



A Roadmap for Realising Nature's Value

Nature brings many benefits to society, enhancing health, well-being and economic prosperity.

Realising nature's value means understanding the benefits we derive from natural resources and accounting for the values of these benefits, both monetary and non-monetary, in day to day decision making so as to maintain and enhance natural capital and achieve sustainable societies.

This aim of this Roadmap¹ is to enable evidence, knowledge and tools, including those created by LWEC partners, to be available to practitioners and other stakeholders in a form that readily supports everyday decision making for managing natural resources sustainably.

With a focus on practical application of the information and knowledge delivered by research and assessment activities, the Roadmap will catalyse activities to improve understanding of organisational, sectoral and common needs to support decision making. Central to this is collaborative working between organisations, groups and networks to share expertise and experiences and, where beneficial, co-design and co-deliver outcomes. These activities should lead to more efficient and effective management of our natural resources.

Key achievements will include a robust evidence base of the benefits we gain from nature, how our decisions can change them, and their values, both monetary and non-monetary.

The Roadmap is designed to facilitate the LWEC partners in achieving impact from their research investments, but will be relevant to a broader range of stakeholders in natural resource management, including governments, both national and local, businesses and charities with local, national and international customers and influence, and local communities.

Aim of the Roadmap

To enable evidence, knowledge and tools, including those created by LWEC partners, to be available to practitioners and other stakeholders in a form that readily supports everyday decision making for managing natural resources sustainably.

The Roadmap Structure

¹ A brief overview of the background to the Roadmap and previous work of the LWEC ecosystems theme is provided in Annex 1.

This Roadmap is designed to facilitate the LWEC partners in achieving impact from their research investments and to help practitioners and stakeholders involved in realising nature's value understand the way in which LWEC will seek to mobilise evidence and knowledge to support practice.

A simplified structure is summarised in Figure 1: The start point is setting out the major achievements to date, i.e. the status of current evidence and knowledge and how this is shared and being utilised. The next step is to build a better understanding of practical uses of this information. Central to this is gaining clarity over the practitioner and stakeholder community that may benefit from evidence and knowledge, bringing them together when potential beneficial to foster an understanding of individual and shared needs, and then creating opportunities to improve access to evidence, knowledge and tools. Flowing from this will be information about how to continually improve evidence, knowledge and practice, and the development of a monitoring strategy and identification of future research needs and priorities are elements of this. Finally, measuring outcomes is an important part of the process, although evaluation of progress should be integrated throughout.

