the participation of nineteen farmers was viewed as a good turnout. This highlights the importance of understanding the groups to be engaged in any project and their social and business circumstances before identifying the best ways to get messages across and methods to engage them in any process. The language used was also highlighted as an important consideration for engaging with different groups as this can be off-putting if the messages become obscured by scientific language; *'messages shouldn't be too scientific and they should strike a chord with people'*. It was noted however, that messages from different sources, especially those considered to be 'expert' were often well received and could pave the way for more in-depth follow-on conversations. Working with and through existing partners and networks was also considered a valuable way to open and sustain dialogue effectively. This, it was noted, may also help to guard against 'initiative fatigue' whereby communities are engaged in a series of often short-term initiatives;

*'People only have so many days or so much willingness to get involved and people get bored with initiatives and similar discussions'.*

From a farmer perspective, it was felt that whilst such partner meetings do have value in providing a space to discuss issues, there is some frustration that financial resources are inevitably lacking and so there may be limited value for actually getting anything done. There is also a very real conflict in terms of prioritising partner meetings over managing the land and getting the day to day work accomplished. Interestingly, there are also tensions between promoting working at a landscape-scale and the realities of this since there are many cases where farmers work in isolation and have limited opportunity or reason to work or collaborate with other farmers. Working across boundaries was also considered problematic by some farmers as not all were working to

the same standards as some were not in agri-environment schemes and there seemed therefore, to be a sense of inequality between farmers;

*'Some farmers overgraze and keep more stock than they should and no-one can say anything. It is really difficult to think about working together while there are so many different opinions and ways of working'*.

Despite the appreciation for participatory ways of working and the importance of including a wide range of people in conversations, some tensions were apparent around the reality of implementing the ecosystem approach versus the theory. In practice, it was noted that conflicting priorities meant that land could not always be managed for aspirational multiple benefits. Similarly, the deep-rooted cultural identity of many land owners and managers which adheres them to particular ways of working, such as working in isolation for example, were noted as a potential barrier to implementing the ecosystem approach effectively. This was reflected in some farmers managing land in particular ways (usually as a result of signing up to an agri-environment scheme) whilst others choose to manage in different ways. The following quote illustrates the view of one interviewee to address this;

*'It needs brave individuals to take a different path and to demonstrate to the majority that there can be other ways of doing things'.*

In the face of such difficulties, the key to effective partnership working was noted by some participants as engaging people around issues of relevance and interest to them. Farmers for example, may have been even more willing to participate in this pilot if discussions were framed around issues of real concern to them, in addition to agri-environment schemes, which were used to frame the farmers' workshops. This, in turn calls for more engagement and understanding of what those issues might be; *'we need to know more what is relevant to farmers'*. The benefits of participatory engagement were noted that people do have the opportunity to come together to discuss issues of common interest and to develop a shared understanding of these and other emerging issues. This was discussed largely in terms of developing a common understanding of what is meant by an ecosystem approach since at the time, people were much less familiar with the term;

'*At the heart of it, people understand the concept of what they get from the environment, whether that is the grass they grow for the sheep or the views that tourists come to see, particularly in a place like the Lake District, I think there is a high level of awareness for most people about what the environment does for us so talking about it together at that really simple level, it is a really simple concept'.*

An important aspect of participatory ways of working which was highlighted by some interviewees is the role of social capital in enabling the bonding process which enables partners to come together and to work effectively together. Three interviewees for example, thought more could have been done to foster this amongst participants during the pilot project. One for example, noted that '*you can't shift people's aspirations and understandings purely by having economic levers without doing some of the human stuff as well'*. Some tensions were also apparent around having conversations at the theoretical level during the partner meetings and workshops, and the practical implementation of this thinking and a feeling that *'it is OK for you to put lines of maps but we are trying to run businesses'*. There was a strong feeling through interviews that people do intuitively understand the key messages of working within an ecosystem approach framework but priorities may be more aligned with upholding traditional ways of working, unless incentivised economically to do otherwise. Encouraging land managers to think differently about the rewards of working in different ways is complex and for people to begin to think about taking pride in providing for multiple benefits will require a significant shift in mind-set which participatory ways of working only begins to address.

The challenges of working at landscape scale and of involving many partners and interest groups were also highlighted as groups will inevitably have differing and sometimes conflicting views which can be a hindrance to moving forward with new ways of working. However, it was generally felt through these interviews, that the challenge was worth the effort and that the opportunities provided by working at a landscape scale and involving diverse groups in the conversations was worthwhile. Moreover, it was noted that by involving a wide range of stakeholders in conversations, that people feel a sense of ownership and better outcomes can be achieved.

## 3.3. Economic considerations

The CBD ecosystem approach principle directs us to understand and manage the ecosystem in an economic context. In light of this, this section addresses the following research questions:

- ***To what extent did the pilot consider the need to understand and manage the ecosystem in an economic context?***
- ***To what extent did economic valuation inform decision-making?***

**Key messages:**

- Individual economic motivations behind land management practices are complex and difficult to understand. Some may, for example manage in certain ways because of the inherent benefits of doing so whilst for others, it is the economic incentives which drive them to do so.
- Understanding and making more explicit the links between economics and environmental management could help to better understand the benefits of the ecosystem approach.
- There was a recognition amongst project partners of the need to demonstrate what investments in natural capital might mean in terms of ecosystem service provision, and that using monetary measures can be a good way to demonstrate this. However, agreement was made in this pilot on the shared plan without the need for economic valuation, as this was only completed after the deliberative phase had ended.
- While process-based models such as LUCI estimate changes in multiple ecosystem services, their ability to do this is influenced by the available evidence to parametise the model. There was found to be a lack of coefficients relating to changes in habitat condition. The model outputs were also largely not compatible with existing valuation evidence, limiting reliable economic valuation of changes in ecosystem services.

One of the pilot aims was to demonstrate that investment in the natural environment can result in multiple benefits. The first workshop identified a range of ecosystem services providing both market (such as food) and non-market goods (such as water quality). An economic valuation of the change in ecosystem services, under different land use and management scenarios, was completed in 2015, after the initial participatory phase of the project.

One of the key economic considerations in the Lake District National Park is tourism. This industry is a key driver of the local economy with around 3 million visitor days in 2010 (Rebanks Consulting Limited, 2010). Of these, 2 million were day visitors with 1 million staying over-night in the 1071 tourism accommodation businesses. Tourism provided around 4000 full time equivalent jobs and generated around £306 million per year (2008 figures) (Rebanks Consulting Limited, 2010). 91% of visitors to the Lake District National Park say scenery and landscape is their primary motivation for visiting (Rebanks Consulting Limited 2010). Tourism businesses were represented on the project Steering Group via the inclusion of partners, Cumbria Tourism and Nurture Lakeland (these were not originally part of BLRP).

Another key economic driver in the area is farming. In 2011 there were 157 farms within the area, largely hill sheep farming with a limited amount of beef and less dairy, employing 8% of the population (Rebanks Consulting Limited 2010). Agri-environment schemes supported around 146 farms (93% of farms in the catchment) with nearly £1.5M of financial support for sustainable land

management (Natural England data, 2010). The pilot area was classified in agricultural terms as Highly Disadvantaged Less favoured Area apart from the low lying land around Keswick and to the east of Bassenthwaite Lake, classified as Disadvantaged. The inherent low productivity of farmland in the area meant that agri environment payments were a major component of the profitability of many farm businesses.

As land managers and suppliers of ecosystem services, farmers were an essential part of the Pilot. The NFU were a new partner on the steering group and two workshops were run for farmers to seek their input to the Pilot. Delivery of the key actions in the delivery plan was largely through agri-environment schemes with farmers (see outcomes section 3.4). Ultimately, decisions about land management were made by farmers, as part of the negotiation of their new Environmental Stewardship scheme.

During the course of the pilot, an economic benefits report (Rebanks Consulting Limited, 2010) was commissioned to assess the existing economic context and its relationship to the provision of ecosystem services. The regional economic workshop was run to encourage the participation of the economic development, farming, tourism and health sectors.

Bassenthwaite was, in part, chosen as one of the three Upland Ecosystem Services Pilot Projects due to the presence of the private water company United Utilities' Sustainable Catchment Management Programme, in the Thirlmere sub-catchment. This programme, which already existed when the ecosystem services pilot started, focussed on investment by United Utilities of £4M in catchment management, to reduce raw water treatment costs. This was achieved through renegotiation of tenancies and a private-public joint funding initiative where the water company paid for additional capital works, on top of High Level Stewardship schemes, for example, for tree planting costs not met by the scheme.

