

Scoping the potential benefits of undertaking an MA-style assessment for England

Overview Report

For



(Project Code NR0118)

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Notes:

This document reflects the views of the project team and not those of Defra and its partners.

If you use the document please quote as:

Haines-Young, R., Fish, R., Potschin, M., Brown, C.; Tindall, C. and S. Walmsley (2008): Scoping the potential benefits of undertaking an MA-style assessment for England. Overview Report to Defra (Project Code NR0118).

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Acknowledgements

We are grateful to Defra's Natural Environment Strategic Unit (NESU)¹ group and especially Sarah Moon and later in the project Robert Bradburne as NESU Project Manager for guiding us through the process in a very professional but also encouraging and calm way.

We also would like to thank the following Advisory Board Members for their input: Ian Dickie (Eftec), Mark Everard (Environment Agency), Dave Raffaelli, University of York and UKPopNet Director and Richard Bradbury (RSPB).

Over 20 participants at a workshop in Cambridge on 18.2.2008 gave us feedback on draft material – The outputs from this workshop have informed several parts of these reports.

¹ <http://www.defra.gov.uk/wildlife-countryside/natres/index.htm>

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Executive Summary

Background

The aim of this study is to identify and examine potential benefits of undertaking an ecosystem assessment for England. The need for such a study has arisen largely as a result of the 2005 Millennium Ecosystem Assessment (MA)², which not only demonstrated the importance of ecosystem services to human well-being, but also showed that at global scales, many key services are being degraded and lost.

The contribution that the MA has made globally was acknowledged by the House of Commons Environmental Audit Committee, which reviewed its relevance in the UK context (House of Commons Environmental Audit 2007a). They noted the slow uptake of the implications of the MA in the UK, and recommended that 'ultimately the Government should conduct a full MA-type assessment for the UK to enable the identification and development of effective policy responses to ecosystem service degradation' (para. 125).

However, the Committee took its evidence at the end of 2006, and clearly the situation may now be different. The motivation for this study is therefore to take stock of what has been achieved and test the case for MA-type assessment for England critically. The specific objectives of the study are to:

- Review the case for an MA-style assessment for England, given current evidence needs in relation to the delivery of healthy ecosystems and the sustainable supply of ecosystem services, and the extent to which these are met by existing research and monitoring programmes;
- Develop a framework for how an MA-style assessment could be undertaken in England and make best use of current monitoring and assessment processes in the UK; and
- Identify feasible options for undertaking an MA-style assessment for England, with an assessment of associated costs and benefits, and to make recommendations on how to take the planning and inception process forward.

Findings

An MA-style assessment for England which followed the framework of the 'global MA' would potentially deliver a range of relevant evidence to the UK policy community, and address the needs set out in Defra's current *Action Plan for Embedding the Ecosystem Approach* (Defra, 2007a). However the case for undertaking an MA-style assessment for England depends on:

- The extent to which current and proposed research and monitoring initiatives already meet present and future needs for information about ecosystem services; and,
- There being no significant institutional or cost barriers to taking such an exercise forward.

Thus a detailed review of the adequacy of the developing evidence base was undertaken. We found that:

- Some ecosystems and ecosystem services are better researched than others. In particular, the terrestrial environment is generally better covered than

² www.millenniumassessment.org

the marine, but there is a general lack of information on the importance of biodiversity for securing ecosystem services.

- There are significant gaps in the information available on the state and trends in ecosystems and the output ecosystem goods and services, and the information on the linkages between ecosystems, ecosystem change and conceptions of human well-being is fragmented.
- The majority of existing national ecosystem assessment and monitoring programmes track changes in ecosystem health over time, in terms of the ability of these systems to supply ecosystem services.
- The emerging evidence base on drivers of change has not yet been connected to an assessment of ecosystems services and where it is it is often at the wrong scale given the way decisions are made.
- There is little work on valuing ecosystem services and most existing approaches interpret valuation solely in economic terms.
- Tools for evaluating alternative futures exist, but current scenario exercises are weakly related to requirements of geography or scale.
- A case can be made for a more coordinated and coherent approach to assessing ecosystem services at national scales, and that the process of doing so could be seen as part of work to embed the ecosystems approach in decision-making more generally.

Recommendations

Different assessment options were compared in terms of their thematic scope and empirical detail. **Our review suggests that the most appropriate form for such an assessment is one that is broad in scope but initially limited in the range of new commissioned research and monitoring.** This proposed approach, would however, be highly integrated in tone - exploring connections between a wide variety of themes. The emphasis of the process would be on producing “headline messages” at the macro scale and on creating a compelling and coherent narrative at the national level, designed to recruit new partners to the exercise. We recommend such an option because, if successful, it could set in place new ways of thinking about ecosystem services that would change the way people and organisations make decisions about them – thus embedding the Ecosystems Approach in a quite general way.

We recommend placing leadership of the national assessment within the Defra Chief Scientist Group, and supporting it by establishing a dedicated Scientific Secretariat. We estimate that the cost of such an exercise would be around £520k and the exercise would take about 2 years to complete; 2009 would be an appropriate starting point given the timetables of other studies likely to provide information for it. By using the exercise as a platform to review and refine understandings of evidence gaps, new research could be commissioned or encouraged via the Environmental Research Funders Forum or through the NERC-led Living with Environmental Change initiative. This would deepen the assessment approach in the long term and help embed the Ecosystems Approach in decision making more generally.

Our cost estimates do not cover the resources needed for a UK assessment. Although we strongly recommend that a UK study be done, the cost estimates presented here only cover that for England. It is assumed that the additional costs of the full national exercise would be met by the devolved administrations.

Part 1: Introduction

1.1 Background

The aim of this study is to identify and examine potential benefits of undertaking an ecosystem assessment for England.

The need for such a study has arisen largely as a result of the 2005 Millennium Ecosystem Assessment (MA)³, which not only demonstrated the importance of ecosystem services to human well-being, but also showed that at global scales, many key services are being degraded and lost. It found that around 60% of the ecosystem services⁴ evaluated are being used unsustainably, and that this has major implications for development, poverty alleviation, and the strategies needed by societies to cope with, and adapt to, long-term environmental change.

The MA was the first comprehensive global assessment of the consequences of ecosystem change for human well-being⁵. Its aim was to establish the scientific basis for the actions needed to enhance the conservation and sustainable use of ecosystems and to secure the contribution they make to people's livelihoods. It has resulted in the best available information and knowledge on ecosystem services being brought to bear on current and future policy and management decisions.

The significant contribution that the MA has made globally was acknowledged by the House of Commons Environmental Audit Committee, which went on to review its relevance in the UK context (House of Commons Environmental Audit 2007a). They noted the slow uptake of the implications of the MA in the UK, and recommended that 'ultimately the Government should conduct a full MA-type assessment for the UK to enable the identification and development of effective policy responses to ecosystem service degradation' (para. 125). In its response the Government noted the strong support amongst the UK research community for a full-MA type assessment for the UK, but argued that future initiatives must be carefully designed to avoid duplication (House of Commons Environmental Audit Committee 2007b). The Government suggested that the way forward was to explore how a national assessment might pull together existing initiatives and ensure a more coherent approach to monitoring the status of and trends in ecosystem services, for both terrestrial and marine ecosystems, and predicting future impacts of drivers of change. **The aim of this study is therefore to examine potential benefits of undertaking an ecosystem assessment for England.**