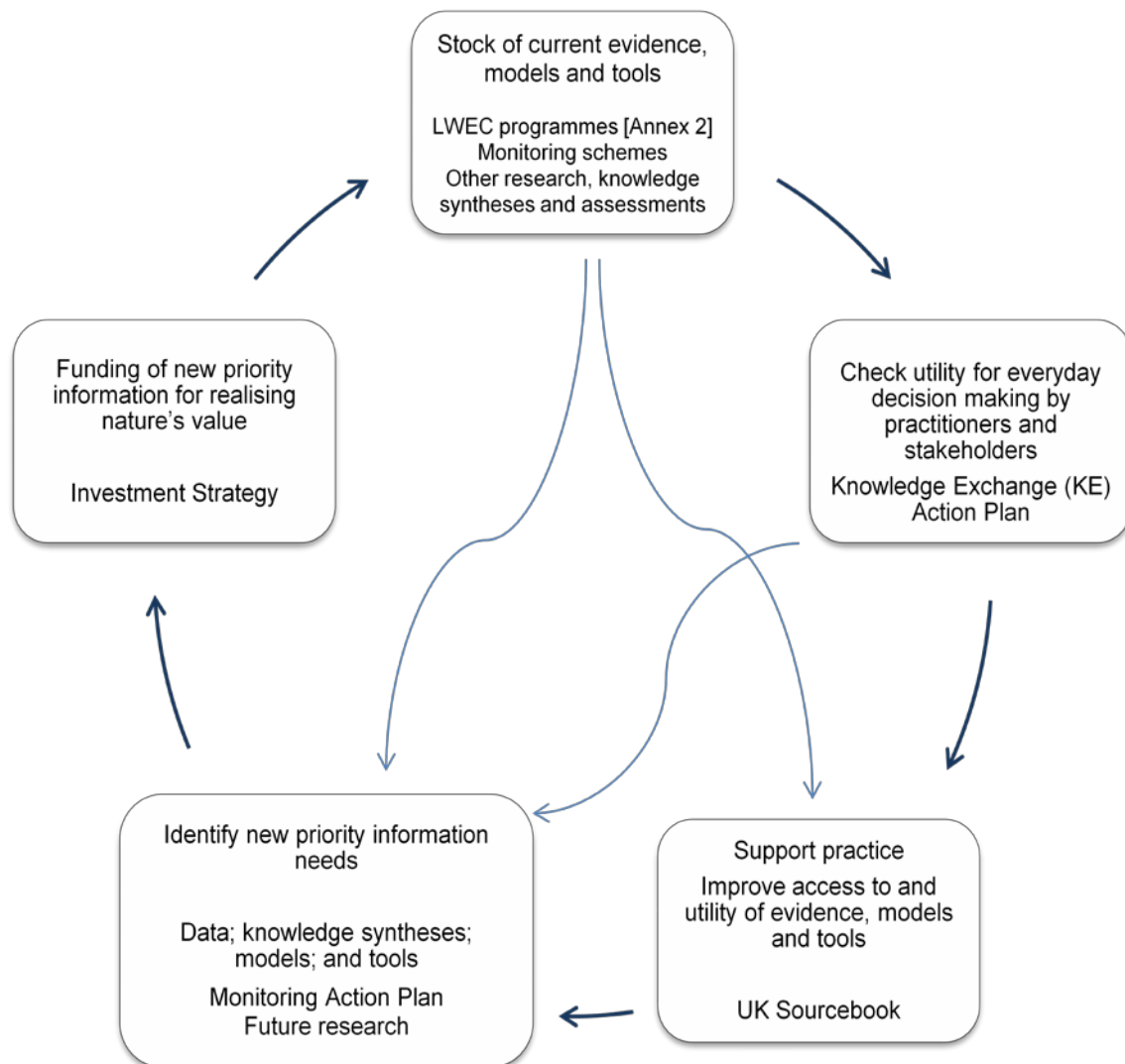


Figure 1: A Roadmap for Realising Nature's Value

Whilst the Roadmap is designed to set out a new course of action and help define that, it is not a simple linear process and the ways of working and outcomes will be diverse. It is important that adequate opportunities to refine and adapt ways of working are supported.

1 Taking stock of current evidence, models and tools

It is worthwhile reflecting on the current breadth of knowledge on natural capital and benefits, and knowledge exchange and development initiatives focused on realising nature's value. Such knowledge is extensive and there are a number of tailored research programmes that will provide more knowledge in the near future (Annex 2 provides a summary).

The UK National Ecosystem Assessment (2011), and its follow on (2014), along with various academic reviews, and reports from forums and groups provide summaries of the status of our knowledge on natural capital, the ecological processes that provide benefits, and some of the tools available for practitioners to adopt an ecosystem approach and use assessments of nature's value to guide decisions.

The range of evidence, models and tools:

- Spatial data for ecosystems, biodiversity, other natural resources, benefits and uses, and associated spatial analytical tools;
- Indicators of status and trends in natural capital, and sustainable development;
- Assessments of ecological processes, and status and trends in natural capital;
- Models and metrics for natural capital accounting;
- Scenarios;
- Resource management models and decision tools;
- Case studies and local projects.

However, from the perspective of some practitioners and stakeholders much of this knowledge is not in a form that facilitates decision making. In addition, tools may be underdeveloped or difficult to understand and use, and so again relatively inaccessible.

A number of interest groups and networks have emerged to help share knowledge and design better approaches. These include, amongst others: the National Biodiversity Network, State of Nature Partnership, UK Biodiversity Science Committee, Natural Capital Committee, Ecosystem Markets Task Force, Natural Capital Initiative, Valuing Nature Network, Ecosystems Knowledge Network (Defra), Knowledge Transfer Network (Environmental Sustainability), UK Network of Environmental Economists, Aldersgate Group, The Prince's Accounting for Sustainability Project, Business In The Community, The Local Enterprise Partnership Network, plus many EU (e.g. The Economics of Ecosystems & Biodiversity; TEEB) and international networks.

Each of these groups or networks has produced important information to help realise nature's value, including, amongst others: State of Natural Capital Reports (Natural Capital Committee 2013); Realising Nature's Value (Ecosystem Markets Task Force 2013); The Economics of Ecosystems & Biodiversity (TEEB): Interim Report (European Communities 2008); and, Mainstreaming the Economics of Nature (TEEB 2010).

