

Chapter 1: Introduction to the UK National Ecosystem Assessment

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1.1 The UK National Ecosystem Assessment	2
1.2 Origins of the UK National Ecosystem Assessment	2
1.2.1 The Ecosystem Approach	2
1.2.2 The Millennium Ecosystem Assessment	2
1.2.3 Response from the UK Government and House of Commons Environmental Audit Committee to the findings of the Millennium Ecosystem Assessment.....	2
1.3 Objectives and Implementation of the UK National Ecosystem Assessment	3
1.3.1 Scope of the UK National Ecosystem Assessment.....	3
1.3.2 Governance of the UK National Ecosystem Assessment.....	6
1.3.3 Structure of the UK National Ecosystem Assessment	7
1.4 Outputs of the UK National Ecosystem Assessment	8
1.5 Linkages to Other Initiatives	8
1.5.1 Links to Other Initiatives Within the UK.....	8
1.5.2 Links to Other Initiatives in Europe and the World.....	9
1.6 Next Steps: Building on the UK National Ecosystem Assessment	10
References	10

1.1 The UK National Ecosystem Assessment

The UK National Ecosystem Assessment (UK NEA) is the first analysis of the UK's natural environment in terms of the benefits it provides to society and the nation's continuing prosperity. Carried out between mid-2009 and mid-2011, the UK NEA has been a wide-ranging, multi-stakeholder, cross-disciplinary process, designed to provide a comprehensive picture of past, present and possible future trends in ecosystem services and their values; it is underpinned by the best available evidence and the most up-to-date conceptual thinking and analytical tools. The UK NEA is innovative in scale, scope and methodology, and has involved more than 500 natural scientists, economists, social scientists and other stakeholders from government, academic and private sector institutions, and non-governmental organisations (NGOs).

Supported by the Department for Environment, Food and Rural Affairs (Defra), the Northern Ireland Environment Agency (NIEA), the Scottish Government, the Countryside Council for Wales (CCW), the Welsh Assembly Government (WAG), the Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC), the UK NEA was carried out as part of the Living With Environmental Change (LWEC) Initiative. The aim of LWEC is 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.

1.2 Origins of the UK National Ecosystem Assessment

1.2.1 The Ecosystem Approach

The 'Ecosystem Approach' is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (CBD 1993).

The Ecosystem Approach is much more than accepting ecosystems as the core of environmental management. It recognises that people and society are integral components of ecosystems and their management and conservation. This necessitates a way of working and decision-making that cuts across traditional policy and institutional boundaries. It brings consideration of natural, economic and social sciences into a single methodological framework. The Ecosystem Approach is an underlying element of important agreements to which the UK has significant commitments—notably the Convention on Biological Diversity (CBD), The Ramsar Convention on Wetlands of International Importance and the European Union (EU) Marine Strategy Framework Directive (MSFD).

Defra, the Devolved Administrations and partners are working towards implementing an Ecosystem Approach to conserving, managing and enhancing the natural environment of the UK. This will be achieved by focusing decision-making away from sector-specific or habitat-specific approaches and towards an integrated approach based on whole ecosystems which ensures the value of ecosystem services is fully reflected in decisions (Defra 2007).

The adoption of an ecosystem approach yields a requirement for an evidence base on ecosystem change and ecosystem service provision to inform decision-making. The UK NEA is designed to provide that evidence base. However its origins are most clearly found in the UK's response to an earlier, global assessment process: the Millennium Ecosystem Assessment (MA).

1.2.2 The Millennium Ecosystem Assessment

The MA was called for in 2000, by the then United Nations (UN) Secretary-General Kofi Annan in his report to the UN General Assembly, *We the Peoples: The Role of the United Nations in the 21st Century*. Carried out from 2001 to 2005, the MA assessed the consequences of ecosystem change for human well-being. It comprehensively demonstrated the importance of ecosystems and the services that they provide to human well-being, and found that, at a global scale, many of these services are being degraded or lost (**Box 1.1**). This conclusion is underpinned by state-of-the-art scientific assessment of the condition and trends in the world's ecosystems and the services they provide (such as clean water, food, flood control and recreation). The MA also explored the options to restore, conserve or enhance the sustainable use of ecosystems.

The MA was conducted as a multi-scale assessment, with interlinked assessments undertaken at local (watershed), national, regional and global scales (MA 2005). Some 34 sub-global assessments were undertaken at a variety of scales as part of the MA, responding to the needs of different decision-makers. Since 2005, at least a further 30 sub-global assessments have been initiated at different scales.

1.2.3 Response from the UK Government and House of Commons Environmental Audit Committee to the Findings of the Millennium Ecosystem Assessment

In 2007, the House of Commons Environmental Audit Committee released a report in response to the findings of the MA. Specifically, this report acknowledged the contribution the MA has made globally and reviewed the relevance of the MA findings in the UK context (House of Commons Environmental Audit Committee 2007). A key recommendation was that: "ultimately the Government should conduct a full MA-style assessment for the UK to enable the identification and development of effective policy responses to ecosystem service degradation".