The ecosystem services pilot project worked with and funded Nurture Lakeland to undertake a Visitor Giving pilot in the Bassenthwaite Catchment. This Visitor Giving pilot, involving thirty five tourism businesses in the catchment, explored innovative funding, looking at how the scheme could be used to pay for ecosystem services (Nurture Lakeland, 2011). Nurture Lakeland (formerly The Lake District Tourism and Conservation partnership) runs the largest Visitor Giving scheme in England generating around a quarter of a million pounds for conservation schemes in Cumbria annually (about 80% for schemes in the Lake District).

**Evidence from interviews around the economic context of the pilot**
Economic issues were discussed during interviews, largely in relation to agri-environment schemes and how, when incentivised, land managers may behave in certain ways. The difficulties were in understanding why people manage the land in the ways that they do and whether this was in recognition of the benefits of doing so, or because they were incentivised to do so;

*'A lot of those discussions come down to money and some will have made changes because they think it is a good idea and some do it for the money and that is where some of the problem is'.*

In view of this tension, some interviewees discussed how a gap existed in terms of fully embedding the ideas and principles of the ecosystem approach and land management practices on the ground, despite evidence from participants that this project did move thinking along in this direction.

The point was raised during interviews that perhaps making more explicit the connections between economics and environment management could help to shift thinking even further. A specific example was given to demonstrate this point, making the connection between the tourism industry and water quality. This interviewee referred to a tourism business owner who highlighted the importance of water quality for attracting tourists, and the dependence of this on landscape quality and management around Lake Windermere (outside of Bassenthwaite catchment). This is

interesting as '*his understanding of diffuse pollution from agriculture might not have been that great, but he recognised the link between his business and the natural environment'.* Another participant noted that '*we need more practical examples of people understanding the links between the economic and environmental contexts which drives people's behaviours to really embed the messages of the benefits of the ecosystem approach'*. This may in part, be an issue of communication as messages need to be relevant to different partner interests.

The links between economics and environmental management may in any case become much more important in future; as one participant noted, discussions are already emerging around demonstrating return on investment in natural capital. This suggests a growing need to be able to demonstrate what investments in natural capital might mean in terms of changes in ecosystem services. Natural capital accounting was considered to be an area ripe for future work.

**Extent to which economic valuation informs decision-making**

An economic valuation of the change in ecosystem services, under different scenarios, was completed in 2015, after the initial participatory phase of the project. This was largely due to the amount of time required to complete an economic valuation of this type and the lack of available staff resource to do it. An economic valuation was completed for the South Pennines Ecosystem Services Pilot Project (Harlow and others, 2012), where there was significant input from both Natural England economists and the water companies. Originally it was envisaged that the valuation would be an essential step in the decision making for the pilot. However partner agreement on a shared plan was reached without economic valuation, as the valuation was done after the project, and because participants felt they could agree on a plan without it
The valuation study in 2015 explored the potential for ecosystem service modelling and valuation to inform an ex-ante assessment of different land use and management scenarios. The project was in two parts: firstly modelling potential changes in ecosystem services under different management scenarios and secondly brief valuation of these changes and a comparison with potential costs.

Three scenarios were developed:

1. A static counterfactual (baseline), representing the catchment in 2011
2. A scenario based on achieving Favourable Condition on 50% of the SSSI area in the catchment
3. A scenario based on a potential implementation of the delivery plan for the Bassenthwaite Ecosystem Services Pilot Project.

The modelled changes in the 50% Favourable Condition scenario mainly involved restoration of moorland and acid grassland. The delivery plan scenario involved modelling changes in ecosystem service provision from the combination of woodland planting on areas of bracken and around upland streams, managing improved grassland to reduce nutrient export, and reducing stocking densities to achieve sustainable grazing levels.

The scenarios were spatially mapped and modelled using the Land Use Capability Indicator (LUCI) toolkit. LUCI is a sophisticated model which examines the effect of spatial placement of management on changes in multiple ecosystem services. It is process-based where established knowledge and computational constraints permit.

The service changes quantified in this study were water quality (total phosphorus), sediment export, carbon storage and flood regulation. Other methods were also used to supplement and compare with the LUCI modelling, for example, habitat weighted methods for sediment export and water quality. It was not possible to quantify changes in other services such as access and recreation or the historic environment. These services are not included in the LUCI model predictions and other methods linking these services to future land management scenarios were not identified.

The project found that, for the case of the phosphorus modelling, LUCI and the habitat weighted approaches provided substantially different quantified estimates of changes in ecosystem service provision. Also, neither these estimates, nor many of the quantifications produced for other ecosystem services, were generally able to be connected to available valuation evidence. Major uncertainties in all service estimates were also introduced due to the current inability to consider changes in condition of habitat and through deficiencies in the input data. A number of the key actions in the delivery plan relate to improving the condition of existing habitats. Changes in habitat type were therefore used as a proxy for changes in habitat condition in the modelling.

Key findings were:

- A lack of validated coefficients, including a measure of their uncertainty, to parameterise the model for prediction.
- Incompatibility between the model and available coefficients.
- Only a limited number of management interventions were included in the version of LUCI available at that time and it was not possible to model changes in habitat condition in addition to habitat type

Given the uncertainty associated with the input layers and the parameters used in the model, the results for both the quantified changes in ecosystem services and the subsequent valuation estimates were considered to be unreliable. Although the modelling results were too unreliable to robustly inform the valuation of changes in ecosystem services, a brief valuation exercise was completed to explore the compatibility between the modelling results and the data required for valuation.

The valuation exercise identified that for some modelled changes in services the outputs were not in a form that was compatible with the valuation evidence.

As the economic valuation was done after the participatory, project officer led phase of the pilot, it was not a part of the deliberative decision making.

**Evidence from interviews around the need for economic valuation in the pilot**

One participant felt that the economic valuation was largely neglected (in the Pilot Officer led phase of the pilot) and that whilst people at the time may have felt that they understood the value of taking an ecosystem approach and that certain land management options might bring about positive changes, this was not expressed in economic terms. It was suggested that thinking has moved on and that today, much more concrete economic evidence would be required to support decision-making and to prove return on investment; '*it isn't enough now to say that is has value, we need to go further'*. As noted by one interviewee; '*being able to put pounds and pence on benefits is a good way to demonstrate these benefits to the wider public'*.

Payments for ecosystem services was considered to be part of a solution for bringing these ideas together with practical ways to implement them in a sustainable way. The problem however, as one participant noted, is that '*there is no, or few, established frameworks for actually delivering this kind of service'*. Similarly, the difficulties in establishing such payments schemes was noted since it is difficult to get people interested enough to invest in concepts such as blanket bog restoration. The Visitor Giving Pilot (Nurture Lakeland, 2011) found that to generate funding related to ecosystem services, there was a need to: repackage complex information into bite-size chunks, build on existing interest and focus on tangible outputs or projects.

## 3.4. Outcomes & Impacts

This section will consider the following research questions:

- **To what extent has the participatory process resulted in attitudinal and behavioural change?**
- ***To what extent did the participatory process influence the development of the integrated delivery plan?***
- ***To what extent did the delivery Plan influence the environmental impacts and deliver multiple benefits?***

**Key messages:**

- It is difficult to assess with any certainty any causal links between the Pilot and changes in attitudes and behaviours since partners were already beginning to consider the ecosystem approach at the time. However, interviews suggest that the Pilot did provide fresh vision and purpose to existing partnerships and a shared language and understanding of the approach.
- Attitude and behaviour changes are explored here in relation to interview data which focused on the Pilot as a pioneer in work around the ecosystem approach, a catalyst for further related work and the role it played in galvanising partners and partnerships.
- The main way in which the delivery plan influenced environmental impacts was through the uptake of agri-environment schemes. This included: 215 ha of woodland creation; 16193 ha of sustainable grazing on the uplands; restoration of 515 ha woodland, 152 ha of species rich grassland, 65 ha of fen and 6 ha of raised bog, as well as 899 ha of nutrient management on improved grassland.
- A GIS analysis of the opportunity maps identified 40 priority land holdings for achieving key actions. When compared to HLS priority farms, this led to an additional 12 land holdings being identified as a priority for Higher Level Stewardship. A much greater proportion of the key actions (apart from sustainable grazing) occurred in the opportunity areas and priority holdings than the proportion of the catchment they covered.