In addition, an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) was established in 2012, and has four functions: (1) to catalyse new knowledge; (2) to undertake global, and regional assessments; (3) to promote the use of policy support tools; and (3) to catalyse capacity building. The first five year work programme for IPBES was

adopted in December 2013 and in many ways corresponds to the LWEC ETF Roadmap at a global scale.

Groups and networks often share some members, but exchange between the groups and networks may be limited, which in turn may limit a shared understanding of different needs for evidence, knowledge and tools.

2 Creating an understanding of the information & tools needed to realise nature's value

All of society benefits from nature's value and take decisions that affect it; understanding how benefits and influences differ between different parts of society is fundamental to supporting sustainable development. There are many initiatives underway in many sectors of society designed to take the value of nature into account. LWEC can provide evidence, knowledge and tools to support these interests, but it is important to clarify who will benefit and how they might benefit.

The breadth of existing knowledge, ongoing research and the many activities to mobilise data, share evidence and develop tools means that gaining a complete picture of what we know and how to take action is challenging. It is probable that different practitioners and stakeholders (Annex 3) are duplicating efforts and that effective knowledge exchange could bring significant benefits. It is also widely acknowledged that there is a demand for new decision tools, drawing on current knowledge, but that these are best designed through collaborative working or co-design with users.

Knowledge exchange (KE), or collaborative learning, should be interactive and involve co-designed activities, sharing expertise, learning and working together to find solutions to common needs, and publishing findings and outcomes in formats that meet stakeholder needs. There is a wide range of KE methods and different methods will be suitable for exchange between different stakeholders and to achieve different goals; the *LWEC Knowledge Exchange Guidelines* (2012) are a reference framework for developing approaches. Effective KE is centred on understanding what each party wishes to get out of the exchange, which means that co-design is critical.

A **knowledge exchange action plan for realising nature's value** is required and should give most benefit, beyond the planned programme or project level activities, when focussed on improved exchange between groups that are least likely to come together, but where significant benefits could flow from closer working. Consideration will be given to making more efficient use of existing activities, seeking to avoid duplication, streamlining activities and maximising the use of evidence, knowledge and tools already available. Characteristics of the KE will include:

- Making the most of existing networks and interest groups
- Creating dynamic, action-orientated forums
- Building shared ownership and creating opportunities for new leadership
- Creating bespoke work flows under shared ownership
- Developing bespoke knowledge exchange strategies & events calendars
- Engaging professional facilitators and communicators, and formalising communication plans
- Taking risks and being open to new ways of working, but being able to exit gracefully

The KE Action Plan will prioritise the creation of effective knowledge exchange activities, including linked to LWEC research programmes and projects (Annex 2), and be developed

with programme leads and communication officers to make the most of planned activities and identify any additional activities with the wider community of practitioners and stakeholders where significant benefits can be realised. Such activities should be action-orientated focussing on issues of practical importance, such as development of datasets, syntheses of knowledge, models and tools, and understanding barriers to realising nature's value; a key role for the Ecosystem Task Force will be to identify the most useful themes for KE events.

3 Supporting practice: a UK Sourcebook for evidence, models and tools

The evidence, models, knowledge and tools already available, and those likely to be identified by practitioners or stakeholders as requiring further development, need to be accessible, understandable and easy to use. At present there is no easy way to find and apply much of the information generated by the LWEC partnership or others, and an important objective of the Roadmap is to improve access and utility.

The development of a **UK sourcebook for realising nature's value** that includes information on evidence, and access to models and tools that could meet the needs of different groups at different scales is a key deliverable.

The Convention on Biological Diversity (CBD) Ecosystem Approach Sourcebook² provides a potentially useful model on which to base a UK approach, although there are various options for how to develop and deliver a sourcebook.

A sourcebook will seek to provide useful groupings of information for different stakeholders, for example by providing bespoke work flows that guide users through the process of acquiring data, and selecting models and tools, as well as guidance for interpreting outcomes from the bespoke selection process. Of key importance will be clear information about the quality of data and tools, explained in a way that meets stakeholder needs.

4 Improving data, synthesising knowledge and identifying research priorities

A Monitoring Action Plan (MAP)

The Ecosystem Task Force is charged with creating a **Monitoring Action Plan for realising nature's value** due to the fundamental need for reliable and relevant data to support decision making.