Early 2008, Defra commissioned a Scoping Study to examine the potential benefits of undertaking an ecosystem assessment for England (Haines-Young *et al.* 2008). The study examined:

1. The policy context in which an ecosystem assessment for England would be set, and the ways in which Defra's involvement or leadership would assist the UK in meeting its wider international commitments and the goals set by national policy.
2. The extent to which the current and planned research portfolio of Defra and its partners had already, or was likely to, put in place all the elements of an ecosystem assessment.
3. Options for an assessment, including benefits and costs.
4. Recommendations on how Defra's requirements for evidence on England's ecosystem services are met.

While the Scoping Study focused primarily on the case for an MA-type assessment for England, it found that there was a strong case for undertaking a UK-scale assessment. The study further recommended that the leadership of a national assessment should rest with the Defra Chief Scientist Group and that a dedicated Scientific Secretariat be established.

In July 2008, the then Secretary of State for Environment, Food and Rural Affairs announced that Defra would commit to supporting an ecosystem assessment for England over two years. Further discussions with the Devolved Administrations led to the expansion of the assessment to include Northern Ireland, Scotland and Wales in order to produce a truly national-scale ecosystem assessment; the decision was taken that the UK NEA would formally begin in March 2009.

1.3 Objectives and Implementation of the UK National Ecosystem Assessment

The objectives of the UK NEA are:

1. Produce an independent and peer-reviewed assessment of the state and value of the UK's natural environment and ecosystem services.
2. Identify and understand what has driven change observed in the natural environment and the services it has provided over the last 60 years, and what may drive change in the future.
3. Foster better interdisciplinary cooperation between natural and social scientists to assist in strengthening policy making in order to ensure effective management of the environment and ecosystem services in the future.
4. Ensure full stakeholder participation and encourage different stakeholders and communities to interact with each other.
5. Use the key messages from the assessment to raise awareness among society of the importance of the natural environment to human well-being and economic prosperity.

Box 1.1 Four main findings of the Millennium Ecosystem Assessment. Source: MA (2005).

1. Over the past 50 years, human have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fibre and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth.
2. The changes that have been made to ecosystems have contributed to substantial net gains in human well-being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of non-linear changes, and the exacerbation of poverty for some groups of people. These problems, unless addressed, will substantially diminish the benefits that future generations obtain for ecosystems.
3. The degradation of ecosystem services could grow significantly worse during the first half of this century and is a barrier to achieving the Millennium Development Goals.
4. The challenge of reversing the degradation of ecosystems while meeting increasing demands for their services can be partially met under some scenarios that the MA has considered, but these involve significant changes in policies, institutions and practices that are not currently under way. Many options exist to conserve or enhance specific ecosystem services in ways that reduce negative trade-offs or that provide positive synergies with other ecosystem services.

Using the ecosystem assessment process developed by the MA (Ash *et al.* 2010) as a starting point, the UK NEA also aims to:

1. Assess the status and trends of the UK's ecosystems and the services they provide at multiple spatial scales.
2. Describe the key drivers of change affecting the UK's ecosystems, including changes in land use, infrastructure development, pollution and climate.
3. Examine plausible futures (scenarios) for the UK's ecosystems and the services they provide.
4. Outline response options to secure continued delivery of the UK's ecosystem services, for the benefit of all of society.
5. Value the contribution of ecosystem services to human well-being through economic and non-economic analyses.

1.3.1 Scope of the UK National Ecosystem Assessment

The UK NEA includes all four of its constituent countries (England, Northern Ireland, Scotland and Wales). It does not incorporate the Isle of Man, the Channel Islands or any of the UK Overseas Territories. At the national scale, the UK NEA assesses terrestrial, freshwater and marine ecosystems, which are categorised into eight Broad Habitats (**Box 1.2**). The picture at country level is captured in four separate individual syntheses, while the local level is addressed through a series of case studies within different chapters.

The UK NEA provides a first attempt at understanding the connection between the environment and people, considering both the ecosystem (Broad Habitat) from which ecosystem services (**Box 1.3**) are derived (**Figure 1.1**) and the people who depend on, and are affected by changes in, the supply of such services. The UK NEA provides an evidence base, highlights gaps in knowledge (research and monitoring), explores plausible futures, and provides a critique of different response options available (including

Box 1.2 The UK's Broad Habitats

Although lacking in extremes—there are no high mountains, no true deserts and no major rivers—the UK is, in fact, remarkably variable biophysically, ecologically and socially, with complex underlying geology, a wide climatic range, (from very wet to semi-arid), and large variations in the distribution of the human population, from extensive areas of near-wilderness (in Scotland) to one of the world's largest metropolitan areas (Greater London). In the UK NEA, this diversity has been captured in eight Broad Habitat types (Figure 1):



Mountains, Moorlands and Heaths cover 18% of the UK's land area. Lowland heaths are highly fragmented, while mountains and upland moors and heaths provide the largest unfragmented semi-natural habitats in the UK. Mountains, Moorlands and Heaths are the source of around 70% of the UK's drinking water, hold an estimated 40% of UK soil carbon, and include some of the country's most iconic landscapes.



Semi-natural Grasslands once covered a large proportion of the UK's land area, largely as the result of low intensity traditional farming. The extent of Semi-natural Grasslands is now extremely reduced, with high diversity grasslands comprising a mere 2% of UK grassland (≥1% of total land area). Semi-natural Grasslands are highly valued culturally—the South Downs, dominated by chalk downland, receives around 40 million visitor days a year.