Baseline data relating to attitudes and behaviours were not collected at the start of the project so it is difficult to assess the extent of any changes. However, stakeholder interviews do provide some insights into attitudes and behaviours which do appear to have shifted, both through the course of this project and beyond. Thinking for example, appears to have developed around the potential benefits of an ecosystem approach to land management and developing ever more sophisticated techniques to understand and demonstrate the value of ecosystem services.

**Evidence from interviews around attitude and behaviour changes**

Many participants spoke about an evolution in thinking both individually and through the organisations they represent towards a better understanding and use of an ecosystem approach. It was difficult however, to attribute this evolution in thinking directly to this project in isolation. Participants acknowledged a general move in this direction of thinking at the time of the pilot, but for many, understanding and use of the ecosystem approach was only just emerging and this pilot project did appear to help propel attitudes and behaviours towards ways of working which were much more aligned with the principles of the ecosystem approach. Attitudes and behaviour change can be considered with regards to some key themes which emerged through the interview analysis; these are 1) *pioneering work 2) catalyst for further, related work and 3) galvanising partners and partnerships.*

*Pioneering Work*

Interview data reveal that the pilot did have an enduring and meaningful legacy in terms of moving forward thinking around managing landscapes in more holistic ways and achieving multiple benefits in a more integrated way;

*'It started us on this road. It feels like we are in a fairly good position in terms of how far advanced we are as a partnership and how far we are engaging with farming and other communities'.*

In some ways, the project was seen as pioneering and one of the first steps in developing understanding around the ecosystem approach and how it can help in managing landscapes for multiple benefits. It was however, acknowledged through interviews, that a lot of other related and similar work was either developing or being considered at that time and so it is difficult to untangle what was part of this and other projects. However, as one interviewee commented;

'*The pilot project was the first flag in the ground really for the ecosystem approach which is something we have been able to point to as something we have done before in the area which has familiarised communities and partners to the language, ways of thinking and the concept'*.

As a project which sought to demonstrate an ecosystem approach on the ground, interviewees largely agreed that it directed and progressed thinking and enabled partner organisations to develop a consistent understanding between themselves. Since this time, thinking has advanced and such ways of working have become much more integrated into partner management plans and thus an ecosystem approach is seen as '*much more relevant now and more people are picking this up and trying to learn what we can from this work'*.

As an early example of putting into practice some cutting-edge thinking around operationalising the ecosystem approach, there is agreement that this project has considerable merit. However, there is also awareness that thinking has progressed and that this work needs to be continued and developed to keep pace with where we are today and to ensure this work remains relevant and useful for moving forward which for some, means incorporating economic value much more explicitly;

'*Although we are looking at it again now, in terms of an ecosystem approach, it stops short of the point of getting to that point where they start to measure the flow of ecosystem services and the monetary values associated with those. So if you were to hold this up today as an ecosystem services project, people would be expecting a lot more and that's only in 6 years. So at the time it was probably quite innovative and ground breaking but now, we are talking more and more about this and current thinking has moved onto the natural capital approach which requires more work than this'.*

*Catalyst for further related work*

In some ways, this project was considered too advanced for where thinking was at the time since the language and concepts of the ecosystem approach were just emerging. However, some participants articulated that the project did emerge at a time which was ripe for moving forward with new ways of working. One participant commented for example, that '*it was ahead of the game at that time and no-one really knew what to do with it'.* Since this time however, other related projects have developed and benefitted from the approaches taken and lessons learned from this pilot. Flood partnerships have now developed for example in Cumbria, with the idea to get people working better together and in different ways to resolve a common threat. In this, work is underway to understand natural capital and the services that it delivers and involving communities in that process also. For partners such as the National Trust who are themselves leading on a project to map ecosystem services delivery in the Lake District National Park, this project was '*instrumental in setting us on the road to understanding how an ecosystem approach can aid delivery and how we can engage with communities on all of this'*. There is also a Rivers Group which is still very active and although it has a much narrower focus of improving the management of river banks, ultimately, this builds on the understandings and approach of ecosystem services.

In addition, Cumbria is also included as a Defra Pioneer Project (one of four areas identified to demonstrate good practice and innovative solutions in the context of the Defra 25 year environment plan) which builds on some of this thinking and shows how some of the natural capital and ecosystem services thinking fits together. A subsequent piece of work around the development of an integrated social, economic and environmental delivery plan for farmers

(Cumbria Connections) also built on the foundations of this pilot project and has taken some of the learning from this to develop ideas and move forward with this thinking;

*'This pilot was a key factor in influencing this work. There was uncertainty around this but when you refer people back to this work and the conversations we have already have, you remind people what can be done. This has been a launch pad for lots of other activities in the area which have taken things on to the next stage'.*

Largely, there was agreement that this project has been the catalyst for a variety of subsequent work which has built on both the learning and the methods used in this pilot; '*it was all a foundation stone for where we are now'*. For some, this was about simply developing the confidence to move into different ways of working and thinking about land management in more holistic ways. For others, it also provided the tangible means to understand more specifically where work could be best focussed and also it *'provided a platform for us to engage with the harder to reach groups, the farmers and the land owners, to help them understand what contribution they could be making, or should be making to help, and also by putting it in services terms, it translated benefits in different ways'.*

Getting to grips with the language and principles of the ecosystem approach has been helpful in a variety of ways, not only for moving this project forward and in demonstrating the concept on the ground, but also in terms of progressing thinking around ideas of holistic landscape management and the benefits of considering natural capital in assessments of assets. One participant for example, explained how, since the time of this project, the terms of ecosystem approach, services and natural capital have become commonplace in his workplace and in thinking more widely so that in current funding applications for example, they are much more able to identify the holistic benefits provided by natural capital and the interlinkages and benefits of different land management options.

*Galvanising Partners and Partnerships*
Despite some partnerships being in existence at the time of the pilot, a strength of this project was the process of getting partners to sit down together and have the time to share aspirations and directions of travel with each other. The value of the project was also seen to be in strengthening the existing BLRP partnership because it gave a new, national and high profile edge to it;

'*We already had a project which brought in lots of partners but this really strengthened that because it was a national pilot, it was seen to be at the forefront of something and that helps bind a group because it gives them purpose and vision beyond that we already had'*.

The project appears to have had an impact in terms of developing partnerships and demonstrating the value of them. In particular, it was noted, that bringing together an array of partners was useful in terms of the learning opportunities that afforded. The project also provided the opportunity to engage with people in a more targeted way. For example, being able to approach farmers and discuss how land management impacts others downstream and that other farmers and land managers are also being involved in the conversations at the same time was quite powerful in terms of being able to ensure that conversations were targeted and relevant; '*rather than just going to farmers and saying this is what we are going to do'.*

One opportunity for improvement was identified by a participant who suggested that whilst various stakeholders and partners were mobilised around this project, it might have been useful to involve more non-traditional sectors to gain wider perspectives and also to feedback those perspectives to the environmental sector, so more of a shared understanding could be developed. As one interviewee insightfully noted; '*the more I go out to different pieces of land, the more I realise that people can look at the same piece of land and see something completely different'*. The difficulties of doing this were however, recognised as the connections between land management and other sectors may not always be completely apparent and conversations would need to be suitably tailored to different sectors to promote a common understanding.

**Extent to which the participatory process influenced the development of the integrated delivery plan**

The development and agreement of the integrated delivery plan was through a series of workshops. The initial workshop was important for identifying the key ecosystem services on which to focus, and three top actions for each key ecosystem service. A number of these actions were progressed further by the project and ultimately contributed to five of the seven key actions in the delivery plan. However it was the mapping workshop that particularly developed the delivery plan. Here participants identified key actions to enhance individual ecosystem services, which were developed into a matrix of actions against services. Workshop attendees also used a combination of their local "on the ground" knowledge, as well as large scale versions of the maps in the baseline assessment (Natural England, 2011a), to map opportunity areas, especially to enhance woodland creation and sustainable grazing. Following a series of one to one meetings, and a further workshop with task group partners, the matrix and opportunity maps were refined to form the delivery plan.

The partners involved in contributing to the development of the delivery plan were predominantly from organisations represented on the task group steering the project, and could be considered to be Natural England's "usual" partners. For the mapping workshop it was important to invite partners who had good local knowledge of the habitats and land management in the catchment. Sectors such as economic development and health, who were involved in the regional economic workshop. Local residents who attended the public conference, did not directly contribute to the delivery plan.