The scope of this plan will include evidence to enable assessment of the status of ecosystems and to detect changes in status, quantify the benefits flowing from them and how these change, and measure the factors driving changes in both. The ways in which benefits are valued and valuation metrics are also required.

The plan will:

- draw on and integrate existing initiatives and activities, such as the UK Earth Observation Forum;
- reflect business and strategic policy demands;

² <https://www.cbd.int/ecosystem/sourcebook/tools/>

- take into account scale issues (local solutions and transferability of information);
- include biodiversity, physical, economic and social data;
- clearly articulate the status of data availability, quality and access;
- engage potential business and other users in co-design and delivery.

In addition to identifying key monitoring series (for ecosystem services and biodiversity), the plan will include recommendations on their maintenance and development, and set out possible ways to improve accessibility of data to allow the development of integrated data, mapping and modelling platforms.

There are many challenges in obtaining and sharing data and metrics that are meaningful and of suitable quality, examples include, amongst others, the development of remote sensing and citizen science, and access to privately held data.

Monitoring done by the public, also known as citizen science, is likely to play an increasingly important role in providing evidence for realising nature's value. Coupled with this is new technology development, which will significantly enhance opportunities for public engagement, but will also provide opportunities for the indirect collection of data through remote sensing and ground level sensor networks; this Big Data challenge is a novel issue for monitoring natural capital and factors influencing its change.

The accessibility of data remains an important issue, especially in relation to privately held and commercially sensitive data. The plan will need to tackle this, taking into consideration the sensitivities associated with these kinds of data, if practitioners and stakeholders are to be able to achieve their aspirations to take account of nature's value.

Identifying priorities for future knowledge syntheses and research

A natural outcome from ongoing research, knowledge exchange, the continued development of practical management tools and decision making will be the identification of genuine gaps in knowledge, i.e. the gaps that hinder realisation of nature's value by any of the practitioner or stakeholder groups. It will be important to capture information on the kinds of evidence and knowledge that are needed to overcome serious barriers to action and promote these needs to the appropriate funding bodies and stakeholders who can fund additional work, whether in the academic sector, government or the private sector. The KE action plan will include specific activities and events to ensure this happens.

5 Promoting priorities for new evidence, knowledge and tools

The Ecosystem Task Force, in promoting and implementing this Roadmap, will seek to facilitate the synthesis and publication of priorities for future research, and create opportunities to promote these needs in the UK, EU and internationally as relevant.

The development of an evidence investment strategy for realising nature's value is a future consideration if resources permit, but informing the investment strategies of research funding bodies is a short-term objective.

Measuring success

The success of the Roadmap and the work of the LWEC Ecosystem Task Force can be measured in both process and outcome terms and a mixture of these is entirely appropriate given the breadth of the practitioner and stakeholder community.

Success over the period to 2018 will be measured by the following:

- A range of KE activities co-designed by practitioners and stakeholders are well underway and have led to greater use of evidence, knowledge and tools, including LWEC products;
- Significant progress has been made in creating a UK sourcebook for realising nature's value, especially including a good range of effective decision, planning and management tools, and user feedback demonstrates its value;
- The LWEC Monitoring Action Plan for realising nature's value has been published and monitoring practitioners have made progress in addressing and making accessible any new evidence needs;
- An improved range of useful, quality data for realising nature's value is available, explained clearly to potential users and is easy to access;
- Requirements for new knowledge necessary to explicitly support the aim of realising nature's value have been identified.
- Case studies that use the work of the LWEC Ecosystem Task Force to make a demonstrable difference on the ground can be cited.

Methods used to monitor and assess success will be simple, and proportionate to resources, taking into consideration the overall aims of the Roadmap. This Roadmap will be supported by action plans relevant to achieving its objectives and deliverables, initially developed by the Ecosystem Task Force, which will also include action-specific milestones and measures of success.

Annex 1

Background to development of the Roadmap

The natural environment underpins economic prosperity, health and wellbeing. We rely on natural ecosystems for food, water, and the air we breathe. Land, seas, rivers, woods and fields, parks and open spaces provide benefits so fundamental that they are often overlooked (LWEC 2008).

The Millennium Ecosystem Assessment (2005) provided a conceptual framework³ for understanding how we derive benefits from nature. This was extremely influential and the concepts quickly taken up by decision makers. However, there was little synthesis of the evidence necessary to support this approach at regional and sub-regional scales, including in the UK.