³ www.millenniumassessment.org

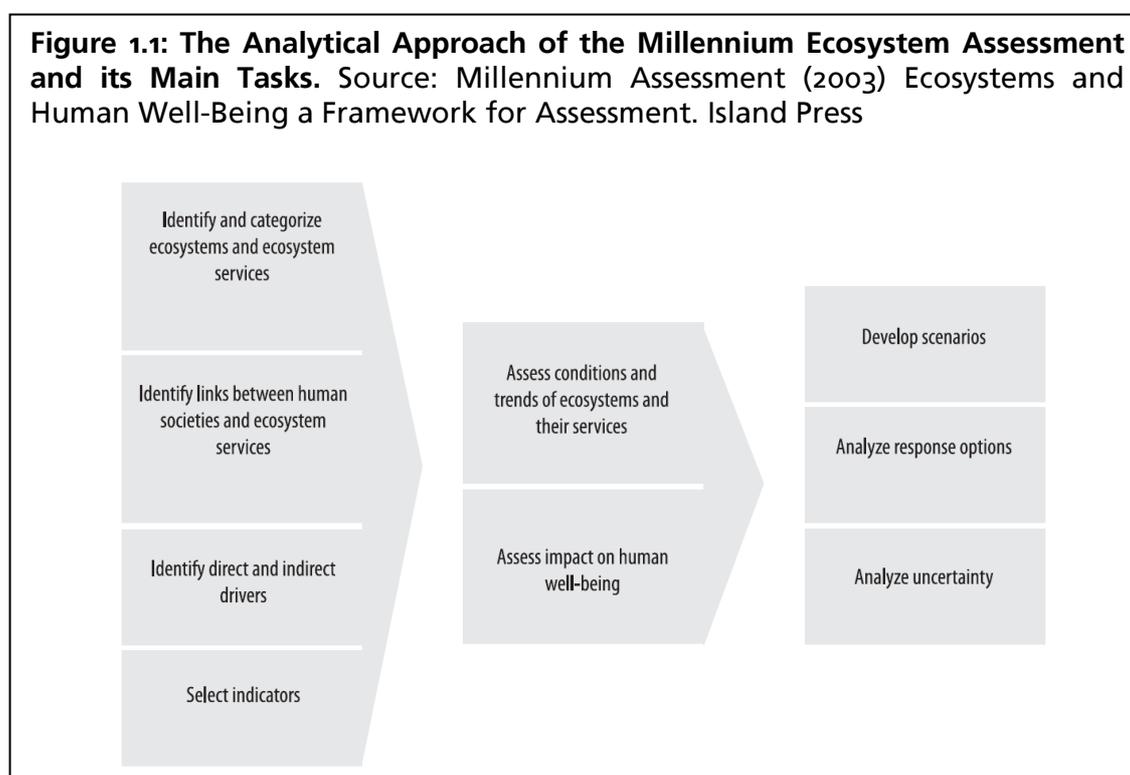
⁴ Ecosystem Services are defined by the MA (2005) as "The benefits people obtain from ecosystems. These include *provisioning services* such as food and water; *regulating services* such as flood and disease control; *cultural services* such as spiritual, recreational, and cultural benefits; and *supporting services* such as nutrient cycling that maintain the conditions for life on Earth." Note that for convenience the term 'ecosystem services' is often used in this report to denote the longer 'ecosystem goods and services'. Ecosystem services are conceptually considered to include the output of goods.

⁵ Human well-being is defined by the MA (2005) as "A context- and situation-dependent state, comprising basic material for a good life, freedom and choice, health and bodily well-being, good social relations, security, peace of mind, and spiritual experience."

1.2 Exploring the Case for an MA-style Assessment

Despite the recommendation that, following the global MA, regional and national scale assessments should be made, there is no single, prescribed model setting out how such exercises should be undertaken. While methodological guidelines are in preparation⁶, it is unlikely that they will be prescriptive, because the experience of the global MA suggested that it was important for sub-global assessments to be tailored to meet 'local' needs. In consequence, some consideration of what the key elements of an MA-style assessment for England might be is an essential part of this study.

Although assessment approaches have to be flexible, clearly for any exercise to 'badge' itself as an 'MA-style assessment', it must conform in some respects to the structure of the global assessment. This model is depicted in Figure 1.1 below and serves as a convenient starting point for a review of what an MA-style assessment for England might involve.



The MA framework suggests that an assessment process follows a logical and sequential process of inquiry including: a **conceptualisation** stage, in which ecosystem services are categorised, drivers of change identified, links to human well-being elucidated, and indicators for monitoring change established; a **monitoring** stage in which the current state and trends of services are described and their implications for human well-being evaluated; a **scenario** stage, in which plausible future changes in ecosystems and their ecosystem services and the consequent changes in human well-being are assessed and an **evaluation** stage in which responses and measures to enhance well-being and conserve ecosystems are explored and key uncertainties hinder effective decision-makings

⁶ Ecosystem Assessment Manual, due to be released in October 2008

addressed. This analytical approach provides the framework in which the case for an MA-style assessment for England is examined in this report.

1.3 Aim and Objectives

Since the Report of the Audit Committee and the publication of the Government's response, a number of studies dealing with different aspects of ecosystem services have been undertaken at the request of Defra. This report takes stock of what has been achieved, and examines the question of whether a formal MA-style assessment is needed to further inform Government policy and decision making in this important area of national and international concern. In looking at the case for an MA-style assessment for England, this document also considers the issue from a more practical perspective. It considers how such an assessment might be undertaken if one was required, and what costs such an exercise might entail. In particular, the specific objectives of the study are to:

- review the case for an 'MA-style assessment for England', given current evidence needs in relation to the delivery of healthy ecosystems and the sustainable supply of ecosystem services, and the extent to which these are met by existing research and monitoring programmes;
- develop a framework for how an MA-style assessment could be undertaken in England and make best use of current monitoring and assessment processes in the UK; and,
- identify feasible options for undertaking an MA-style assessment for England, with an assessment of associated costs and benefits, and to make recommendations on how to take the planning and inception process forward.

A considerable part of the work undertaken to meet these objectives has been directed towards understanding user needs. Given the way this Project was initiated, the starting point was Defra's recently published *Action Plan for Embedding an Ecosystems Approach* (Defra, 2007a)⁷, which outlined its key strategic goal of ensuring the delivery of healthy ecosystems and the sustainable supply of ecosystem services. In order to make our assessment of needs, we have considered the extent to which Defra's vision can be met by existing research and monitoring programmes, or whether that goal may be advanced by initiating a more formal MA-style process at the national level. Although it has been important to retain a 'client focus' for this study, by virtue of its position it has been vital to look at Defra's needs in a broader context. As a result, the evaluation of needs that we have made takes account of the global impact of the MA on science and policy agendas and its wider implications for the UK, together with domestic policy requirements.

1.4 Structure of the Report

The report is divided into four further sections. In Part 2 of the Report we consider the policy context in which an MA-style assessment for England would

⁷ The Defra Action Plan uses the term 'Ecosystems Approach' using the plural to emphasise that no prescriptive methodology is implied. In this report we employ the more widely used 'Ecosystem Approach', as described in the CBD, which emphasises the higher-level or more strategic issues surrounding decision making - but broadly the two are synonymous; see Haines-Young and Potschin (2008).

be set, and the ways in which Defra's involvement or leadership would assist the UK in meeting both its international commitments and the goals set by national policy. In this Part we make an analysis of user needs against the sorts of information that an MA-style assessment might provide, based on the 'model assessment outlined in Figure 1.1.

Part 3 explores the extent to which the current and planned research portfolio of Defra and its partners has already, or is likely to, put in place all the elements of a national ecosystem assessment. A key question that is explored in this part of the report is the extent to which current or planned work amounts to a '*de facto* MA', with the implication that further investment of time and effort in a formal exercise would be redundant. Here our goal is to determine whether there are significant gaps in the current or evolving evidence base that could usefully be overcome by an MA-style assessment, and what kinds of timetable for such an assessment might be appropriate.

Our work has focused specifically on the English rather than the UK context. While there may be merit in coordinating activities across the devolved administrations, the question of whether an MA-style assessment is needed for the UK as a whole can only be answered, perhaps, once the potential partners in such an exercise have looked at their own requirements and responsibilities. We see the outputs of this study as one of the elements in the wider national debate that may need to be had.

Having reviewed the requirements for an MA-style assessment for England, Part 4 of the report looks at the options open to Defra. We compare the benefits and costs of the 'do nothing' option with others that more formally stimulate and coordinate assessments of ecosystem services at different levels of thematic and geographic detail. On the basis of the findings presented in Parts 2, 3 and 4, the final section of the report (Part 5) makes recommendations on how Defra's requirement for evidence on the state and trends of England's ecosystem services are sustained might best be met.