Farmers contributed to the delivery plan through providing comments on how the key management actions could fit with their farm businesses. This was included both within the main part of the plan and as a more detailed annex. The farmers did not however have the opportunity to identify the seven key actions. With the limited amount of time that farmers have available to input to this type of project, a balance was struck between involving them at an early "blank piece of paper stage" and seeking their comments on some proposed actions. Also, farmers were not keen to map opportunity areas for key actions, either on their own or other people's land holdings: this was attempted, unsuccessfully, at another initiative in the catchment.

**Extent to which the delivery plan influenced environmental impacts and delivered multiple benefits**

The main way in which the delivery plan influenced the environmental impacts was through the uptake of agri-environment schemes. The pilot was undertaken at a period of planning for a change from the Environmentally Sensitive Area (ESA) scheme to a new Environmental Stewardship scheme. Over 90% of farms were in the ESA scheme with significantly less expected to go into the Higher Level of the new scheme.

In the project officer-led phase of the pilot, Geographical Information System (GIS) analysis of the delivery plan opportunity maps was used to identify forty priority land holdings for achieving the key actions. This list of priority land holdings was then compared to the Higher Level Stewardship planning "pipeline" of farms which were a priority for this scheme. This resulted in twelve additional land holdings, identified as a priority by the pilot, being put into the "pipeline" in 2011.

For this evaluation, GIS analysis has been undertaken of the uptake since April 2011 of Environmental Stewardship options. The GIS analysis, considers three aspects of the agri-environment delivery in relation to the pilot and delivery plan:

i) The delivery plan targets - for each of the seven key actions;
ii) The opportunity mapping areas - identified in the delivery plan;
iii) The forty priority holdings and the twelve pipeline holdings

i) The Delivery Plan targets

Almost 4/5 (79%, 27760 ha) of the catchment has been entered into the Environmental Stewardship Scheme (ESS) since 2011. Linked to the seven key actions in the delivery plan, this has included the following: 215 ha of woodland creation; 16193 ha of sustainable grazing on the uplands; 899 ha of nutrient management on improved grassland; plus restoration of the following habitats: 515 ha woodland, 152 ha of species rich grassland, 65 ha of fen and 6 ha of raised bog.

Table 2 shows that the delivery plan area targets for sustainable grazing and nutrient management on improved grassland have been exceeded, just through agri-environment scheme options. The pilot target for woodland creation was 1140 ha, with 206 ha of woodland creation options delivered under ESS. This does not include other schemes such as the England Woodland Grant Scheme which could significantly increase the figures for both woodland creation and management.

For habitat restoration, hectare targets were only defined for woodland and raised bog in the delivery plan. The target for woodland management was 600 ha, with 515 ha of woodland restoration delivered by ESS. Although not a specific target in the delivery plan, grazing has been excluded from 484 ha, specifically to allow woodland creation or restoration (this is a supplement accompanying these ESS options, so not an additional area). 6 ha of raised bog was restored under ESS, towards a target of 16 ha. Other habitat restoration across the catchment under ESS has included 152 ha of species rich grassland and 65 ha of fen. Although not included in the table, two of the nine Scheduled Monuments at risk are covered by ESS options for archaeological restoration; five of the remaining seven are mines, which are not likely to be restorable through ESS.

**Table 2** Agri-environment schemes options (2011-2016), which manage land for the key actions in the Delivery Plan.

| Delivery Plan Action | Delivery Plan Target Area (ha) | Whole catchment | Priority holdings (25% of catchment) | Pipeline holdings (7% of catchment) | Delivery Plan Action |
|---|---|---|---|---|---|
| Woodland Creation | Area of ESS | 1140 | 206 ha | 204 ha | 29 ha |
| | ESS occurring on Opportunity Areas | | 122 ha | 122 ha | 15 ha |
| Sustainable Grazing | Area of ESS (ha) | 4590 | 16193 ha | 3062 ha | 1159 ha |
| | ESS occurring on Opportunity Areas (ha) | | 5721 ha | 1644 ha | 890 ha |
| Nutrient Management on Improved Grassland | Area of ESS (ha) | 800 | 899 ha | 405 ha | 121 ha |
| | ESS occurring on Opportunity Areas (ha) | | 240 ha | 194 ha | 73 ha |
| Improve Biodiversity of Valley Habitats | Woodland restoration under ESS (ha) | 600 | 515 ha | 371 ha | 49 ha |
| | Woodland restoration on Opportunity Areas (ha) | | 284 ha | 241 ha | 38 ha |
| | Raised bog restoration under ESS (ha) | 16 | 6 ha | 6 ha | 0 |
| | Raised bog restoration on Opportunity Areas (ha) | | 0 | 0 | 0 |
| | Species rich grassland restoration under ESS (ha) | | 152 ha | 25 ha | 8 ha |

| | | | | | |
|---|---|---|---|---|---|
| | Species rich grassland restoration on Opportunity Areas (ha) | | 16 ha | 3 ha | 3 ha |
| | Fen restoration under ESS (ha) | | 65 ha | 41 ha | 8 ha |
| | Fen restoration on Opportunity Areas (ha) | | 41 ha | 29 ha | 6 ha |

i) The Opportunity Mapping areas

Further GIS analysis was undertaken to determine whether the ESS management options occurred in the mapped opportunity areas identified in the delivery plan (Table 3). The opportunity areas are not the same as the targets identified for each action. The opportunity areas were identified at the participatory mapping workshop as areas of opportunity for delivering the key actions. They are much larger than the target areas. The ambition of the pilot was not to achieve the key actions on all the opportunity areas; in some places, more than one opportunity may have been identified on the same piece of land. The management that ultimately occurred on the opportunity areas was dependent on the decision of individual land managers, potentially including their negotiations with Natural England advisers over their ESS agreement.

**Table 3** Proportion of the Delivery Plan key actions located in the Opportunity Areas.

| Delivery Plan Key Action | Opportunity Area (ha) | % of catchment covered by Opportunity Area | % of Key Action under ESS occurring in the Opportunity Area |
|---|---|---|---|
| Woodland creation | 2767 | 8% | 59% |
| Sustainable grazing | 12879 | 37% | 35% |
| Nutrient management on improved grassland | 2659 | 8% | 27% |
| Improve biodiversity of valley habitats, restoration of: | 2767 | 8% | 47% |

The key actions have been delivered through ESS both within and outside of the opportunity areas. However, for all the key actions analysed (apart from the sustainable grazing), the opportunity areas support a much larger proportion (three to seven times more) of the key action, than the proportion of the catchment that they cover.

ii) The Priority and Pipeline holdings

The GIS analyses also compared three different sets of land holdings (Table 4): all the land holdings in agri-environment schemes in the catchment; land holdings identified as a priority by the pilot (the priority holdings, covering 8970 ha); the land holdings that were put into the HLS planning pipeline due to the pilot (the pipeline holdings, covering 2585 ha).

**Table 4** Proportion of the delivery plan key actions located in the priority and pipeline holdings.

| Delivery Plan Key Action | % of catchment covered by Priority Holdings | % of area under ESS covered by Priority Holdings | % of Key Action under ESS occurring in the Priority Holdings | % of catchment covered by Pipeline Holdings | % of area under ESS covered by Pipeline Holdings | % of Key Action under ESS occurring in the Pipeline Holdings |
|---|---|---|---|---|---|---|
| Woodland creation | 25% | 32% | 99% | 7% | 9% | 14% |
| Sustainable grazing | | | 19% | | | 7% |
| Nutrient management on improved grassland | | | 45% | | | 13% |
| Improve biodiversity of valley habitats (through habitat restoration and creation): | | | 60% | | | 9% |

The priority and pipeline Holdings also support a higher percentage of the key actions than the proportion of the catchment that they cover. Although the priority holdings only constitute a quarter of the catchment and a third of the area under ESS, they contribute virtually the entire area of woodland creation and woodland restoration under ESS, 45% of the nutrient management and 60% of the enhancement of valley habitats. The proportion of key actions delivered under ESS is less marked on the pipeline Holdings. The sustainable grazing options are much more evenly spread across the priority, pipeline and other holdings.

Although the twelve pipeline agreements occurred because of the pilot, it is not known what other agreements might have occurred, if these had not. Example maps of ESS options on the whole catchment, priority and pipeline holdings are provided in Appendix 5.