In response, governments in the UK began to explore the role that a more integrated approach to nature conservation, in which nature is valued for its many benefits, could have in managing natural resources and natural capital. The Living With Environmental Change (LWEC) programme was initiated in 2008 to ensure that decision makers in government, business and society have the knowledge, foresight and tools to mitigate, adapt to and benefit from environmental change.

A thematic programme of research at the landscape/ ecosystem scale was developed by LWEC (below and Annex 2), and a landmark assessment undertaken to synthesise the available information on the status and trends of broad habitats (ecosystems), their ability to deliver benefits (ecosystem services), and contribution to human well-being (UK National Ecosystem Assessment 2011 (UK NEA)). Additional assessment was also commissioned as a follow on to the UK NEA and is due for publication in 2014 (Annex 2).

The UK NEA has helped inform policy development in each country of the UK. For example, it was used as evidence in the development of *The Natural Choice: Securing the Value of Nature* (Natural Environment White Paper for England; 2011) and *Biodiversity 2020* (the England biodiversity and ecosystem services strategy; Defra 2011). The Devolved Administrations have also developed new strategies that begin to embed an ecosystem approach, including valuing natural capital, in decision making; the Land Use Strategy (Scotland; 2011) and *2020 Challenge for Scotland's Biodiversity* (Scottish Government 2013); and, *Living Wales* (2010) and the green paper *Sustaining a Living Wales* (2012). Northern Ireland will publish a new biodiversity strategy in 2014.

To facilitate implementation of these policies and identify evidence needs, a number of engagement activities were initiated by governments, including the establishment of the Natural Capital Committee and the Ecosystem Markets Task Force. Within the non-government sector a number of groups have taken up the challenge of addressing natural capital accounting, and engagement activities, like the Natural Capital Initiative, have emerged.

In 2012, LWEC recognised that a focus on practical application of the information and knowledge delivered by its research and assessment activities was an important next phase for the programme and it created the Ecosystem Task Force to facilitate the realization of nature's value:

³ IPBES has since published an updated conceptual framework to underpin its work programme (2013)

Realising nature's value means understanding the benefits we derive from natural resources and accounting for the values of these benefits, both monetary and non-monetary, in day to day decision making so as to maintain and enhance natural capital and achieve sustainable societies.

Achieving this requires that a range of evidence and tools is readily available to meet the needs of practitioners involved in natural resource management and other stakeholders. This roadmap is designed to help create an understanding of these needs and enable the best use of existing knowledge and tools. Implementation should also give the added benefit of highlighting where new knowledge and solutions are required to enable practical action.

The LWEC Ecosystem Challenge (2008)

To ensure that decision-making takes full account of impacts on the natural environment and their consequences for ecosystem sustainability, human well-being, and economic prosperity.

The natural environment underpins economic prosperity, health and wellbeing. We rely on natural ecosystems for food, water, and the air we breathe. Land, seas, rivers, woods and fields, parks and open spaces provide benefits so fundamental that they are often overlooked. However, in recent years there has been an ongoing decline in many aspects of the environment, over which many people feel they have little control.

The ecosystem challenge will assess the links and feedbacks between the natural environment, ecosystem services and human well-being; how these might continue to develop within environmental limits in the face of major environmental and social change; and how decision-making, and local and national planning, can take account of these links and feedbacks to produce the maximum benefit for society and lead to the development of new social, environmental and economic opportunities.

LWEC will help to address user needs identified for this challenge including:

- enabling and encouraging individuals and organisations to be more sustainable in their choices through understanding:
 - how people and environments interact;
 - the roles that institutions, social dynamics, individual choices, technologies and infrastructures play in embedding particular lifestyles;
 - the trade-offs between provisioning and other ecosystem services;
- why ecosystems can be vulnerable, and what can lead to irreversible changes in ecosystems; and
- the value, both financial and non-financial, of natural capital and ecosystem services to different communities.
- facilitating the development of the green economy through opportunities arising from managing ecosystems and ecosystem services or by providing products or services which reduce negative impacts on ecosystems, for example, certification of forestry and agricultural products, carbon and biodiversity offsetting, and monitoring technologies;
- identifying and promoting novel solutions to challenges facing ecosystems and provision of ecosystem services, for example, halting biodiversity loss, ecosystem restoration and elimination of damaging invasive species;
- promoting environmental sustainability in developed and developing countries, and identifying methods to reduce the UK's impact on overseas ecosystems.