Enclosed Farmland is the most extensive form of land use in the UK, accounting for around 40% of land area and producing around 70% of the UK's food. Most is managed for cereal, cattle and sheep production. Half of the area of Enclosed Farmland is arable land, mostly in eastern England; almost all the rest is nutrient enriched grassland, mostly in wetter, western parts of the UK. As well as playing a crucial role in provisioning services, Enclosed Farmland is of great cultural significance and is a major determinant of landscape in much of lowland UK.

Dominant UK NEA Broad Habitats (>50%) by area per 1 km cell

- Mountains, Moorlands & Heaths
- Semi-natural Grasslands
- Enclosed Farmland
- Woodlands
- Freshwaters – Open waters, Wetlands and Floodplains
- Urban
- Coastal Margins
- Marine

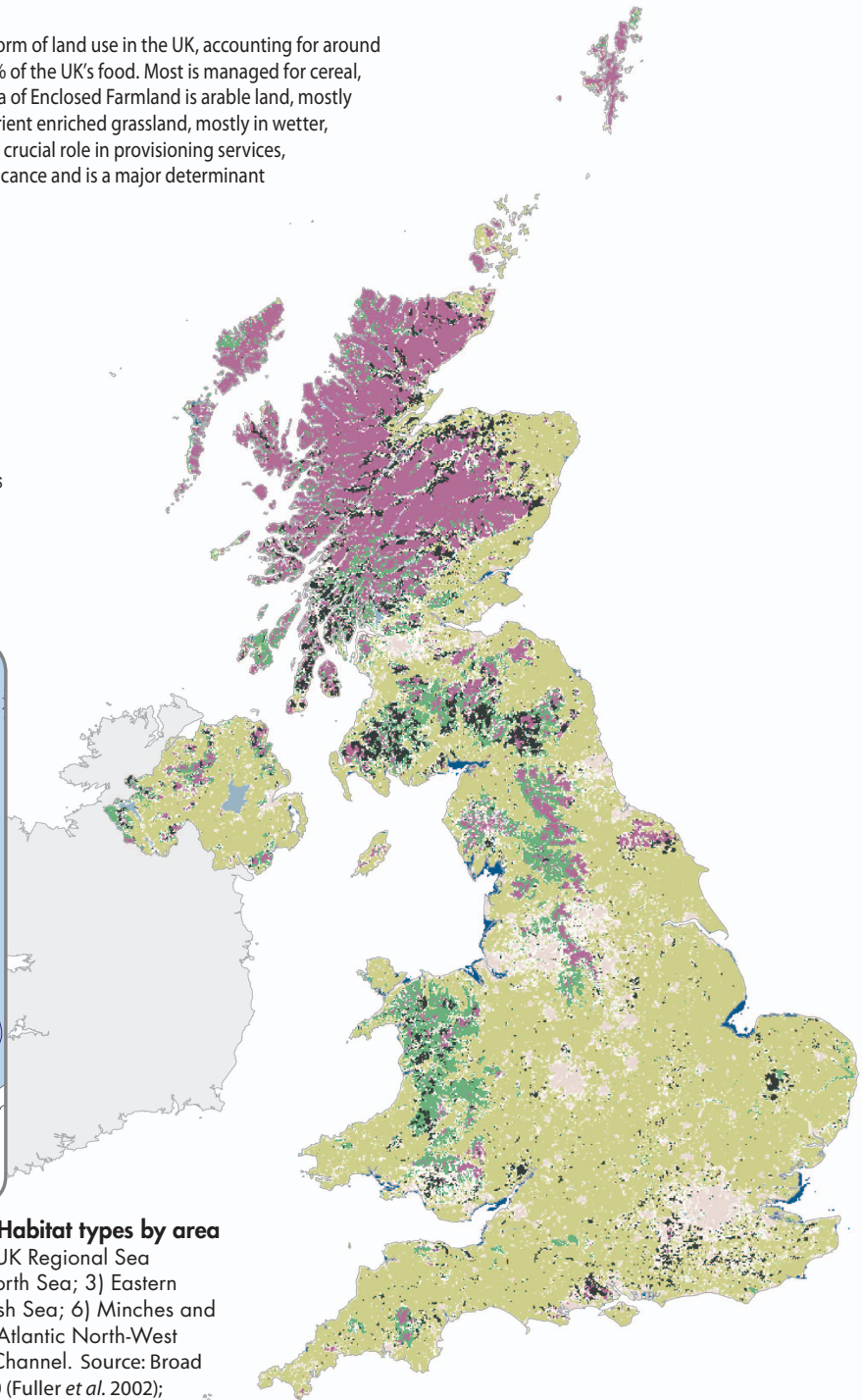
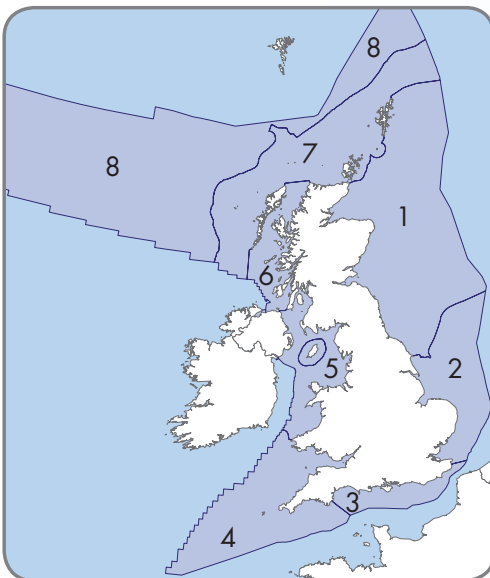