Part 2: Policy Contexts

2.1 Introduction

This part of the Report considers the policy context in which an MA-style assessment for England would be set and the ways in which Defra's involvement and leadership would assist the UK in meeting its policy goals and international commitments. The main focus of the analysis is not to determine if such an exercise is necessary, but whether the types of information that it might provide are needed. In part 3 we investigate whether this need is best served by an MA-style assessment rather than by other initiatives.

2.2 International Policy Frameworks

A potential use of the kinds of information from an MA-style assessment could provide is to support the UK Government's implementation of the decisions under, the Convention on Biological Diversity and the Ramsar Convention on Wetlands of Importance. The former calls for parties to conduct assessments making use of the conceptual framework and methodologies of the MA, while the latter expands the 'wise use' concept to include the key concept embodied in the MA framework and the ideas surrounding ecosystem services. **Thus whether or not a formal MA-style assessment for England is undertaken, some way of demonstrating what has or is being done in relation to ecosystem services in the UK will be needed.**

The findings and concepts of the MA have also been taken by the European Commission. As a result future European initiatives are likely to require the UK to develop some overview of ecosystem services at the national scale. The Communication of the Commission of the European Communities on halting biodiversity loss by 2010 and beyond (Com (2006) 216 final), for example, emphasises the importance of biodiversity for ecosystem services, which ensure human well-being. SEBI2010 is a pan-European initiative that was launched in 2004, aim to develop a European set of biodiversity indicators to assess and inform progress towards the European 2010 targets. To date, 19 biodiversity indicators have been developed, though none as yet specifically address the importance or role of ecosystem services. It is likely that such developments will, however, be stimulated especially as a result of the proposals for a European-scale ecosystem assessment, 'EURECA 2012'⁸, and the wider but specific requirements of the EU Water Framework Directive.

In the marine sector there are a number of additional, specific initiatives that are relevant to questions of the need for information about ecosystem services. The International Council for Exploration of the Sea (ICES), for example, defines and promotes the Ecosystem Approach⁹ as the integrated management of human activities based on knowledge of ecosystem dynamics to achieve sustainable use of ecosystem goods and services, and maintenance of ecosystem integrity. Furthermore, the Bergen Declaration at the 5th International Conference on the Protection of the North Sea, 2002, commits signatories to use the Ecosystem Approach within management of the North Sea.

⁸www.eea.europa.eu or <http://biodiversity-chm.eea.europa.eu/information/F1051869800/fol818985/>

⁹ In this report we try to avoid abbreviating the term 'Ecosystem Approach'. The often used abbreviation 'EA' conflicts with the EA used in the UK for Environment Agency and others. The IUCN CEM suggests to use EsA as an abbreviation.

The proposed EU Marine Strategy Directive indicates that all human activities affecting the marine environment should be managed in an integrated manner that promotes conservation and sustainable use of oceans and seas in an equitable way. European Marine Regions will be established and strategies will be developed for each of them based on detailed assessment of the state of the environment and the extent to which 'good environmental status' has been achieved. The strategies will also set environmental targets and initiate monitoring programmes. Clearly evidence about the state and trends of marine ecosystem services and the impacts of change on society will be fundamental.

Whether England, or the UK as a whole, initiates a formal MA-style process, it is clear that increasingly international policy will be framed around notions of the Ecosystems Approach and the wise use of ecosystem services. **If the UK is to participate in, and contribute effectively to, such debates, then some coordinating mechanism is likely to be required to marshal evidence relevant to national interests and present it in a way that has currency in the international arena.** The key question that must be addressed is whether such coordination is best achieved a country-level MA-style assessment, or whether existing initiatives are likely to fulfil this need.

2.3 National Policy Frameworks

A valuable starting point for investigating the potential contribution of a MA-style assessment in the domestic context is provided by Defra's recently published *Action Plan* (Defra, 2007a). This document elaborates Defra's broad strategic goals for the natural environment set out within an Ecosystems Approach and sets out important links with wider policy initiatives.

The *Action Plan* has two key themes:

- The new, cross-Government Public Service Agreement (PSA) which aims to secure 'a diverse, healthy and resilient natural environment'. The Action Plan stresses the vital contribution that an 'Ecosystems Approach' to decision making will play in achieving it; and,
- The importance of understanding the state and trends of our terrestrial and marine ecosystem services, how we value them and how we manage these resource systems for people within the limits of ecosystem functioning.

The two are closely connected in that they require a holistic approach to policy development and appraisal that links concerns for the biophysical aspects of natural resource systems to its consequences for human well-being. Echoing international policy frameworks, the *Action Plan* goes on to describe the importance of embedding the Ecosystems Approach in decision making at all levels, and across different policy domains, so as to escape the problems created by thinking in 'silos'.

The document lists 34 actions designed to build awareness of the Ecosystems Approach and the importance of ecosystem services, and to ensure that the concepts are used widely in decision-making. These actions offer insight into Defra's immediate information needs and the links with other organisations that are seen as being of direct importance in taking its vision forward.

A review (see Table 2.1) of the activities identified in the *Action Plan* against the nine conceptual elements of the 'model MA' suggested in Part 1. This analysis indicates that there is a clear need for the types of information that such an exercise might generate.

Table 2.1: Immediate Customers for a potential England MA-style assessment – number of relevant actions assigned to each in the Action Plan (Source Defra, 2007a)

'Action Owner' and Potential Customer for an 'MA-style assessment for England'	Number of Actions	MA Elements										
		1	2	3	4	5	6	7	8	9		
Director, Wildlife and Countryside, Defra	12	3	3	1	2	4	3				12	1
Chief Economist, Defra	6				1	1	4				6	3
Executive Director, Strategy and Performance, Natural England	6				1	3	3				6	1
Director, Forestry Commission England	5				1	2	2				5	1
Head of Wildlife, Recreation and Marine, Environment Agency	5				1	2	2				5	1
Deputy Director, Science and Innovation, NERC	4	1	1			1	1		1		4	
Director, Head of Science Directorate, Defra	4					1					4	
Director of Water, Defra	3	1	1								3	
Director, Marine and Fisheries, Defra	3					2	1				3	
Chair, ERF	2										2	
Deputy Regional Director, Environment, Resilience & Rural, GONW	2				1	1					2	
Director, Rural Landscape and Adaptation, Defra	2	1	1			1	1				1	
Associate Director for Research (Environment, Education and Governance), ESRC	1										1	
Associate Director for Research (International Relations and Development), ESRC	1	1	1			1	1				1	
Director of Communications, Defra	1										1	
Director of New Homes and Sustainable Development, CLG	1					1					1	
Director, International Climate, Air and Analysis, Defra	1	1	1								1	
Director, Policy and Research, DFID	1	1	1			1	1				1	
Director, Rural Landscape and Performance, Natural England	1										1	
Director, Sustainable Consumption and Production and Waste, Defra	1										1	
Director, Sustainable Development and Regulation Directorate, BERR	1	1	1		1	1					1	
Director, Transport Analysis and Economics, DfT	1	1	1		1	1					1	
Head of Programmes, Forestry Commission	1					1					1	
Director, Strategy and Sustainable Development, Defra	1					1	1				1	
Grand Total	66	11	11	1	9	25	20	1	65	7		

Note: Organisations external to Defra are highlighted in grey. **Key:** BERR = Department for Business, Enterprise and Regulatory Reform; CLG = Common Language Group; DFID = Department for International Development; DfT = Department for Transport; ERF = Environmental Research Funders Forum; ESRC = Economic and Social Research Council; GONW = Government Office for the North West; NERC = Natural Environment Research Council.

Potential MA elements: (1) Identifying and categorising ecosystems and ecosystem services; (2) Identifying links between human societies and ecosystem services; (3) Identifying direct and indirect drivers; (4) Selecting indicators; (5) Assessing conditions and trends of ecosystems and their services; (6) Assessing impacts on human well-being; (7) Developing scenarios; (8) Analysing response options; (9) Analysing uncertainty.