Annex 2

LWEC research activities

The LWEC Partners have instigated a range of activities to promote ecosystem research from extending our knowledge of role of biodiversity in ecosystem function to improving our understanding of how ecosystem good(s) influence individual well-being, and preliminary investigations of how ecosystems underpin the wider economy. These are listed below (Figure 2.1) and include research programmes and activities (red bars) together with the reorientation of activities, especially within the NERC Centres to address ecosystem level questions (green bars).

Of particular significance among these activities in terms of their relevance for decision makers are:

- 1) The UK National Ecosystem Assessment (UK NEA): has provided a comprehensive synthesis of the state of ecosystems in the UK and develops an approach for their valuation.
- 2) The Valuing Nature Network (VNN): has provided insights into the use of valuation techniques in decision-making.
- 3) Biodiversity and Ecosystem Service Sustainability (BESS): is providing evidence on the role of biodiversity in delivering ecosystem services.
- 4) Ecosystem Services for Poverty Alleviation (ESPA): is providing evidence for how ecosystem services can be used to promote human well being and alleviate poverty.
- 5) The Scottish Government Research Programme 2011-2016 has a specific ecosystems theme seeking to ensure *Scotland's environmental assets, biodiversity and ecosystem services are identified and valued to inform decision making.*

A number of programmes (e.g. BESS, ESPA) have only recently begun their main activities and will be delivering results over the next three years. While NERC is planning a sequel to the Valuing Nature Network research which is focused on:

- (1) To improve our understanding of (i) the links between ecosystem stocks and tipping points, (ii) how the values of ecosystem services change as tipping points are reached and exceeded, and (iii) critical levels of natural capital that avoid abrupt and damaging ecosystem change;
- (2) To improve our understanding of the roles ecosystems play in human health;
- (3) To continue to provide time-limited support to the VNN.