Figure 1 Distribution (%) of the UK NEA Broad Habitat types by area at 1x1 km resolution. Inset: Charting Progress 2, UK Regional Sea boundaries: 1) Northern North Sea; 2) Southern North Sea; 3) Eastern Channel; 4) Western Channel and Celtic Sea; 5) Irish Sea; 6) Minches and Western Scotland; 7) Scottish Continental Shelf; 8) Atlantic North-West Approaches, Rockall Trough and Faeroe/Sheiland Channel. Source: Broad Habitat distribution—data from Land Cover Map 2000 (Fuller *et al.* 2002); Regional seas map based on UKMMAS (2010). Coastline: World Vector Shoreline@National—Geospatial Intelligence Agency. Source: NOASS, NGDC.

Box 1.2 Continued



Woodlands include managed plantations as well as ancient, semi-natural woodlands. Woodlands cover 12% of the UK's land area, making the country one of the least wooded in Europe. At least 80% is less than 100 years old and just 5% is classified as 'ancient woodland'. In the past century, much planting of coniferous trees (often non-native) has taken place. Only in England is Woodland dominated by broadleaved species. Much of the Woodland estate is managed as a source of timber, but Woodlands are increasingly valued for their delivery of other ecosystem services, particularly recreation and carbon storage.



Freshwaters include Openwaters, Wetlands and Floodplains. In the UK, there are more than 389,000 kilometres of rivers, 200,000 hectares of permanent lakes and nearly half a million small ponds. There are also estimated to be at least 390,000 hectares of fen, reedbed, lowland raised bog and grazing marsh, and nearly 1 million hectares of floodplain. Freshwater habitats are a major source of water for a wide range of uses and are important for recreation, including angling, boating and other water sports, and for hazard (notably flood) regulation.



Urban areas in the UK cover just under 7% of the land area. They are home to eight out of ten people, often living at extremely high population densities. Greenspace is very limited in extent, and access to it is unequally distributed; thus it assumes disproportionate cultural significance. Urban areas depend very largely on other habitat types for the provision of most of their ecosystem services.



Coastal Margins, comprising Sand Dunes, Machair, Saltmarsh, Shingle, Sea Cliffs and Coastal Lagoons, cover just 0.6% of the UK's land area. Culturally, Coastal Margins are of immense significance. More than 250 million visits are made to the UK's coast per year, of which, around one third are to natural habitats. These areas are also important in coastal defences, sediment transport and as nursery grounds for fish.



Marine habitats of the UK cover more than three and a half times the land area. They are highly variable, comprising a very wide range of subhabitats. Inshore Marine habitats are of great cultural importance, offering many opportunities for tourism and recreation. Offshore habitats support fisheries and provide a wide range of other ecosystem services such as avoidance of climate stress and waste breakdown and detoxification.

Photo sources: Cairngorm National Park mountain landscape, Scotland by Peter Mulligan available under a Creative Commons Attribution license. Semi-natural Grassland, South Downs, Hampshire by Alistair Young available under a Creative Commons Attribution license. Hay bales © Joingate, 2011 used under license of Shutterstock.com. Veteran oak and beech trees in a mixed lowland woodland, courtesy of FC Picture Library/Isobel Cameron. Glen Cannich, Scotland by Peter Mulligan available under a Creative Commons Attribution license. Housing in Plymouth © Samot, 2011 used under license of Shutterstock.com. Dorset coast © Markus Gann, 2011 used under license of Shutterstock.com. Current swept bed of Zostera marina, courtesy of Keith Hiscock (from www.marlin.ac.uk).

Box 1.3 The UK's Ecosystem Services



Supporting services provide the basic infrastructure of life. They include primary production (the capture of energy from the sun to produce complex organic compounds), soil formation, and the cycling of water and nutrients in terrestrial and aquatic ecosystems. All other ecosystem services—regulating, provisioning and cultural—ultimately depend on them. Their impacts on human well-being are indirect and mostly long-term in nature; the formation of soils, for example, takes place over decades or centuries. Supporting services are strongly interrelated to each other and generally underpinned by a vast array of physical, chemical and biological interactions. Our current understanding of exactly how such ecological interactions influence ecosystem processes and the delivery of supporting services is limited.



Regulating services provided by ecosystems are extremely diverse and include the impacts of pollination and pest and disease regulation on the provision of ecosystem goods such as food, fuel and fibre. Other regulating services, including climate and hazard regulation, may act as final ecosystem services, or contribute significantly to final ecosystem services, such as the amount and quality of available fresh water. As with supporting services, regulating services are strongly linked to each other and to other kinds of services. Water quality regulation, for example, is primarily determined by catchment processes and is thereby linked to other regulating services, such as the control of soil and air quality and climate regulation, as well as to supporting services such as nutrient cycling.