It is clear from Table 2.1 that an MA-type exercise could meet many of the needs identified in Defra's *Action Plan*. Specifically by:

- **Helping to conceptualise and communicate Defra's thinking about ecosystem services in a national context and international context.** This need is apparent in a number of the actions identified in *Plan*, particularly those seeking to ensure that the value of natural resources are taken into account in decision making. The need would be supported by the strong conceptual basis that a national MA-style assessment would potentially provide.
- **Identifying case studies that demonstrate the importance of managing ecosystem services in sustainable ways so that their importance can be appreciated by others.** A number of the actions identified in the plan seek to demonstrate 'best practice', and a national assessment exercise would help identify and develop such materials.
- **Promoting understand of the direct and indirect drivers of change affecting ecosystem services and human well-being through scenarios and modelling.** The conceptualisation and evaluation of direct and indirect drives is a key element of the MA-model and so such an exercise would potentially ensure consistent approaches to these issues across policy sectors.
- **Promoting understand of how information about ecosystem services can be used to design policy relevant indicators.** At present there are a limited number of indicators designed to track ecosystem services, and so such an initiative would stimulate development work across a range of topic areas.
- **Providing access to robust and timely information on the state and trends of ecosystem services.**
- **Showing how values that can be attached to ecosystem services and how they vary from place to place and change as a result of the impact of direct and indirect drivers upon them.** The importance of economic valuation of environmental resources has been emphasised by Defra and Treasury. A national assessment exercise could help coordinate information and assist in the task of developing robust benefit transfer methods.
- **Promoting new institutional arrangements that would achieve the integrated or holistic management of ecosystem services required by the Ecosystems Approach.** This would be the likely outcome of the sorts of partnership that would have to be formed in order to make a national assessment.
- **Contributing to the design and promotion of policy relevant research, and to gain access to the best science to support its decision making.** The focus that a national assessment exercise would provide is likely to stimulate additional research on the processes that underpin the generation of ecosystem services and their links to human well-being.

Although the *Action Plan* sets two main actions that are relevant to the marine environment it does not provide the full context of the national policy framework for the marine environment. For this we must refer to the developments arising out in Defra's *Safeguarding Our Seas*.

The *Safeguarding Our Seas* Strategy, which was published in 2002, set out a 'shared vision' for clean, healthy, safe, productive and biological diverse oceans and seas. It also committed the UK to implementing an ecosystems approach in the marine sector. The *Strategy* recognised the importance of *integrated assessments* based on the environment, marine resources and socio-economics to enable a planned use of resources. The strategy encourages decision making based on 'sound scientific evidence' on the quality, structure and functioning of the marine environment and is based on maximising long-term economic benefits. Currently, the strategy is reported on within an assessment report called 'Charting Progress (CP)' delivered in 2005 and due again (CP II) in 2010. Reviewing the commitments in the *Strategy*, and the aspects that an MA-style assessment would deliver, it is clear that such an assessment would also enhance a progress report by providing status and trends on marine ecosystem services (rather than ecosystem components) and their likely values.

Other areas in which an MA-style assessment might contribute valuable information for the marine sector are:

- In the development of the Marine Policy Statement, that will define headline marine objectives. An MA-style assessment could be used to provide support on defining objectives and priorities for the future through the use of scenarios, and provide information to assist in measuring progress against the objectives.
- Defra also has a vision for sustainable fisheries for 2027 which contributes to '*Safeguarding our Seas*'. An MA-style assessment could be used to bring together information on the current state of the wider marine environment and the impact that fishing is having, as well as projected future scenarios to enable management to plan for the future, particularly in the face of climate change.

Despite the potential for an MA-style assessment to assist delivery of marine policy, a key constraint would be an England-only focus. Restricting an MA to England would artificially divide up different ecosystems, and potentially nullify the objectives of the Ecosystems Approach. Added to this for the marine environment, is the complexity of different reporting obligations at different scales (national, sub-regional, regional and international) and the over-lapping jurisdictions of different institutions.

Thus in both the marine and terrestrial context, an MA-type exercise could potentially make an important contribution to the evidence base upon which Defra draws. The outputs could also underpin the developments Defra seeks to promote to secure the sustainable management of environmental resources. In making the analysis presented above it is also clear that while Defra would be an important user of this information, the customer-base for an assessment is a broad one. The extent of the user community is described below, as a foundation for exploring what kinds of competing initiatives are currently being supported or planned.

2.4 Potential Users of an MA-style Assessment

The *Action Plan for Embedding an Ecosystem Approach* notes 'owners' against each of the actions (Table 2.1). If we make the assumption at this preliminary stage that an MA-style assessment for England would contribute to the actions in the way envisaged, then these data can also be used to identify some of the main customers for such an exercise, both within Defra and outside it.

As might be expected given the context of the *Action Plan*, the most widespread interests were internal (Table 2.1). Defra's Wildlife and Countryside Directorate, and the Chief Economist Group were linked to the largest number of actions:

- The Wildlife and Countryside Directorate is made up of a number of groups covering environment and biodiversity issues relating to marine and terrestrial ecosystems. Within it the International Biodiversity Policy Unit has a mandate to respond to biodiversity issues through the CBD and any international follow-up activities related to the MA. As Table 2.1 shows their interests were spread across most of the potential information outputs from an MA-type exercise.
- Evidence of the potential importance of ecosystem assessments to the Chief Economist group is provided by the recent publication of a set of guidelines for the valuation of ecosystem services (Defra, 2007b), and case studies that explore the role of valuation tools in policy appraisal (Defra, 2007e). However, while their interests focused on cost and benefit issues, their work clearly depends upon more basic assessment information being available.

Although the Marine and Fisheries Directorate does not have a large number of associated actions in the *Action Plan for Embedding an Ecosystem Approach*, it is likely also to be a major user of a MA-style assessment, along with:

- The Directorate for Climate Change
- The Strategy and Sustainable Development Group, within the Science Directorate

There are also other government departments, government authorities and agencies and advisory bodies that would have a use for such data, including:

- The Joint Nature Conservation Committee (JNCC)
- The Executive Director for Strategy and Performance in Natural England
- The Director of the Forestry Commission England
- The Head of Wildlife, Recreation and Marine at the Environment Agency
- The Centre for Environment, Fisheries & Aquaculture Science (CEFAS)
- The England Biodiversity Group
- Marine Advisory Policy Committee (MAPC)
- HM Treasury
- The Foreign and Commonwealth Office
- The Directorate of Policy and Research in DFID
- Communities and Local Government (CLG)
- Department for Transport (DfT)
- The Ports Authority and the Marine Management Organisation (when created)
- The Department for Business, Enterprise and Regulatory Reform (BERR)
- The Crown Estate

Outside Government our analysis suggests that other potential users of the type of information an MA-style assessment could provide are:

- Natural Environment Research Council (NERC)
- Economic and Social Research Council (ESRC)
- Engineering and Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC)

- Shellfish Association (SA)
- National Federation of Fishermen’s Organisations (NFFO)
- Association of Sea Fisheries Committees of England & Wales
- SeaFish
- Energy Networks Association (ENA)
- United Kingdom Cable Protection Committee (UKCPC)
- British Marine Aggregate Producers Association (BMAPA)
- British Wind Energy Association
- Renewable Energy Association
- Conservation orientated NGOs (Coastal forums, Wildlife Trusts)

For each of these organisations the kind of framework provided by a national assessment exercise would provide a context for their work as well as a resource. It is also likely that some organisations would not only be users of data but also providers. Thus, if Defra decides to take an MA-style assessment forward, the list presented above identifies potential partners.

2.5 Conclusions

The aim of this part of our report has been to identify what kinds of evidence needs Defra and its partners have in relation to the task of sustaining the supply of ecosystem services. The aim has been to cross reference these needs to the types of output that an England MA-style assessment might provide. In its *Action Plan* Defra have highlighted five broad strategic issues to be resolved for the ecosystems approach to be used effectively:

- How are ecosystem services provided?
- What is the state of service provision?
- What will happen in the future?
- Does this matter?
- What can we do about it?

If a national assessment exercise followed the structure of the global mode, then it is clear that all of these questions can, in principle, be answered by the types of evidence that an MA-style assessment might provide. The first two concern the need to assess the current situation and the latter two the design of policy responses – both of which are fundamental components in the generic MA-model. Although need for scenarios did not emerge as a strong theme in the analysis of Defra’s current *Action Plan*, consideration of likely futures is nevertheless also helpful in the design and evaluation of different policy options.