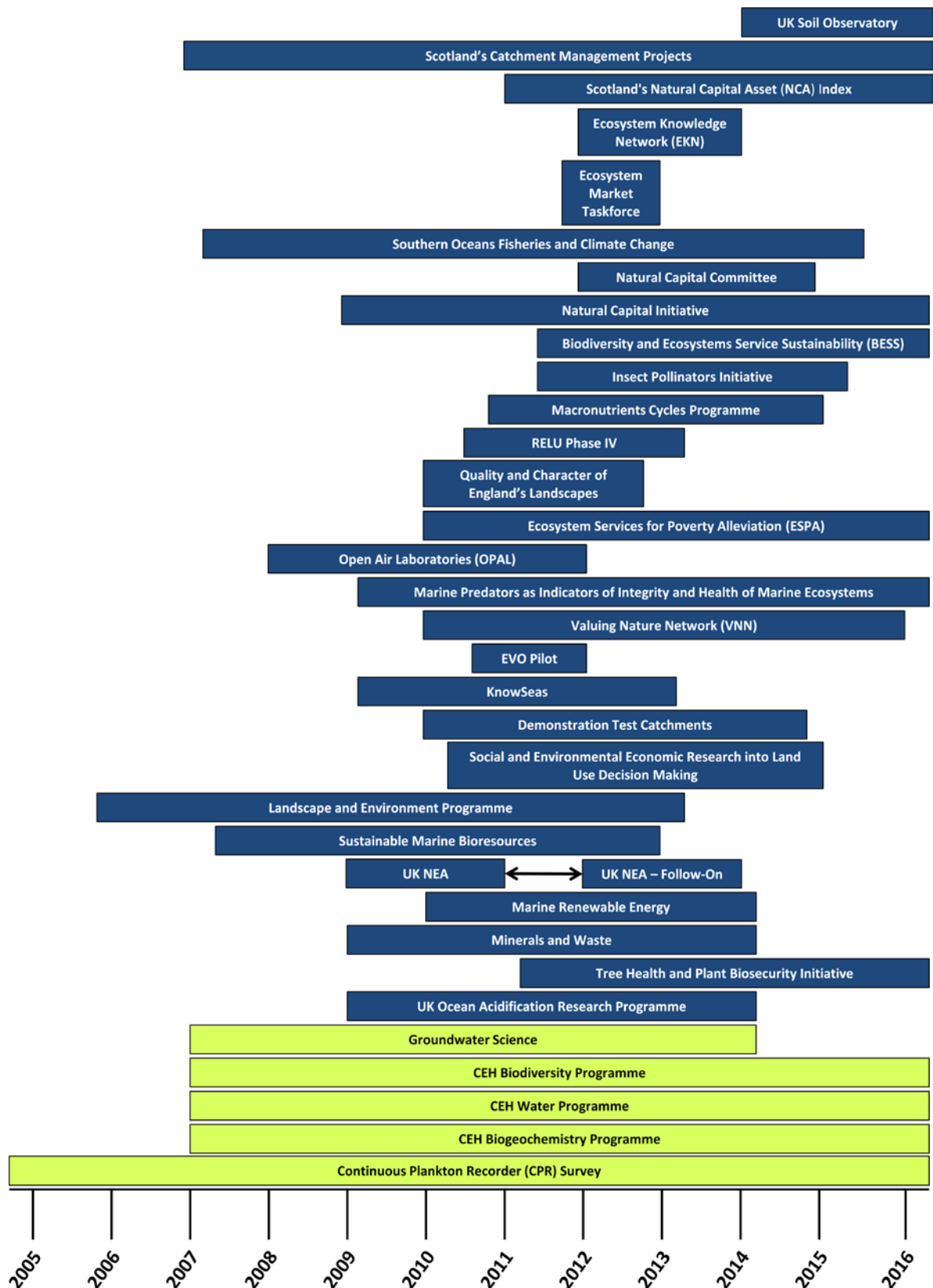


Figure A2.1: A timeline of major research investments relating to ecosystems by the LWEC Partners.

The UK National Ecosystem Assessment Follow On project, which will report in March 2014, is focused on the generic question of *How have we advanced our understanding of the*

influence of ecosystem services on human well-being to help better manage ecosystems and deliver sustainable benefits? It will do this by i) providing insights from the economic analysis of the value of ecosystems and their contribution to the economy, ii) improving our understanding of cultural services, and shared values so that non-monetary valuation of ecosystems can be incorporated in decision making, iii) exploring the usefulness of scenarios to compare policy options, and iv) reviewing the tools/systems available to ensure that ecosystem trade-offs are considered in decision making. Ten work packages together address the following set of questions:

- WP1 - What characteristics of natural capital assets should we understand in order to improve environmental appraisal and national income accounts?
- WP2 - How can we quantify the impact of changes in ecosystem services on the national economy?
- WP3a - How can economic valuation elucidate the trade-offs in the delivery of ecosystem services arising from alternative land-uses?
- WP3b - How can we better measure and value changes in both the stock and flows of ecosystem services in the coastal/marine environment?
- WP4 - How can we strengthen our understanding of the link between ecosystem attributes and the delivery of cultural services and goods to improve decision making?
- WP5 - How can we characterise and assess the shared and social values provided by ecosystems?
- WP6 - How can plausible future scenarios help understand, manage and communicate the consequences of changes in ecosystem services across all scales?
- WP7 - What response options might be used to improve policy and practice for the sustainable delivery of ecosystem services?
- WP8 - What institutional behaviours and cultures enable or constrain the use of ecosystems knowledge in decision making?
- WP9 - How can the processes and tools useful in policy and decision making be adapted to systematically embed an ecosystem service framework into the ecosystem approach?

The general research picture

The LWEC activities above together with other relevant research activities (identified through Envirobase) have been mapped in terms of their relevance to six priority areas identified by the Partners. These are:

- 1) Integrated ecosystem and bioeconomic models
- 2) Standardised monitoring
- 3) Ecosystem resilience
- 4) Integrated land and seascapes
- 5) Improved valuation
- 6) Ecosystem services, biodiversity, function

The map indicates that there are a substantial number of research programmes contributing to our understanding in each of the six areas, except perhaps for 'ecosystem resilience' where surprisingly few things are seen as a "high" priority.