Provisioning services are manifested in the goods people obtain from ecosystems such as food and fibre, fuel in the form of peat, wood or non-woody biomass, and water from rivers, lakes and aquifers. Goods may be provided by heavily managed ecosystems, such as agricultural and aquacultural systems and plantation forests, or by natural or semi-natural ones, for example in the form of capture fisheries and the harvest of other wild foods. Supplies of ecosystem goods are invariably dependent on many supporting and regulating services. Historically, provisioning services have been a major focus of human activity, so are, therefore, closely linked to cultural services.



Cultural services are derived from environmental settings (places where humans interact with each other and with nature) that give rise to cultural goods and benefits. In addition to their natural features, such settings are imbued with the outcomes of interactions between societies, cultures, technologies and ecosystems over millennia. They comprise an enormous range of so-called 'green' and 'blue' spaces such as gardens, parks, rivers and lakes, the seashore and the wider countryside, and including agricultural landscapes and wilderness areas. Such places provide opportunities for outdoor learning and many kinds of recreation; exposure to them can have benefits including aesthetic satisfaction, improvements in health and fitness, and an enhanced sense of spiritual well-being. People's engagement with environmental settings is dynamic: meanings, values and behaviours change over time in response to economic, technological, social, political and cultural drivers, and change can be rapid and far-reaching in its implications.

Photo source: Fly agaric fungus by Dave W. Clarke available under a Creative Commons Attribution-NonCommercial license. Flooded street in Oxfordshire by Dachalan available under a Creative Commons Attribution-NonCommercial license. Stack of wood © Copit, 2011 used under license of Shutterstock.com. Cyclists © Maga, 2011 used under license of Shutterstock.com.

trade-offs between different decisions and outcomes that might need to be made).

The UK NEA focuses on ‘ecosystem services’ that are derived from ecosystem processes including biotic interactions; as such, it does not provide an assessment of ‘environmental services’ that may be purely abiotic in origin such as minerals extracted from the ecosystem. Furthermore, when considering plausible futures, the UK NEA does not provide a model, or predictions, of the future. Neither does it provide a recipe book of simple answers for decision-makers. Rather, it lays out the evidence base for informed decision-making, organised in a way to enable easy navigation.

1.3.2 Governance of the UK National Ecosystem Assessment

A key feature of the UK NEA is that it is an inclusive process involving a large number of government, academic and private sector institutions, and NGOs. Each institution or individual can offer valuable information and knowledge from a range

of perspectives, and the UK NEA includes various groups and bodies as part of its governance structure.

CoChairs of the Expert Panel, Professor Robert Watson (Chief Scientific Adviser, Defra and Strategic Director, Tyndall Centre, University of East Anglia) and Professor Steve Albon (The James Hutton Institute, formerly the Macaulay Land Use Research Institute), led the assessment. Professor Watson brings his invaluable experience from Chairing the MA and the Intergovernmental Panel on Climate Change (IPCC) to the UK NEA process. Professor Albon brings his extensive knowledge of the natural environment of the UK.

A diverse group of academics—consisting of natural scientists, economists and social scientists—formed the 27-member **Expert Panel**. They provided expertise in all technical focal areas of the UK NEA, advised on the assessment process, and approved all chapters for final ‘sign-off’ after they had been through the external review process (see below). The Expert Panel also defined the key messages of the UK NEA included in the Synthesis Report (Section 1.4).