In addition to Defra’s specific needs it is also apparent that there is also a wider constituency of organisations who would also have an interest in the sorts of output that an MA-style assessment might provide or the research and monitoring it might stimulate.

We conclude therefore that there is a *prima facie* case for some kind of national initiative which draws upon the concepts developed in the global MA. It would contribute to Defra’s *Ecosystems Approach Action Plan* and there is a demand for certain elements of an MA from both Defra and its advisory organisations. The extent to which a formal initiative called an ‘England MA-style assessment’ is required, or whether the same kind of evidence can be achieved simply by investing in or expanding existing research and monitoring programmes is yet to be determined. This question forms the basis of Part 3 of our Report.

Part 3: Reviewing the Current Evidence Base

3.1 Introduction

The analysis presented in Part 2 of this report suggests that there is growing policy interest in the question of ecosystem services, and that there is a need for evidence about their state and trends at a variety of scales for both the terrestrial and marine environments. Although there is no simple prescription for what an ecosystem assessment might entail, it is clear from the analysis presented that any national exercise consistent with the broad structure of the global assessment would potentially deliver a range of data that would inform decision making in Defra, its partner organisations, other government departments, and the wider business, NGO and research communities.

Although there are a range of monitoring, policy and research needs that could be fulfilled by an MA-style assessment, it does not follow that Defra should necessarily encourage or sponsor such an exercise. The context in which the global assessment was undertaken is very different to one in which a national scale assessment might be done, some years on. As result of the publication of the global study, for example, it may be that initiatives are now in place that would fulfil most of the needs identified in Part 2, without the necessity for Defra to take the lead in an MA-style assessment for England. In this part of our report we therefore consider recent work and review the extent to which this already meets, or is likely to meet, the requirements identified earlier.

Our analysis is based on two sources of information. First, a review of the extent to which current or proposed research, monitoring and assessment initiatives might provide the kinds of evidence about ecosystem services that is required. Second, the analysis of feedback gained from a round of expert consultation with key informants drawn from Defra, its agencies and the wider research and policy communities on the need for an MA-style assessment for England. The expert consultation involved: a questionnaire circulated to an Advisory Group identified together with Defra at the start of this project; a one-day workshop organised by the project team for a wider range of policy stakeholders.

In this part of our report, we review these materials presented in these appendices in terms of the broad requirements for evidence identified in Part 2 and the ways they would be supported by the nine components of the 'global MA model' (Figure 1.1). The aim is to determine the extent to which current initiatives are sufficient to meet these needs, or whether there are significant gaps that could be filled by an MA-style assessment for England.

3.2 Meeting the Evidence Needs

3.2.1 Conceptualising Ecosystem Services and Communicating their Importance

One of the primary purposes of the Global MA was to raise awareness of the importance of ecosystem services amongst decision makers. By making the link to human well-being, the initiative demonstrated forcefully that arguments about the protection of species and ecosystems are not merely about conservation of biodiversity. It showed that they can also be made in terms of the role of ecological systems in sustaining people's livelihoods and quality of life. Therefore, if an MA-style assessment were undertaken for England, and it

followed in some respects the global MA model, then it might have similar benefits. To what extent would it be valuable for Defra to sponsor such an awareness-raising exercise?

The House of Commons Environmental Audit Committee also considered the awareness issue, and they were “disappointed” by the lack of engagement with the MA findings in some sectors, particularly by NGOs. In their recommendations they argued (para. 8, p.4) that “we must ensure that policy-makers are both fully aware of the implications of the global MA and that they respond to its challenges” (House of Commons Environmental Audit, 2007a, p.4). For this to be achieved, they suggest that policy-makers must understand the economic, social and environmental benefits arising from the sustainable management of ecosystem services and see the importance of adopting an MA conceptual framework.

The Committee took its evidence at the end of 2006, and clearly the situation may now be different. Defra has built on the programme of work it started before the Committee sat, to actively promote the ecosystems approach through the development of its *Action Plan* (Defra, 2007a). It has also highlighted the importance of making economic assessments of the benefits ecosystem services provide, through the recent publication of its introductory guide to valuation (Defra, 2007b). Although Defra acknowledged to the Committee that its proposed research programme did not amount to a ‘full MA’ (House of Commons, 2007b, para. 128, p45) much has clearly been achieved in widening interest in the issues both as a result of its leadership and more general appreciation of what the global MA achieved.

There is little doubt therefore that compared to the time at which the House of Commons Environmental Audit Committee took its evidence there is greater awareness of the concept of ecosystem services and the contribution that the MA has made to thinking in this area. Thus we tested the issue of the need for further awareness-rising through our consultation with experts. It was apparent that in terms of what a national MA-style assessment might deliver, it was the analytical aspects rather than the conceptual elements that were likely to be most valuable. Although it was felt that there would have to be some tailoring of concepts and definitions of ecosystem services if the assessment framework was applied at the England level, current work probably is already helping people to better formulate and communicate ideas about ecosystem services, although there was still a gap between the terrestrial and marine sectors.

3.2.2 Case studies

Case studies played an important role in the global assessment for a number of reasons, one being due to the difficulties of acquiring comprehensive and consistent data at a range of scales on the state and trends of the world’s ecosystem services, with the time and resources available. Instead, the assessment was in part based on the evidence from a number of sub-global, regional and local studies that employed the MA’s conceptual framework. These studies were used to compare differences in the role that ecosystem services played in different parts of the world at different scales, illustrate key issues and test the robustness of the global assessment. Although UK supported the global assessment, no case study material was provided.

Through its Phase II NESU research programme, Defra has now funded a number of studies that are beginning to provide insights into the application of the Ecosystems Approach and the tasks of making ecosystem assessments. Such

investment in case studies is important because it allows concepts and tools to be tested and refined in a focused way. They are of course no substitute for a comprehensive and systematic assessment of ecosystem services, if such an exercise is in fact deemed necessary. Indeed, it could be argued that the case study route may produce a rather fragmented evidence base, and that there may be still some more overarching assessment framework. We tested this idea further in our workshop discussions.

We asked workshop participants to consider the need for an MA-style assessment, given the range of current activities and initiatives. **Although it was agreed that the level of activity in this area had increased with the publication of the global study, it was generally felt that at the national scale, gaps in the current evidence base could be identified.** The consensus was that although case studies and focused research projects were valuable, a national MA-style assessment would be preferable. The consultations suggested that if a case for an MA-style assessment has to be made, it is perhaps most effectively done in terms of the general need for coordination and synthesis than simply as an awareness raising exercise.

3.2.3 Understanding the drivers of change

The need to understand the drivers of change and their potential impacts is generally considered to be a major concern for policy makers. It is striking, therefore, that the analysis of evidence needs made in relation to Defra's *Action Plan* (Table 2.1) did not suggest that the understanding of drivers and scenarios was a major immediate requirement.

It could be argued that the importance of developing an understanding of direct and indirect drivers is implicit the issues covered in other parts of the *Action Plan* (e.g. in relation to indicators and state and trends). Certainly it must be recognised that Defra has acknowledged the importance of the topic, by funding several studies in this area (e.g. Atkins, 2006; Fast Futures 2005; Merme et al., 2005; Richardson et al., 2006; and Defra, 2006). **The review of these materials suggest that there is limited systematic monitoring of the drivers of change that impact on ecosystem services, and only a few studies that allow a detailed consideration of possible future trends, especially in relation to the impact of climate change.**

Again we tested the need to better identify and understand the direct and indirect drivers of change through our consultations with experts in the field. **It was generally agreed that the identification of the drivers of change was an important and essential task, especially for understanding where to target interventions, and that further work in this area was necessary.**

3.2.4 Indicator design, selection and usage

If the protection of ecosystem services is seen as an important policy objective then we need indicators to understand what is happening. The review of recent work and current monitoring schemes suggest, however, that there is an acute lack of information on the importance of biodiversity for securing ecosystem services, and very little information on the linkages between ecosystems, ecosystem change and human well-being¹⁰. Thus this is an area of work that that probably needs to be encouraged.