# 4. Discussion

Through document, GIS and interview data analysis, the evaluation of the Bassenthwaite Ecosystem Service Pilot Project has revealed that the pilot has achieved a great deal in terms of advancing thinking around the benefits of an ecosystem approach, providing a catalyst for further related work and a platform for galvanising partners. In addition, environmental impacts are apparent in the uptake of additional agri-environment schemes which would not have happened without the holding being identified through the participatory mapping processes. 16,193 ha of Priority Habitats were maintained or improved and 944 ha restored or created through agri-environment options over five years. This is significantly greater than the Nature Improvement Areas, which were of a similar size, and over a three year period maintained or improved 1,139 ha of Priority Habitat, and restored or created 385 ha (mean amount per NIA, Collingwood Environmental Planning Limited 2015).

Importantly, the process of involving a wide range of perspectives in the deliberative aspects of the project led to a shared understanding and broad agreement on the land management options which could lead to an agreed set of key actions for enhancing individual ecosystem services. The process of opportunity mapping and the production of the maps were also seen as important outcomes for the project as a whole in that they provided the opportunity for partners to come together to visualise the area and to broaden perspectives around the ecosystem services it produces. Since this time, it was noted that different organisations have used similar techniques to explore ecosystem services and opportunities for more holistic land management. Importantly, as a legacy, these outputs are still in demand and have been used by various partners in subsequent projects;

*'The maps have been in demand long after the project, they have a lasting legacy, partly because they are tangible, - people can see them - words get lost but visuals and maps are really valued for anything we do for land management., I know I've had requests for people to see these maps long after the project'.*

One aspect of the project was about developing understanding of natural flood management techniques. This was developed with academic partners who were engaged in modelling the impacts of natural flood defences downstream. The learning from this aspect and indeed from the entire project is a significant outcome of the project which is valued for moving forward knowledge in this area; '*the value of this was about developing learning and the knowledge increased around natural flood management'.* However, there was some concern that this learning had not (at least not sufficiently) filtered down to work on the ground and that whilst the development of human and social capital was seen as an important outcome of the project, there was some feeling that this needed to be better linked to policy incentives and projects on the ground to better demonstrate tangible impacts.

In this respect, an important output of the project was about linking these maps and emerging understandings of where work could best be focussed to achieve multiple benefits from new agri-environment schemes. The maps and discussions around potential land management opportunities did influence and feed into the one on one discussions that Natural England advisers subsequently had with farmers and land managers and, although difficult to directly attribute to the project, this is an important outcome and significant link between the project process and environmental (and arguably social) outcomes; as one adviser noted; *'there was a whole phase afterwards of negotiations and conversations with farmers on a one to one basis about what was going to happen on their land'*.

The discussions within the context of the project also aided the development of a shared vocabulary and understanding of ecosystem services and different land management techniques

for multiple benefits for a whole range of partners, who were then better equipped to talk to each other and to help to translate messages to farmers.

## 4.1. Recognising the Counterfactual

It is difficult to be conclusive about the degree of impact of this pilot and what might have happened in the absence of it. This is especially difficult for evaluations which take place some time after the project has ended, particularly when using participant interview data as memories tend to fade and exact details are often lost. That said, for evaluating the environmental impacts of the pilot, such longer timescales may be much more suitable and these impacts are clearer to understand.

Although not all of the land management action under agri-environment schemes has occurred in areas prioritised by the pilot, these areas proportionally supported a much larger amount of this activity than the rest of the catchment. However, this correlation does not necessarily demonstrate that the effect is due to the pilot. Without the pilot, advisers and farmers might have identified the same areas as opportunities for the key actions, e.g. bracken beds for locating new areas of woodland. Over a third of this catchment is designated as Site of Special Scientific Interest (SSSI) and the catchment has a continuing history of high levels of agri-environment scheme coverage. Sustainable grazing is a key target of agri-environment schemes in this area to achieve favourable condition of upland SSSIs. The large areas of ESS options to achieve sustainable grazing are likely to be due to this target, rather than the Pilot. This is played out in the even spread of these options across the whole catchment, regardless of whether areas were identified or prioritised by the Pilot.

Despite the causal links between the pilot and specific outcomes and impacts being difficult to prove, the findings do nonetheless contribute to our understanding of how this type of project works in practice. It is worth noting also that some interviewees and project partners were more certain of the role of this pilot in helping to better conceptualise thinking and to develop confidence to work more in this ecosystem approach space than had previously been recognised. Interviewees stated for example, that related work has built upon the foundations laid down by this pilot project and that the project helped to create a platform to open dialogue with farmers and to engage them with new conversations about where to focus land management efforts for multiple benefits.

# 5. Conclusions

The Bassenthwaite Ecosystem Services Pilot project has effectively engaged a wide range of partners, farmers and beneficiaries to demonstrate how multiple benefits can be delivered through working together at a catchment scale. The aim of this evaluation is to assess how effective the Bassenthwaite Ecosystem Services Pilot Project has been in achieving its original aims.

From the evidence gathered from project documentation, interviews and GIS analysis of environmental data, it can be concluded that these aims have largely been achieved, although perhaps to differing extents. The principles of the ecosystem approach have been demonstrated throughout the project and they have clearly been used to guide thinking and operations throughout the project. For example, a range of perspectives and disciplines were involved in the project which led to rich discussions and outputs. Including an even wider range of stakeholders in future work may be beneficial and especially including more 'non-traditional' partners could help to broaden-out discussions even further.

The deliberative process adopted by the pilot in developing the maps and the integrated delivery plan had value in themselves in terms of enabling the sharing of information and social learning between partners. In this respect, the project started a process of collective learning and of developing momentum to get people talking about issues of shared importance. In terms of demonstrating more practical and tangible outcomes 'on the ground' resulting from these outputs, these were largely achieved through the integration of learning about where investment could be made to result in multiple benefits, with the development and inclusion of additional land managers in agri-environment schemes. Environmental outcomes have been assessed in terms of changes in land management through the uptake of agri-environment scheme options, since the development of the shared integrated delivery plan in 2011. It is not possible to directly measure changes in delivery of the ecosystem services attributed to these land management changes. A time lag is also expected between a change in land management and any change in ecosystem service provision. Substantial changes in land management, through agri-environment agreements, have occurred in the five year delivery plan time-span. However it is not possible to conclusively attribute this effect to the pilot; it is not known what would have happened in terms of agri-environment delivery, if the pilot had not occurred.

The existing partnership of the BLRP, with its established catchment project area, has been integral to the success of the pilot project. Through effective partnership working, this project has provided the impetus for a lot of thinking and learning about new ways of working and in doing so, has generated a certain amount of both human and social capital. However, in terms of actually developing trust and understanding of land owners and managers, there is possibly still a long way to go. A general feeling from partner interviews suggests that whilst people may intuitively understand the multiple benefits that can be achieved through different ways of working, certain cultural, business or social barriers may prevent the advancement of these. Altering traditional land management techniques may require considerably more time, investment in demonstration projects, further engagement and social capital building work; '*we need to work with people, the farmers and the landed through a variety of interactions, we have to get the incentives right to solve some of these broad issues'*. Furthermore, farmers of course are concerned with running a business and so thinking through additional elements of land management may be costly in terms of the time and effort required. Achieving holistic buy-in from farmers and land managers may require more of a concentration on the mutual benefits which can be achieved both for farm businesses and for the environment. However, in terms of getting people to begin to think in different ways and more deeply around a multiple benefits approach, this project is certainly viewed as having considerable merit.

*'A fair assessment would be that it was good in that it was probably the first time a multiple benefits approach had been flagged up and there was a dialogue opened and there are positives which could be replicated again. I think it probably needs to be a little bit more focused on what can be mutually achieved to benefit the environment and businesses'.*

Whilst some positive and tangible outcomes have been achieved through this project, arguably, the most notable outcome has been the opportunity to identify and trial different ways of approaching land management. By including a wide range of stakeholders and using innovative methods for exploring and including a range of inputs from different disciplinary perspectives, new learning has emerged and new partnerships and ambitions created. The Bassenthwaite pilot appears therefore, to have fostered a legacy of partnership working and generated a platform for continued innovation in thinking. Two other pilot projects were initiated at the same time as Bassenthwaite, in the South Pennines and South West Uplands and they are in the process of undergoing a similar evaluation process. Collective lessons from these three pilots will be shared with partners and will ultimately, determine our overall approach for moving forward with potential future projects across the country. The synthesis evaluation report for all three pilots helps to answer these questions.