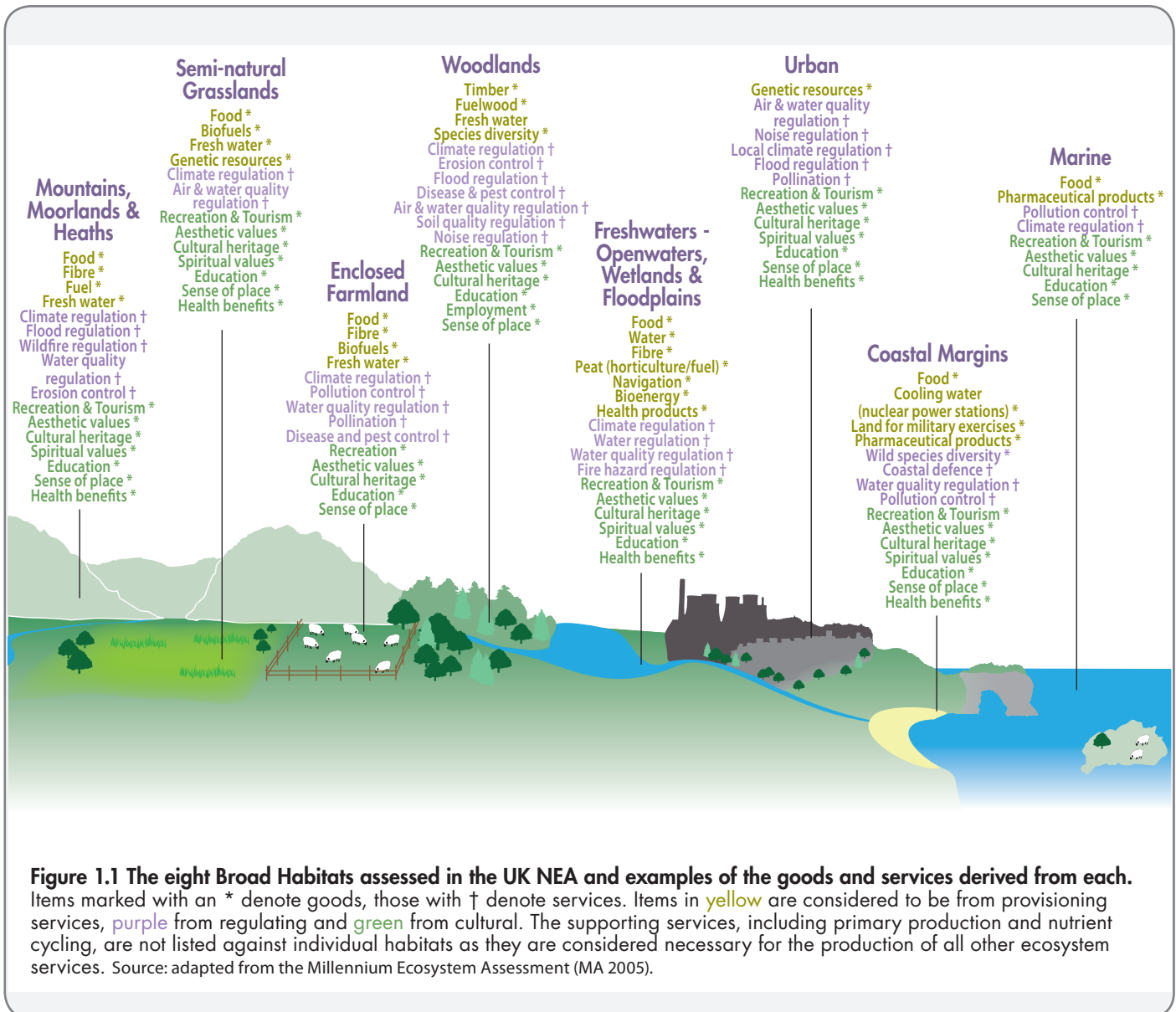


Figure 1.1 The eight Broad Habitats assessed in the UK NEA and examples of the goods and services derived from each. Items marked with an * denote goods, those with † denote services. Items in yellow are considered to be from provisioning services, purple from regulating and green from cultural. The supporting services, including primary production and nutrient cycling, are not listed against individual habitats as they are considered necessary for the production of all other ecosystem services. Source: adapted from the Millennium Ecosystem Assessment (MA 2005).

Box 1.4 Key questions addressed by the UK NEA.

1. What are the status and trends of the UK's ecosystems and the services they provide to society?
2. What are the drivers causing change in the UK's ecosystems and their services?
3. How do the ecosystem services affect human well-being, who and where are the beneficiaries, and how does this affect how they are valued and managed?
4. Which vital UK provisioning services are not provided by UK ecosystems?
5. What is the current public understanding of ecosystem services and the benefits they provide?
6. Why should we incorporate the economic value of ecosystem services into decision-making?
7. How might ecosystems and their services change in the UK under plausible future scenarios?
8. What are the economic implications of different plausible futures?
9. How can we secure and improve the continued delivery of ecosystem services?
10. How have we advanced our understanding of the influence of ecosystem services on human well-being and what are the knowledge constraints on more informed decision-making?

Devolved Level

UK

	Mountains, Moorlands and Heaths	Semi-natural Grasslands	Enclosed Farmland	Woodlands	Freshwaters – Openwaters, Wetlands and Floodplains	Urban	Coastal Margins	Marine
Supporting Services								
Regulating Services								
Provisioning Services								
Cultural Services								

Figure 1.2 Matrix of Broad Habitats and ecosystem services.

The involvement of a wide range of public, private and third sector decision-makers and stakeholders through a **User Group**, as well as a range of wider stakeholder meetings, helped to shape the assessment process and ensure that the outputs are relevant for a variety of different audiences.

The 300-plus authors involved, managed by a group of **Coordinating Lead Authors** (largely natural scientists, but including economists and social scientists), were drawn from more than 50 academic institutions, together with representatives from over 15 government agencies, more than 10 NGOs and 11 private sector institutions.

Each chapter was peer-reviewed by a number of **external reviewers** (on average, seven per chapter, and never less than three for any one chapter) using a standardised review template. After chapters had been revised by the respective Coordinating Lead Author, they were reassessed by the Expert Panel for final approval prior to publication.

Together, the organisations that commissioned the UK NEA—Defra (England), the Devolved Administrations of Northern Ireland, Scotland and Wales (with CCW), NERC and ESRC—formed the **Client Group**, which provided continual oversight and guidance on the whole process.

Coordination was carried out by an independent **Secretariat** based at the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). The Secretariat was responsible for coordinating

the different assessment activities, and liaising with each of the various author teams, reviewers, data providers, oversight groups and other stakeholders. The Secretariat also provided support to the CoChairs, organised meetings, and managed the timetable, budget, and the review and production processes of the various UK NEA outputs such as the website and communication materials.

1.3.3 Structure of the UK National Ecosystem Assessment

The work was conducted by 26 author teams, working across a matrix (**Figure 1.2**) to answer a set of core questions (**Box 1.4**). Each author team, led by one or two Coordinating Lead Authors, produced a chapter. The three introductory chapters develop the Conceptual Framework for the assessment (Chapter 2), outline the drivers of change operating in the UK (Chapter 3) and examine the links between biodiversity and ecosystem services in the UK (Chapter 4).