¹⁰ See outcomes of ESRC/NERC Transdisciplinary Seminar Series on understanding the links between ecosystem services and human well being, Seminar 2, (<http://www.nottingham.ac.uk/FRESH>).

In the past, Defra has funded work on how ecosystem health might be conceptualised and monitored (Raffaelli et al., 2004) and has recently commissioned a review of the targets and indicators that underpin the Ecosystems Approach (Linstead et al., 2008). Such work could clearly inform the design of an England MA-style assessment, although it will not, by itself, generate new evidence unless it is linked to the design of new monitoring systems. Similar exploratory work appears to be required in the marine sector, and particularly on its links with the terrestrial environments. Identifying indicators that measure marine ecosystem health requires a clear understanding of causal factors which is not always available.

Clearly a national MA-style assessment could provide support for the better alignment of current indicators with ecosystem services and ultimately elements of human well-being. It may also act to coordinate activities across the terrestrial and marine environments so that a coherent framework for investigating ecosystem services is developed.

Once again, we tested these ideas through expert consultation and there was a general consensus that an MA-style assessment might stimulate some valuable work in this area. While the selection and design of potential indicators would clearly draw upon existing research and monitoring studies, there is little doubt that a national assessment initiative would help refine existing ideas about how the links between ecosystem services and human well-being might be measured. If the main purpose of an MA-style assessment is to inform decision makers about the state and trends of ecosystem services, then success will depend fundamentally on developing metrics that are both sensitive to the major drivers of change and the effects of policy interventions, and easily understood by a wide range of potential users. Consultees felt that the impetus that an MA-style assessment would give to the task of designing new, policy relevant indicators could be a significant part of the case that could be made for it.

3.2.5 Assessing state and trends

Our review suggested that there is currently insufficient information on the state and trends in ecosystems, particularly of ecosystem goods and services in England. The majority of existing ecosystem assessment and monitoring systems do not track ecosystem health over time, and assess the ability to supply ecosystems services. Indeed, most ecosystem assessment and monitoring frameworks identified use an ecocentric approach (centred on the ecosystem or environment) unlike the MA framework, which is anthropocentric (centred on human well-being). As a recent study for Defra has shown, some ecosystems and ecosystem services are more researched on than others, and monitoring data is fragmented and difficult to integrate across all habitats and services (Haines-Young and Potschin, 2008). Some of these deficiencies in relation to making assessments of terrestrial systems are likely to be overcome with the publication of the Countryside Survey 2007¹¹. However, it will mainly provide insights at national rather than the local level, which is the scale at which many decisions affecting ecosystem services are often made.

A similar, incomplete and fragmented picture exists for the marine sector. Assessments of state and trends of the marine environment in the UK are coordinated by UKMMAS through a number of different reporting initiatives.

¹¹ <http://www.countrysidesurvey.org.uk/>

The key assessment of status and trends of marine ecosystems in the UK is the Charting Progress report which reports against the government's 'Safeguarding Our Seas' Strategy. The first assessment was undertaken in 2005 and Charting Progress 2 is due in 2010. In addition to charting progress the UK also provides Quality Status Reports (QSR) to OSPAR with the next report also due in 2010 and reporting against Good Environmental Status reporting that will come on stream with further development of the EU Marine Thematic Strategy. There are also obligations under the Water Framework Directive although this is currently coordinated by the EA.

The extent to which a national MA-style assessment is needed to provide a picture of the state and trends of ecosystem services and their impacts on human well-being is clearly the central issue for this study, and as might be expected, it formed a major part of the discussions we had with consultees. There was general agreement that there was still much to be done and that it was in this area where a national assessment exercise could make its greatest contribution.

3.2.6 Understanding values

The importance of valuing natural resources and ecosystem services was recognised in the analyses for the 2007 Comprehensive Spending Review (HM Treasury, 2006), and has been further emphasised by Defra in its recent publication of a valuation guide for policy makers (Defra, 2007b), and other commissioned work. In the marine sector a number of recent studies have attempted to value ecosystem services and illustrate how the analysis of costs and benefits of policy proposals can be a valuable decision making tool (Beaumont et al., 2006), SAC and University of Liverpool (2007) and ABP Marine Environment Research Ltd et al. (2007).

Recent work commissioned by Defra (e.g. Jacobs, 2007) suggests that further work in the area of economic valuation of ecosystem services is probably required, particularly in relation to the problem of benefits transfer. Indeed the lack of valuation information was one of the major shortcomings of the global MA, and it is likely that it will be a far stronger component in any future exercises at any scale. **Such economic valuation studies could be undertaken and coordinated through an MA-type exercise for England, which would have the particular advantage that the analysis could be used to help policy makers understand how marginal values will change under different assumptions about the future.**

The view that valuation approaches still need to be refined so that they can be used more easily in decision making was one shared by those consulted during this study. The MA itself, for example, suggested a much wider understanding of value than the simply economic¹². **Thus an MA-style assessment might bring considerable focus to the debate about values, which many felt was necessary.**

3.2.7 Designing Response Options

The global MA not only focused on making an assessment of past and current trends, but also sought to direct attention to what the future might hold and what policy responses might therefore be necessary. A key component of this part of the exercise was the development of a set of scenarios describing a range of potential futures and what consequences they might have for ecosystem services and human well-being.

¹² <http://www.millenniumassessment.org/documents/document.304.aspx.pdf>

The development and use of scenarios is, of course, not unique to the global MA. Indeed, for many scenario studies are an essential part of the policy development process and an increasingly wide range of 'plausible futures' are available as the basis for discussion and reflection by policy makers (see for example, the recent review by the EEA, 2007). Given the range of material that is now available the crucial question is whether more scenarios studies are required. Thus we have sought make a critical review material that is relevant to the question of ecosystem services in UK, to determine whether there are any gaps that might usefully be fulfilled by work undertaken within a national MA-style assessment.

The utility of the scenario studies was assessed in terms of their time-scales, the assumptions on which they have been built, and their sensitivity to an assessment of ecosystems services in an English context. **The analysis suggests that the recent scenario studies undertaken in the UK and international arenas are of relevance to current needs but such exercises are variable in their sensitivity to units of analysis (i.e. 'Ecosystems') and geographical contexts (i.e. 'England').** Relying on these scenarios to meet existing requirements will demand that work is undertaken to 'proof' them for both these issues coupled with an evaluation of the extent to which their underlying assumptions are credible and their timeframes appropriate.

For example, interest in the drivers of change and their relevance to natural resource systems has begun to emerge recently in Defra through the Land Use Project (Defra, undated), which aims to develop a 2050 vision for land use by looking at trends and pressures through scenarios and models. The work will inform discussions about future land use and ways in which the multiple benefits arising from the use of land can be sustained. However, although the outputs from the Land Use Project will be valuable, it is likely given its specific objectives that tracing the impact of change on ecosystem services through to full valuations and the design of policy responses will not be possible within the scope of the initiative.

The alternative to an approach based on existing scenario work would be to initiate a process that involves the creation of new scenarios in the context of an MA-style assessment or England. The case for doing so is made stronger when we consider that the process of *developing* scenarios is a proven way of fostering stakeholder understandings of how ecosystems services and human well being will be affected over time given different types of policy intervention. Relying on existing scenario work may not be enough to clarify these consequences. **Thus there is a strong argument in favour of initiating a formal scenario-building exercise within an England MA-style framework and integrating terrestrial and marine aspects.**

The importance of scenarios in designing potential response options was confirmed by those consulted as part of this project. Although it was recognised that a number of organisations were now involved in developing scenarios and of producing 'future visions' that were based upon them, it was agreed by many that still further work was necessary, particularly in relation to the way geographical scale is handled. It was also agreed that any national assessment exercise should draw upon existing scenario studies, so that it could develop and build on current thinking.