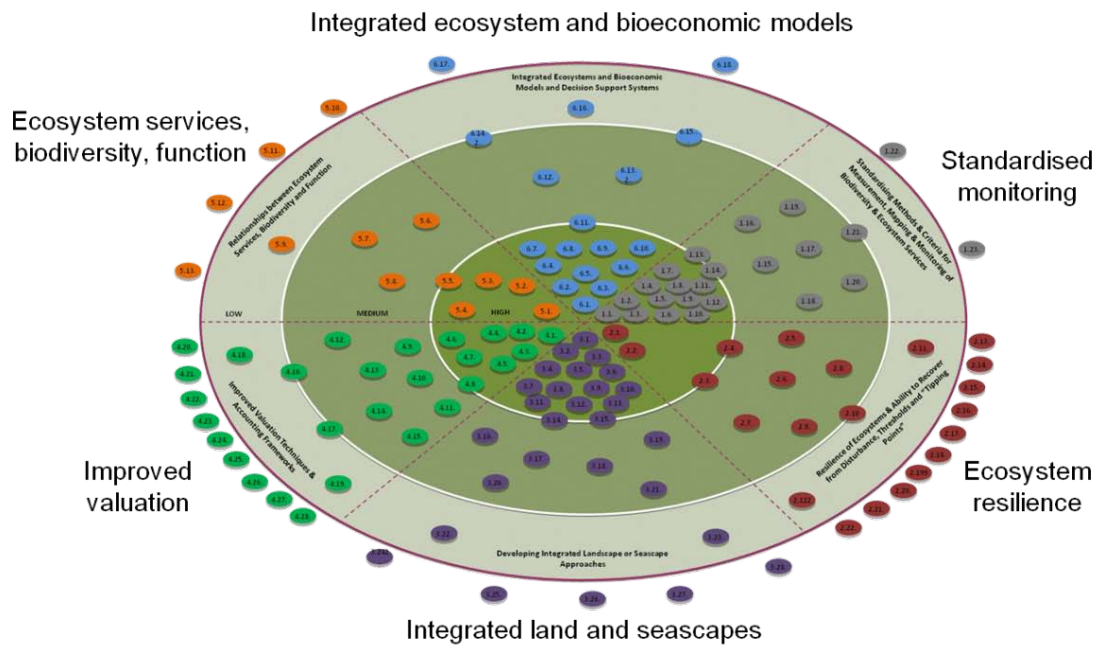


Figure 2.2: A map of research activities in six major areas with the most relevant programmes positioned towards the centre of the map.

Annex 3

Practitioners and Stakeholders

A practitioner may be any person or group that makes use of knowledge on ecosystems, their benefits and values to make policy or management decisions affecting natural resources, or natural capital. Other stakeholders may not be directly involved in policy or management practice, but are affected by or influence those decisions, for example, a family visiting a National Park for a walk, someone selecting an energy supplier, or a parent buying food in a supermarket.

Each practitioner or stakeholder will have different demands for evidence and tools to enable them to make decisions and assess the impact of those decisions: to make best use of the knowledge from the LWEC programmes and other resources requires an understanding of these demands.

The grouping of practitioners and stakeholders by possible common needs may be helpful in designing ways to share knowledge and data, and make tools available. Many groupings already exist, such as Local Enterprise Partnerships, and engagement through such groups can be an efficient way of ensuring broad representation.

The UK NEA follow on project (2014) recognised seven different broad types of practitioner/stakeholder (see Box 1).

Practitioner or stakeholder	Example information needs, activities or decisions
National government policy makers	Natural Capital Accounting; Indicators; Legislation affecting land and sea management; Policy affecting land and sea management, including taxation and incentives; Impact analysis (environmental and social); Cost-benefits analysis; Data provision; Research
Local government	Implementation of national law and policy, e.g. planning regulation; Local policy affecting land management and development; Indicators
Government agencies	Implementation of national law and policy through regulation and nature conservation management, including through impact analysis; Cost-benefits analysis; Data provision; Research
Business	Development and supply chain impact analysis (environmental and social); Cost-benefits analysis; Indicators; Accreditation or certification; Labelling; Marketing; Data provision; Research
NGOs	Data provision; Research; Impact analysis (environmental and social); Cost-benefits analysis; Indicators; Accreditation or certification; Labelling; Marketing

Practitioner or stakeholder	Example information needs, activities or decisions
Education and research	Understanding natural resources, natural processes and factors causing change; Data & evidence provision
The public	Planning decisions, including major infrastructure; Understanding everyday cost of living to inform choice, including taxation; Labelling; Access to natural resources; Understanding trade-offs (impacts and benefits) associated with use of natural resources; Data provision

Scale is an important consideration and these groups might be further divided according to whether they have international, national or local responsibilities or interests. In addition, the groups can be sub-divided by sectoral interests, for example government departments dealing with agriculture, energy, transport, and health and their associated agencies.

Other ways to define and group stakeholders exist, and stakeholder mapping and matching is often used as a tool to create natural groupings, but the important thing is awareness of who should have opportunity to engage (could benefit from LWECC findings and activities), understanding motivation for doing so, creating opportunity and avoiding discrimination.