Following this, eight author teams assess each of the eight Broad Habitats (Chapters 5–12). These chapters present the state of knowledge of the condition and trends of the Broad Habitat from the end of the Second World War (WWII) to the present day, along with an examination of what is driving that change, the ecosystem services provided and their links to human well-being. They also explore trade-offs and synergies between different ecosystem services, sustainable management options and knowledge gaps. A further four

author teams examined the status and trends of four groups of ecosystem services, namely Supporting Services (Chapter 13), Regulating Services (Chapter 14), Provisioning Services (Chapter 15) and Cultural Services (Chapter 16). These chapters further outline the drivers causing change in these services and the consequences of these changes.

The chapters focusing on Broad Habitats and UK-wide ecosystem services are complemented by four chapters which synthesise the evidence and provide the narrative for each of the individual countries within the UK: England (Chapter 17), Northern Ireland (Chapter 18), Scotland (Chapter 19) and Wales (Chapter 20). To assist in putting trends in habitats and ecosystem services within the UK into a global perspective, a short chapter outlines the trends in the dependence of the UK on overseas ecosystem services (Chapter 21). The UK NEA endeavours to understand the contribution that ecosystem services make to the well-being of people in the UK, with three teams assessing the different components of value: Economic values (Chapter 22), Health values (Chapter 23) and Shared Social values (Chapter 24).

The Scenarios assessment team considered possible future trends in ecosystem services under six scenarios, each with two different climate projections (high and low carbon emissions) (Chapter 25). The Economic team then valued changes for a selection of ecosystem services under a range of these plausible futures (Chapter 26). Lastly, the Response Options team considered a range of options for decision-making and the different actors that could play a part in shaping the future for ecosystem services in the UK (Chapter 27).

Chapters 3–27 each begin with a set of key findings. Adopting the approach and terminology used by the IPCC and the MA, those chapters that present the existing evidence base (Chapters 3–21) also include an indication of the level of scientific certainty of each finding: *Virtually certain* (>99% probability of occurrence); *Very likely* (>90% probability); *Likely* (>66% probability); *About as likely as not* (>33–66% probability); *Unlikely* (<33% probability); *Very unlikely* (<10% probability); and *Exceptionally unlikely* (<1% probability). A qualitative scale was also implemented: *well established* (high agreement based on significant evidence); *established but incomplete* (high agreement based on limited evidence); *competing explanations* (low agreement, albeit with significant evidence); and *speculative* (low agreement based on limited evidence). Estimates of certainty were derived from the collective judgement of authors, observational evidence, modelling results and/or theory examined for this assessment.

1.4 Outputs of the UK National Ecosystem Assessment

The UK NEA has been produced in two separate volumes. The **Technical Report** presented here represents the

evidence from which the findings and key messages of the UK NEA are derived. It contains each of the chapters prepared by the different author teams (Section 1.4.3). It is not necessarily intended to be read from cover to cover, but is structured as a compendium of the state of knowledge and as a resource for consultation. The Technical Report is fully referenced to enable the reader to explore in depth the supporting literature for any issue of interest.

A **Synthesis Report** (*UK NEA: A Synthesis of the Key Findings* 2011) has also been prepared. This is considerably shorter than the Technical Report and is written for a wider audience of stakeholders and decision-makers. The Synthesis Report presents a series of high-level key messages, together with a summary of the main findings of the UK NEA. It includes consolidated answers to each of the questions in **Box 1.4**, as well as an annex containing the key findings from Chapters 4–16 of the Technical Report. It is comprehensively cross-referenced to the Technical Report in order to enable the reader to source the supporting evidence for the findings it presents. The Synthesis Report was launched by the Secretary of State for the Environment, and by each of the Devolved Administrations, in June 2011.

The Synthesis Report, together with each of the chapters in the Technical Report, has been made available electronically from the UK NEA website, hosted by UNEP-WCMC (<http://uknea.unep-wcmc.org>). In addition, a series of summary PowerPoint slides, and all major graphics, are also available for download.

1.5 Linkages to Other Initiatives

1.5.1 Links to Other Initiatives Within the UK

The UK NEA is an assessment of the evidence base and, therefore, has drawn on and complements a number of major UK initiatives. These include:

Charting Progress 2: Published by the UK Marine Monitoring and Assessment Strategy community, Charting Progress 2 (CP2; UKMMAS 2010) reports on the state of the UK's seas. It provides the evidence base on progress made since 2005 (Defra, 2005) in five key areas: ocean processes; healthy and biologically diverse seas; clean and safe seas; productive seas; and climate change. One of the attributes of CP2 is the provision of key findings from UK marine research and monitoring for use by policy makers. The evidence base developed for CP2 has been used within the Marine assessment (Chapter 12) of the UK NEA.

Countryside Survey: The Countryside Survey is a regular survey about the state or 'health' of the UK's countryside. The survey has been carried out in 1978, 1984, 1990, 1998 and 2007, which allows change, and the relative rate of change, to be identified. The evidence generated from the Countryside Survey is used to inform policies that influence the management of the countryside. The

Countryside Survey is broken into two components: a field survey using a sample of 1 km² quadrants; and the creation of a Land Cover Map, derived from satellite data.