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# Appendix 1: Ecosystem Approach Principles (Convention on Biological Diversity)

(Source: https://www.cbd.int/ecosystem/principles.shtml)

**Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.**
Different sectors of society view ecosystems in terms of their own economic, cultural and society needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognized. Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account. Societal choices should be expressed as clearly as possible. Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way.

**Principle 2: Management should be decentralized to the lowest appropriate level.**
Decentralized systems may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the wider public interest. The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

**Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.**
Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. This may require new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

**Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:**
a. Reduce those market distortions that adversely affect biological diversity;
b. Align incentives to promote biodiversity conservation and sustainable use;
c. Internalize costs and benefits in the given ecosystem to the extent feasible.
The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favor the conversion of land to less diverse systems.
Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

**Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.**
Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species.

**Principle 6: Ecosystem must be managed within the limits of their functioning**.

In considering the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable of artificially maintained conditions and, accordingly, management should be appropriately cautious.

**Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.**
The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.

**Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.**
Ecosystem processes are characterized by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

**Principle 9: Management must recognize the change is inevitable.**
Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilize adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change.

**Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.**
Biological diversity is critical both for its intrinsic value and because of the key role it plays in providing the ecosystem and other services upon which we all ultimately depend. There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations, where conservation and use are seen in context and the full range of measures is applied in a continuum from strictly protected to human-made ecosystems

**Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.**
Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

**Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.**
Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

# Appendix 2: Stakeholder participation

**Table A** Participation by stakeholders on the steering group and at each workshop during the pilot project. Particpation is shown by organisation

| Partner Organisation | Steering group member/s | Numbers attending workshop (not including the Project Officer) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1. Partner workshop 22.1.10 | 2.Mapping workshop 23.3.10 | 3.Regional economic benefits workshop 30.3.10 | 4.Partners workshop 7.12.10 | 5.Farmers workshops 25.1.11 & 3.2.11 | 6. Public conference 12.3.11 |
| Country Landowners Association | | | | 1 | | | |
| **Cumbria County Council** | 1 | | | 5 | | | |
| **Cumbria Tourism** | 1 | | | 1 | | | |
| Cumbria Vision | | | | 1 | | | |
| Cumbria Wildlife Trust | | | 1 | | | | |
| Cumbria Woodlands | | | | | | | 1 |
| Derwent Owners Association | | 1 | | | | | 1 |
| **Environment Agency** | 3 | 3 | 1 | 1 | 5 | | 2 |
| Farmers | | | | | | 19 | |
| Fix the Fells | | 1 | | | | | |
| **Forestry Commission** | 1 | | 1 | 1 | 1 | 1 | |
| Friends of the Lake District | | | | | 1 | | |
| Government Office North West | | | | 1 | | | |
| Keswick Tourism Association | | | | 2 | | | |
| **Lake District National Park Authority** | 1 | 1 | 6 | 1 | 3 | | 2 |
| Members of public | | | | | | | 43 |
| **National Farmers Union** | 1 | | 1 | | 1 | | |
| **National Trust** | 1 | 1 | 3 | 1 | 2 | | |
| Natural Economy North West | | | | 1 | | | |
| **Natural England** | 1 | 3 | 7 | 3 | 2 | 2 | |
| NHS Cumbria | | | | 1 | | | |
| North West Development Agency | | | | 1 | | | |
| **Nurture Lakeland** | 1 | | | 1 | 1 | | 1 |
| Rebanks Consulting | | | | 1 | | | |
| RSPB | | | 1 | | 2 | | |
| **United Utilities** | 1 | 1 | 1 | | 2 | | |
| Woodland Trust | | | 1 | | | | |
| | | | | | | | |
| | | | | | | | |

# Appendix 3: Bassenthwaite Ecosystem Service Pilot Logic Model

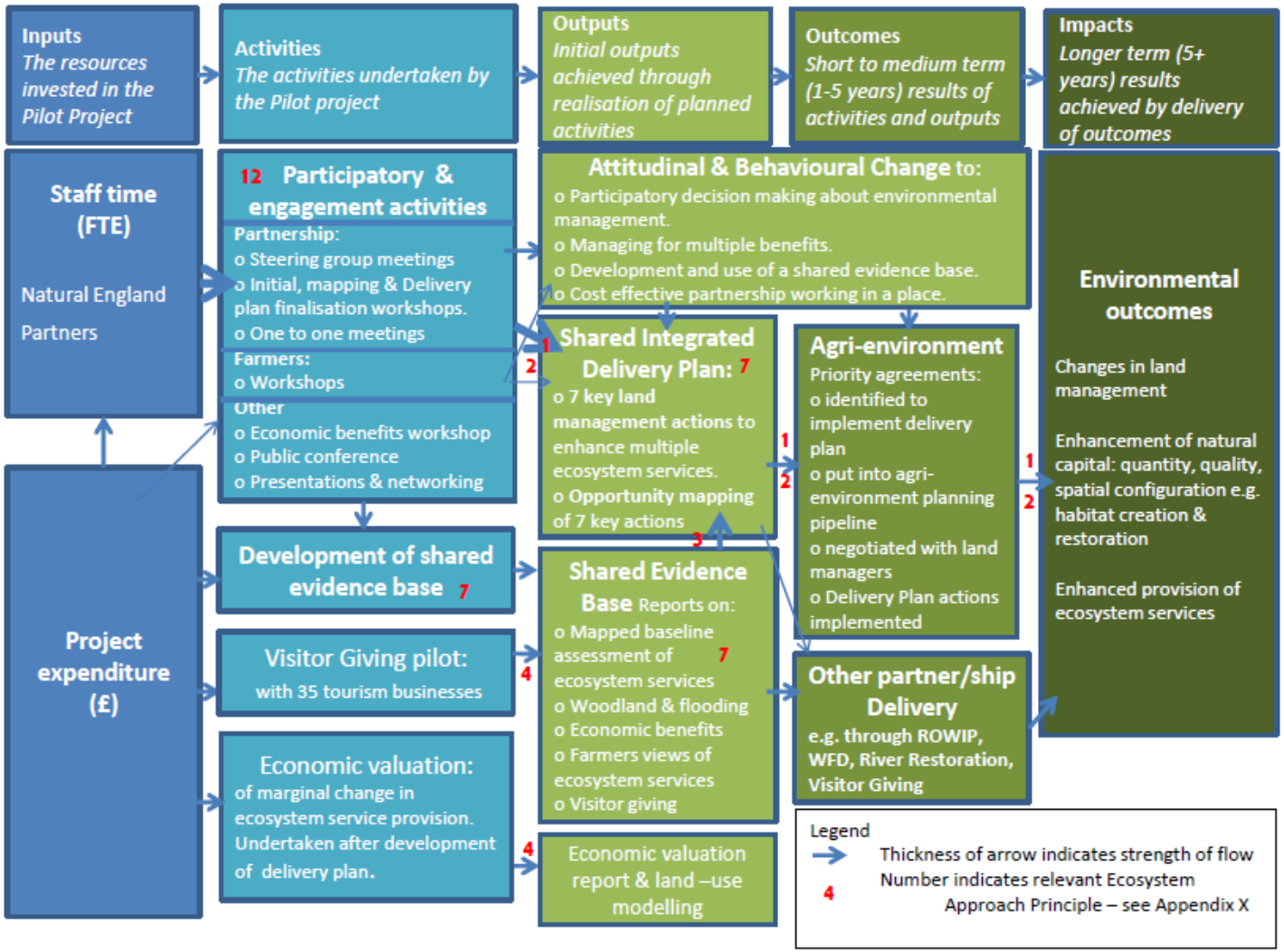



**Figure A** Showing the links between project inputs, activities, outputs, outcomes and impacts of the Bassenthwaite Ecosystem Service Pilot.