3.2.8 Institutional Change

In its *Action Plan* Defra notes that embedding an Ecosystems Approach in monitoring, management and policy may well require institutional adaptations because of the emphasis it places on dealing with cross-cutting issues and drivers, and on developing integrated responses. Although the Plan is valuable in crystallising many of these issues, the needs to develop more holistic approaches to the resolution of problems at the environment-society interface have also been promoted through other initiatives. In the UK we can, perhaps, see this type of process taking place in new frameworks being developed for the protection and use of marine systems, through the Marine Bill White Paper. In the terrestrial sector similar kinds of change in 'institutional thinking' is taking place which would also require much closer attention to the issues surrounding the output of ecosystem goods and services, driven by initiatives at the EU level, including:

- The 2008 health check on **CAP**; within which emerging environmental mandates under single farm payments and pillar II frameworks will be reviewed.
- The 2010 review of the **Birds and Habitat Directives**;
- The preparation of the **2013 financial perspectives**, covering CAP reform, and the budgets for cohesion and structural funds, research, environment and development;
- Discussions arising from the **Green Paper on market-based instruments for environment and related policy purposes**¹³;
- Implementation of the objectives of the **Water Framework Directive** by 2015; which requires that all Member States achieve good chemical and ecological status in their surface water bodies and groundwater;
- The development of policy for **adaptation to climate change**, following the UK Climate Change Bill, and the publication of the recent EU *Green Paper* on Climate Change; and,
- The UK and EU Soil Strategies.

While each of these developments are significant in their own right, in terms of embedding the Ecosystem Approach in decision making, there will be an emerging need for Defra look across them to determine what overall impact they are having on the delivery of ecosystem services in general. This view was confirmed by those consulted. **Thus for the terrestrial environment, investment in an MA-type assessment may provide a framework in which such a co-ordinated view might be developed. As noted above, although there are mechanisms for monitoring status and trends of marine ecosystems, these are not currently focussed on ecosystem services. A national assessment exercise may also help stimulate developments in this area also.**

3.3 Conclusion

The material presented in Part 2 of this Report suggested that there was a clear requirement for the types of evidence that a national MA-style assessment might provide. We argued that such a conclusion did not by itself justify the

¹³ http://ec.europa.eu/taxation_customs/article_3849_en.htm

need for a national assessment – if other initiatives and programmes were likely to fulfil these requirements.

The additional material reviewed in Part 3 suggests that despite the widespread and growing interest in the links between ecosystem services and human well-being, and the monitoring and reporting activities that these have engendered, a number of issues emerge which could be addressed through an appropriately designed national assessment exercise.

Our review suggests, for example, that while much current work acknowledges the need and value of ecosystem assessment, the various parts do not yet add up to a whole. There is still separation of efforts across sectors (the split between the terrestrial and marine is especially evident) and difference in assessment approaches in relation to spatial and temporal scales. As a result it is difficult to see how decision makers might be encouraged to take account of ecosystem services despite the encouragement of those who might promote an 'Ecosystems Approach'. Something like a national assessment therefore appears to be the next logical step for a process that is currently sprawling in various directions, if only to ensure that those in Government and its agencies are able to summarise and communicate the current situation effectively.

Our review of the global assessment, and the way existing sub-global assessments are viewed within this model structure, suggests that the MA-type framework is a process that is capable of linking together different forms of inquiry. Our work suggests that neither at the England or UK level, can one plausibly say that this has happened yet as a result of existing initiatives. Nor, it seems, is this likely to be achieved in the near future.

We suggest therefore that on the basis of the review that we have made there is a *prima facie* case for a national assessment of some kind. Any final recommendation, of course, will depend upon whether such an exercise could be designed and implemented in a cost-effective and timely way. Thus in the final part of our Report we consider these more practical and procedural issues.

Part 4: Assessment Options

4.1 Scoping an MA-style Assessment

We have argued that there is a case to be made for some kind of MA-style assessment for England. We have, however, qualified that assertion by suggesting that any final decision must take account of whether the design of such an exercise was a cost-effective and likely to achieve the key aims that might be identified for it. Our review suggests there are three:

- (i) ***a means of better understanding the links between ecosystems, human well-being and decision making.*** There is a case to be made that an MA for England would help consolidate and strengthen science-policy understandings of the links between ecosystems, human well-being and structures of decision making. While the empirical and methodological evidence base is recognised to be developing fast, and in many respects, internationally 'leading', our understanding of how these links function is considered still quite poor.
- (ii) ***a way of developing a compelling story using existing evidence.*** There is a case to be made for an MA for England on the basis that it would create a more coherent and powerful narrative about ecosystem services and human wellbeing than would otherwise be possible. The strength of an MA would come from pulling existing information together in a more compelling way. It would therefore serve an important communication function - both in terms of communicating priorities across government departments, and with society at large - and influence policy frameworks in ways that have not been yet realised.
- (iii) ***a process in which different communities of interest would interact and co-learn.*** There is a case to be made for an MA for England on the basis that it would foster stakeholder interactions and learning in ways that would not be otherwise possible. The case for an MA for England is not necessarily determined by the issue of creating new evidence or 're-engineering' existing information. The additionality of an MA arises also in terms of the process that occurs in its name. The act of conducting an MA-style assessment for England has the potential to build capacity and understanding among diverse communities of interest and influence.

Clearly there are many ways in which these objectives might be achieved, and in designing any initiative one must take account of where the emphasis between these objectives might lie. As a basis for discussion, we have, in Figure 4.1 below, suggested a framework for looking at the different design options that might be considered. The framework presents a different mix of what we term ***thematic scope*** (the number of policy issues the assessment process addresses) and ***empirical detail*** (the resolution at which assessment outputs are compiled and presented).

The axis for ***thematic scope*** distinguishes between design options that seek to address assessment as a cross cutting initiative considering a range of topic areas, (such as water, air, soil etc), in a highly integrated way (which we term "broad") and those that seek to be more targeted, focusing on a more limited number of priority policy areas, (such as, for example, water quality which we term 'narrow'). The axis for ***empirical detail*** distinguishes between design options that are multi-scale in their reporting structure, producing insight at

Figure 4.1 Possible options for an MA-style assessment for England

		<i>Thematic Scope of Assessment</i>			
<i>Empirical detail of Assessment</i>		<i>"Broad"</i>		<i>"Narrow"</i>	
<i>"Shallow"</i>		A cross-sectoral, single level assessment.		A targeted, single level assessment.	
<i>"Deep"</i>		A cross-sectoral, multi-level assessment.		A targeted, multi-level assessment.	

<i>Geographical coverage</i>	<i>UK wide</i>	<i>Great Britain</i>	<i>England and Wales</i>	<i>England Only</i>
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high levels of spatial resolution (which we term “deep”), and those that are single scale in their reporting structure, producing insight in an aggregated or generalised way, (which we term ‘shallow’). The mix of these two issues presents potential sponsors of an MA-style assessment with the key parameters of assessment of which it is possible to distinguish between four quite different approaches to assessment: ‘broad and deep’; ‘broad and shallow’; ‘narrow and deep’ and ‘shallow and narrow’ respectively.

Before going any further it is important to note that, in making choices about the preferred approach to assessment, sponsors will also need to consider two further issues:

- **The assessment’s geographical coverage:** a fundamental choice will need to be made regarding the geographical coverage of the assessment process. In particular, the issue at stake here concerns how the assessment process would interpret the idea of ‘national scale’ reporting. For example, while the brief for this study asked us to consider the case for and against an MA-style assessment for *England*, many of those consulted, and particularly those concerned with the marine sector considered the England focus as being too narrow, and that the assessment should aim to bring evidence together for the UK as a whole. Notwithstanding that the UK government needs to meet many of its international and European commitments at the UK scale, ecosystems and their services do not respect legal jurisdictions. Moreover, even at the England scale, the national dependency and impact on the global flows of ecosystem services is an issue that must be considered. As a result, none of the four approaches outlined below preclude variations in the geographical coverage of the assessment although issues of coverage may impact on timing and costs.
- **A one-off assessment or a linked process?** A second important issue is that while all of these approaches can be adopted as ‘one-of’ assessment options, they are by no means mutually exclusive. Indeed, one of the ways

we can overcome the limitations that are associated with adopting one approach alone is to combine them together to form different **assessment pathways**. We examine the idea of assessment pathways in detail below.