Foresight Studies: The UK's Foresight Programme, reporting directly to the Government's Chief Scientific Adviser and the Cabinet Office, brings together key people, knowledge and ideas to look beyond normal planning horizons and identify opportunities that could arise from new science and technologies; it then explores the actions that the UK might take to help realise those opportunities. Foresight Studies provide an evidence base, coupled with strategic insights, that helps to inform policy on potential issues. Issues examined by Foresight Studies include: The Future of Food and Farming (2011); Land Use Futures (2010); Sustainable Energy Management and the Built Environment (2008); and Future Flooding (2004).

Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network: Led by Professor Sir John Lawton, and published in 2010, Making Space for Nature (the Lawton Report) is an independent review of England's wildlife sites and the connections between them, specifically looking at where wildlife sites are capable of responding and adapting to climate change and other demands on the land. Key recommendations arising from the Lawton Report include requirements for: better protection and management of designated wildlife sites; the establishment of new Ecological Restoration Zones; and better protection of non-designated wildlife sites.

1.5.2 Links to Other Initiatives in Europe and the World

The UK NEA is framed within an evolving international policy framework. Specifically, the UK NEA will support the UK in meeting a set of global obligations including:

- CBD Decision VIII/9, paragraph 23, which calls for parties to conduct assessments making use of the conceptual framework and methodologies of the MA.
- CBD Decision IX/15, paragraph 1, which invites parties to promote and support integrated national ecosystem assessments, including response scenarios that build on existing frameworks and experiences such as the MA.
- Ramsar Resolution IX.1, Annex A, which updates the 'wise use' concept to include the MA framework and ecosystem services.

The UK NEA also builds on, and contributes to, a number of international science-policy initiatives, some of which are highlighted below:

The MA Follow-up Process: In February 2008, the MA Follow-up Process was established by interested partners of the MA, with the production of A Global Strategy for Turning Knowledge into Action (UNEP/CBD/COP/9/INF/26). The strategy was developed to respond to the recommendations of two independent evaluations of the MA (2005). The evaluations concluded that, despite the advancement in knowledge that the MA contributes, there was little evidence that the MA had made a significant direct impact on policy formulation and decision-making. The key reasons for the lack of impact of the MA have been attributed to:

- gaps in the ecosystem services knowledge base;

- lack of operational tools and methodologies;
- insufficient attention to sub-global assessments;
- limited economic analysis;
- lack of periodic assessments; and
- limited awareness and understanding among decision-makers of the MA findings and the concept of ecosystem services.

In an attempt to give the MA greater traction, a global strategy was created around four objectives:

1. Build the knowledge base.
2. Integrate the MA ecosystem services approach into decision-making at all levels.
3. Disseminate the MA and communicate its findings.
4. Future global assessments.

In particular, under the first objective, ecosystem assessments are encouraged at different scales. Efforts have been made to create a network of such assessments, coordinated by a Secretariat, to ensure consistency with the MA framework and to contribute to international lesson-sharing and a possible further global assessment.

The Economics of Ecosystems and Biodiversity: The Economics of Ecosystems and Biodiversity (TEEB) study is a major international initiative whose findings were published in 2010. The aim of TEEB was to draw attention to the global economic benefits of biodiversity, in turn, highlighting the growing costs of biodiversity loss and ecosystem degradation. Bringing together experts from the fields of science, economics and policy, TEEB produced a series of reports examining: the global economic costs of biodiversity loss, and the costs and benefits of actions to reduce these losses; guidance for policy makers at different scales (including consideration of subsidies and incentive, environmental liability, national income accounting and implementing instruments such as Payments for Ecosystem Services); access to tools for measuring business impacts on ecosystems and biodiversity; and raising awareness of the contribution of ecosystem services and biodiversity to human well-being and how individual action can have an impact.

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: Since 2008, UNEP has been facilitating discussion on a proposed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). This has been conducted through three Ad Hoc Intergovernmental and Multi-Stakeholder meetings. At the final meeting in Busan, Republic of Korea (7–11 June 2010), the plenary adopted the Busan Outcome (UNEP/IPBES/3/3) which recommends the establishment of IPBES. This recommendation has subsequently been endorsed by the UN General Assembly (resolution number 65/162). It is envisaged that, during 2011, IPBES will be established and that ecosystem assessments at national and regional scales, such as the UK NEA, will make an important contribution.

1.6 Next Steps: Building on the UK National Ecosystem Assessment

The UK NEA provides a major foundation of evidence for Defra's new White Paper on the Natural Environment for England. As such, the assessment process is closely tied to government policy making. The approach taken and methods developed within the UK NEA have significant potential to influence future action on the natural environment and the direction of national development.

To realise this potential will require the findings and messages of the UK NEA to be widely disseminated. Consultation with stakeholders and the User Group identified a number of ways in which the findings might be packaged for specific audiences, and there will be ongoing efforts beyond the launch of the Synthesis Report to ensure the UK NEA reaches audiences across a variety of sectors and scales.

The UK NEA is a first step in assessing the UK ecosystems and their services for human well-being and establishes a comprehensive evidence base to support decision-making by different actors and at different scales. While the UK NEA provides comprehensive answers to a number of the questions posed at the start, many gaps in knowledge were uncovered during the assessment process. Effectively, the UK NEA provides a road map for future research and monitoring needs to better understand the UK's ecosystems, their services and benefits to society. Some of this future research may be undertaken as part of LWEC.

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