# Appendix 4: Evaluation Question Matrix

**Groups to be included in evaluation**

- Local people representing national organisations (United Utilities, National Trust, Environment Agency, Forestry Commission)
- Local organisations (Lake District National Park Authority, Cumbria Wildlife Trust, Cumbria Woodlands)
- Natural England Advisers
- Farmers (some questions may be less relevant for this group)

**Table B** Questions which formed the basis of the interview schedule.

| **Project Aims** | **Underlying Logic** | **Evaluation Questions** | **Considerations/Questions for interviewees** |
|---|---|---|---|
| To provide a practical example of how the ecosystem approach can be applied on the ground (multiple benefits through integrated partnership working) | Linking inputs to activities, outputs, outcomes and impacts | 1. What are the inputs (staff time, funding etc)<br>2. To what extent has the project applied the ecosystem approach?<br>3. Which principles of the ecosystem approach have been applied?<br>4. To what extent were time and spatial scales taken into account in applying the ecosystem approach and in terms of achieving outcomes and impacts?<br>5. Overall, what difference has the project and the ecosystem approach made a) to ecosystem services provision and b) to local planning and delivery?<br>6. What differences can be attributed to the project?<br>7. What was the overall feedback both during and following the project? | • Natural England and partner input?<br>• What are the main benefits of this project to your mind?<br>• Might these have happened anyway?<br>• To what extent is the ecosystem approach understood/used in your organisation?<br>• Were you aware of/had you applied the ecosystem approach before this project?<br>• What were the main learning points for you?<br>• Do you think this project led to a more integrated way of working? For what benefit if so? |

| | | | |
|---|---|---|---|
| | | | • Has it lead to you/your organisation thinking/working in different ways? How?<br>• How were timescales considered through the project? Do you think adequate attention was paid to timescale?<br>• How were spatial scales discussed and agreed? Do you think the right scales were used?<br>• What issues arose if any regarding time and spatial scales? |
| Participatory ways of working / Partnerships (local involvement and expert input) | The participatory approach and engagement activities influenced the development of the integrated delivery plan and achievement of outcomes | 1. What approaches were taken to embed the ecosystem approach through partnerships?<br>2. To what extent did the participatory approach involve a range of stakeholder perspectives (including from a range of disciplines?)<br>3. What partnerships and governance arrangements have been involved in the project?<br>4. Were these partnerships already in existence or did the project foster new relationships?<br>5. Were these partnerships effective in driving the project to achieve outcomes?<br>6. Have these partnerships endured following the design and planning stages?<br>7. How important were the partnerships and engagement activities in developing a shared evidence base and integrated delivery plan? | • Of the groups and interests which were represented in this project, did this feel representative of the area?<br>• Who else should or could have been involved?<br>• Do you consider that all interested parties had a chance to input adequately? If not, who and why not?<br>• Do you feel that those involved were optimistic/sceptical? (How) did this change through the process?<br>• What mechanisms were used to gain and record input? Did these work well? If not, why not?<br>• What were your thoughts on the engagement activities? Did you get any feedback on these from attendees? Were they well attended? Were they pitched at the right level for the audience? |

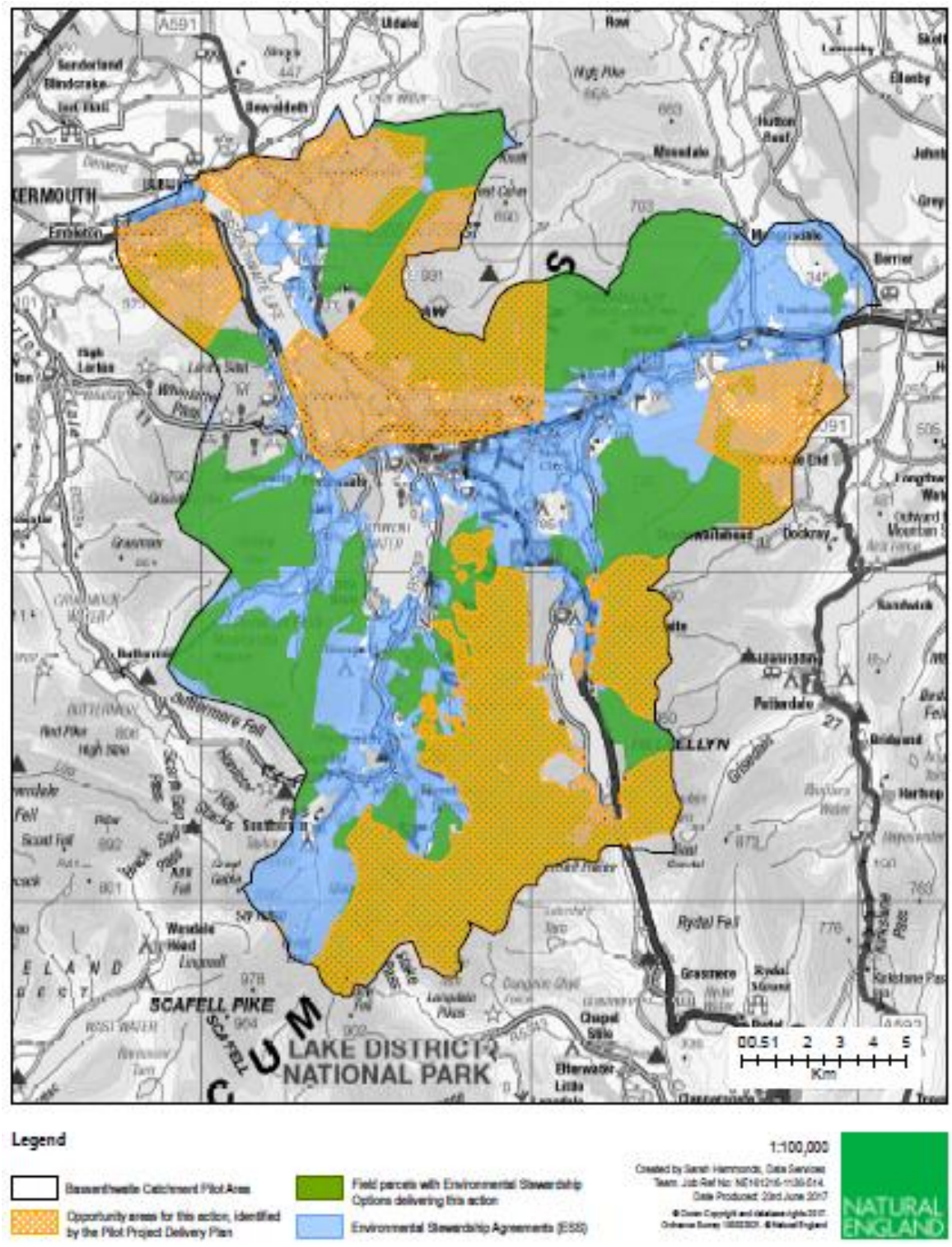
| | | | |
|---|---|---|---|
| | | | • Did you get the sense that everyone was engaged during these activities? If not, why not?<br>• What difference did the driving partnerships make to the project? Could it (or some of it) have occurred without their guidance?<br>• Were the 'right' partners involved? Could others have been involved and what outcomes might have been achieved if they were?<br>• |
| Consideration of multiple benefits | The participatory approach and engagement activities influenced the delivery of a range of benefits and outcomes | 1. What benefits have been delivered through this project (environmental and attitudinal/behavioural)?<br>2. To what extent has the participatory process resulted in attitudinal and behaviour change?<br>3. To what extent has the delivery plan influenced the environmental outcomes?<br>4. To what extent are these benefits the result of an ecosystem approach? Would benefits have occurred without the project?<br>5. To what extent are ecosystem services linked with land management schemes? Have new agreements arisen as a result of the project? Will these linkages continue to be made in the long term? | • What do you consider to the main benefits of this project?<br>• Which individuals/groups most benefit from these benefits? In what ways?<br>• Are there any dis-benefits that you have identified? For whom?<br>• Have you identified any changes to the ways that people think or work as a result of this project? In what way? (e.g. increased partnership working, working across different scales, consideration of wider stakeholder groups etc)<br>• What environmental outcomes can you identify as a result of this project?<br>• To what extent are these the result of the delivery plan? Would they have occurred anyway? |

| | | | |
|---|---|---|---|
| | | Further considerations for farmers:<br>1. Does working in a more collaborative way, at landscape-scale help or hinder in terms of understanding and being able to manage land effectively and feel supported in delivering multiple benefits whilst trying to juggle 'traditional' farming practices | • How were you engaged in the project? Which activities did you take part in?<br>• How was your experience of taking part in this project? Which particular aspects did you enjoy or not enjoy?<br>• Did it change your thinking in any way (whether about land management or partnership working etc)<br>• What are your thoughts on different ways of working, such as considering managing for multiple benefits for example?<br>• How does this it with your other pressing concerns?<br>• Do you find levels of support for new ways of working are adequate? What could help you to achieve your objectives? |
| Provide tools that help demonstrate the value of benefits of the natural environment | The participatory approach enabled the development of a shared evidence base and integrated delivery plan | 1. What tools have been developed through the process?<br>2. How effective are the in demonstrating the value of the natural environment to a wide range of beneficiaries?<br>3. Did tools help to link services to beneficiaries? Was this useful in demonstrating the benefits?<br>4. How have these tools informed decision making?<br>5. What are the strengths and weaknesses of these tools and lessons learned? | • How useful did you find the maps and other tools in getting a better understanding of the benefits provided by the natural environment?<br>• How easy were they to understand and discuss?<br>• Were boundaries and issues of connectivity taken into account?<br>• Is there anything else that could have helped you to gain a better/more complete picture of benefits? |

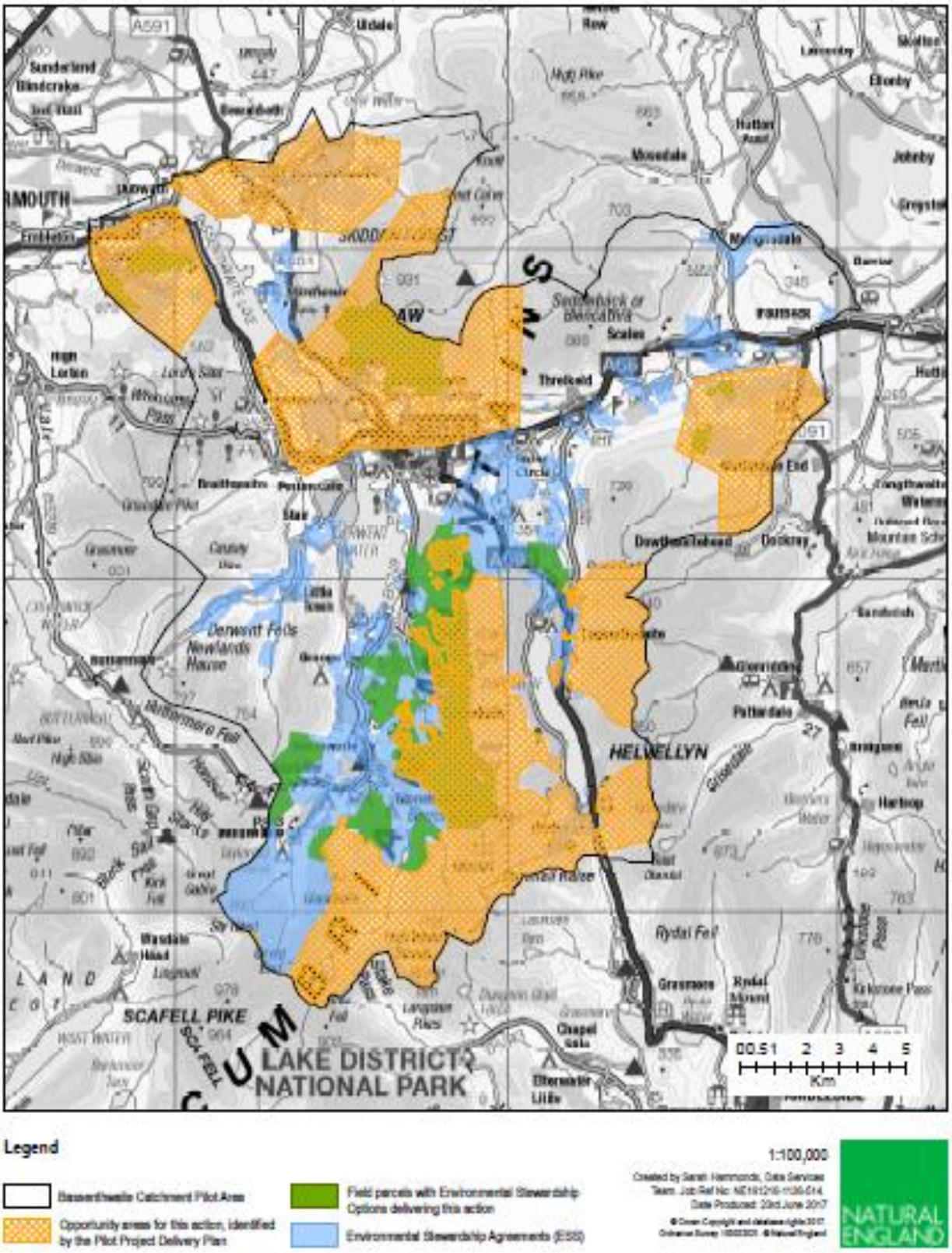
| | | | |
|---|---|---|---|
| | | | • Have you used these within your own organisations? For what purpose and with what effect? |
| Explore innovative funding mechanisms to pay for ecosystem services | Participatory processes led to consideration of economic valuation and schemes such as visitor giving | 1. To what extent did the pilot consider the need to understand and manage the ecosystem in an economic context?<br>2. To what extent did economic valuation inform decision making?<br>3. What funding mechanisms were explored and for what purpose?<br>4. Which mechanisms were trialled and with what success? Which have sustained? Have others been identified since?<br>5. How has funding been used and what difference has it made in delivering public benefits? | • What are your thoughts overall on payments for ecosystem services?<br>• Is this something you had considered prior to this project?<br>• Is this something which is considered/utilised in your organisation? In what way?<br>• Which mechanisms are you aware of?<br>• Are you aware of the success (or otherwise) of these?<br>• What lessons have been learned about payments for ecosystem services? |

# Appendix 5: Example maps

These maps show uptake of Environmental Stewardship Scheme options contributing to the key actions in the Pilot Delivery Plan, for the whole catchment, priority agreements identified by the Pilot and agreements which entered the agri-environment scheme pipeline due to the Pilot.




**Map A** All Environmental Stewardship agreements in the Bassenthwaite catchment with an action to achieve sustainable grazing (2011-2016)




**Map B** Priority environmental stewardship agreements (identified by the pilot) with action in 2011-2016 to achieve sustainable grazing.

# Appendix 6: Maps produced for the baseline assessment of ecosystem services

The baseline assessment (Natural England, 2011a) included the following maps, listed under the ecosystem service type being assessed.

- Land cover in the Bassenthwaite catchment (May and others 1995). Land cover data for 1988 were supplied by the Lake District National Parks Authority.
- Soils in the Bassenthwaite catchment (May and others 1996). Reproduced from National Soil Resources Institute soils map. Map derived from soils data © Cranfield University (NSRI) and for the Controller of HMSO, 2011. For further information please visit www.landis.org.uk

**Provisioning Services:**

- Food: Density of breeding ewes (Defra, 2007)
- Food: Summer stocking levels on the fells (Natural England, 2010)
- Food: Winter stocking levels on the fells (Natural England, 2010)
- Timber: Woodland over 10 hectares (National Inventory of Woodland and Trees)
- Water Supply: Water abstraction – volume in mega litres (Environment Agency)
- Water Supply: Raw water colours (United Utilities)

**Regulating Services:**

- Climate Regulation: Peat soils – deep and shallow (Natural England)
- Climate Regulation: Blanket bog condition – SSSI (Natural England)
- Flood Regulation: Flood risk – of over 1% chance from rivers (Environment Agency)
- Erosion Control: Sediment supply risk ratings for the Bassenthwaite sub catchments from Orr and others, 2004.
- Soil vulnerability: based on EA and Forestry Commission funded work undertaken by Forest Research and Lancaster University.
- Water Quality: Water Framework Directive status of water bodies (Environment Agency 2010).

**Cultural Services:**

- Wildlife-rich Environment: Biodiversity – Broad Habitats (Natural England)
- Wildlife-rich Environment: Designated Areas (Natural England)
- Wildlife-rich Environment: SSSI condition (Natural England)
- Cultural Heritage: Historic Environment: Scheduled Monuments at risk & Historic Environment Record (English Heritage)
- Cultural Heritage: historic landscapes (Lake District National Park)
- Tranquillity (CPRE)
- Perceived Tranquillity in North West England (CPRE)
- Inspiration from landscape – sites inspiring art or literature (Lake District National Park Authority)
- Access – Public Rights of Way, footpath restoration (Lake District National Park Authority and Natural England)
- Tourism businesses (Rebanks Consulting 2010 *produced by Mersey Forest Green Infrastructure section)*

- Visitor Origin (Penrith Visitor Survey 2005)


**Natural England works for people, places and nature to conserve and enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas.**

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