4.1.1 Option 1 - a broad and shallow approach

A broad and shallow approach refers to an assessment process that is cross-sectoral in scope but single level in its reporting style. This approach is highly integrated in tone - exploring connections between a wide variety of themes - yet the emphasis of the assessment process is on producing "headline messages" at the macro scale; on creating a compelling and coherent narrative at the national level.

In practical terms, this approach is likely to rely heavily on expert panels extrapolating trends from existing data sets to generate its insight and insofar as this process would demand stakeholder engagement, it would tend to be focus on interactions between expert panels and national policy customers. A characteristic of this approach is that it would seek to build upon, and exploit, synergies with parallel initiatives. By drawing on existing sources of information a virtue of this option is that it would be perceived to 'add value' to the existing investments of resources for monitoring made at the national scale. So, for instance, a broad and shallow approach might build on partnerships already established by Defra through its membership of the Environmental Research Funders Forum, and specifically make use of the outputs of on-going initiatives such as Countryside Survey 2007, which is already part-sponsored by Defra. This survey includes plans to make an 'integrated assessment' of ecosystem services based on the analysis of the field survey data. At present the outputs of this element of the work is not expected until 2010, and so there may be the opportunity to ensure that the reporting could form part of a wider national initiative, that might also include parallel but preliminary work for the marine sector that draws on outputs from the new monitoring initiatives that are now being put in place. In particular, the assessment could build on the work being done by UK Marine Monitoring and Assessment Strategy (UKMMAS) and coordinated with the timing of Charting Progress II (2010 and occurring every 5 years). The new Foresight¹⁴ initiative on future land use could also inform the development of scenarios.

In operational terms, the broad and shallow option could involve the setting up of an independent review panel that could invite or take evidence across a broad range of issues, and have the resources to prepare a one-off or series of staged thematic reports targeted at different interest groups.

In structure, this approach to assessment conforms most closely to the global MA. Its key characteristic would therefore be that it is essentially an attempt to create a process through which information about ecosystem services might be assembled, rather than one that in which new monitoring systems might be designed and created. If, like a 'committee of enquiry', the panel driving the assessment could invite or commission the preparation of evidence from other organisations or groups over a reasonably long period, over say one year, then the expert plan would be able to reflect on information critically and present a reasoned assessment. These guidelines would help those willing to be involved to think about the types of data and evidence they should be collecting, and thus potentially initiate new patterns of working.

¹⁴ <http://www.foresight.gov.uk/Drumbeat/OurWork/ActiveProjects/LandUse/LandUse.asp>

In terms of the three overall objectives of the assessment process identified, a broad and shallow assessment is likely to produce some telling, but in itself fairly generalised, insight into the links between ecosystems, human well-being and decision making. Because of its shallow design, stakeholder engagement would primarily involve national policy customers, some of whom would be unfamiliar with the MA process, but many with pre-existing investments. Engagement with wider communities of interest, such as state and civil society groups at the regional level, would tend to occur through the process of dissemination, and the consumption of assessment outputs. In essence this approach stands and falls on the assessment's ability to create a compelling story that wins hearts and minds. A broad and shallow approach is likely to report in two-three years depending on geographical approach, although because this process draws upon a diverse range of resources it may be that some kind of staged set of outputs would be inevitable since different sources would deliver outputs at different times.

4.1.2 Option 2 – a narrow and deep approach

A narrow and deep approach is a targeted, multilevel mode of assessment and is the direct inversion of Option 1. Here the purpose of assessment is to produce new and novel insight around a limited set of themes, yet highly refined in terms of its empirical detail. Thus, while partnerships such as those established through the ERFF will be important, active involvement in new research initiatives, such as *Living with Environmental Change*, will be essential. A refocusing of some of Defra's own research funds might also be necessary. The essential and defining characteristic of this approach to assessment is to explore the complexions of a particular issue at different scales of resolution. It therefore presumes a process of multilevel stakeholder interaction and co-learning, one in which different scales of decision making come to shape final assessment outputs. Targeted forms of assessment could report in approximately one and half to two years.

A narrow and deep approach to assessment could be undertaken as a one-off option or as a cognate feature of an assessment pathway. As a stand-alone option, for instance, this approach could restrict its thematic coverage to the terrestrial environment alone, or focus on a tightly defined policy priority area, such as "water quality". In terms of the three overall objectives of the assessment process, an approach such as this would therefore produce some carefully delimited, but nonetheless very illuminating, insight into the links between ecosystems, human well-being and decision making, and implies that within the context of a given set of themes, stakeholder involvement would be extensive. However, the targeted nature of this process means that insight would by no means be comprehensive or complete, and may lack the overall impact of a broader approach. Moreover, in many respects, this option may be regarded as incongruous with the integrated nature of ecosystem assessment. For example, under an assessment model where the terrestrial and marine environments were decoupled, important insights into land-sea interfaces (such as the relationship between agriculture and water quality) would be lost to the process. In short, as a one-off option a narrow and deep focus would not do much to overcome the current, somewhat fragmented, nature of the evidence base described in Part 3 of this report.

An alternative, and arguably more reasonable, way of adopting the narrow and deep approach is to see it as the second stage in a linked process, in particular,

one that exploited the impact of an initially broad and shallow form of assessment. Here, a narrow and deep approach would involve the targeted exemplification of issues highlighted in the initial assessment and would serve to take the process forward gradually, progressively involving a deeper and wider community of stakeholders. Arguably this targeted exemplification could follow a rolling cycle of “narrow and deep” reporting, ordered according to emerging policy priorities.

4.1.3 Option 3 - a narrow and shallow approach

The third option – narrow and shallow – is a targeted, single level, approach to assessment. The purpose of this option is to produce a simplified, national message around a limited number of issues or themes. Here insight would follow Option 1 in relying heavily on expert panels extrapolating trends from existing data sets, while stakeholder interest would tend to be fairly prescriptive and national in outlook. The same kinds of partnerships would also be required.

Again, the narrow and shallow approach to assessment can be used as a one-off option or as a cognate feature of an assessment pathway. As a ‘one-off’, the particular advantage of the narrow and shallow approach is that it would be the least demanding option of the four considered in terms of resourcing, but it is also the least comprehensive insight. It would produce some tightly delimited, and fairly generalised, information into the links between ecosystems, human well-being and decision making, but the targeted nature of the assessment process means that, like Option 2, insight would be far from complete. Again, many would regard this option as out of step with the integrated nature of ecosystem assessment. Because stakeholder engagement is weak when conducting assessment, the success of this approach turns ultimately on the way messages are communicated and received once the assessment process has been completed. The danger of this option is that assessment sponsors are left with the worst of both worlds: messages may appear simplistic to a specialised audience, whilst wider stakeholder audiences may fail to see the relevance of, or connections between, assessment insight and their own areas of professional responsibility. A narrow and shallow assessment could report in 6-12 months.

An alternative way of adopting the narrow and shallow approach is to again regard it as the second stage in a linked process, and in particular, one that periodically updates aspects of either a broad and shallow or narrow and deep form of assessment. Here, a narrow and shallow approach would serve to keep ecosystem assessment fresh in the mind of stakeholders, and again, could follow a rolling programme of reporting, ordered according to emerging policy priorities.

4.1.4 Option 4 – a broad and deep approach

The fourth and final approach - a broad and deep assessment - refers to a cross-sectoral, multi-level process and is the most comprehensive of the suite of options identified. The purpose of this approach is produce wide ranging and novel insight at varied scales of resolution: local, regional and national. In terms of the three overall objectives of the assessment process identified above, a broad and deep approach would create an authoritative and compelling narrative about ecosystem services, human well-being and decision making, and would do more than simply summarize the current evidence basis. Indeed, it would bring significant new insight to bear upon these links. Moreover, as a process, a broad and deep approach implies an assessment model

whereby an extended community of interest actively interacts, engages and co-learns. This is because the process is like Option 1 - multi-thematic in scope, and like Option 2 in that it is reliant on a multi-level process of engagement. Thus partnerships such as those established through the ERFF will be essential. Moreover, active involvement in new research initiatives such as *Living with Environmental Change* will be necessary, supported by a refocusing of Defra's own research funds.

It is possible to envisage a broad and deep assessment as a one-off process, which we estimate would take approximately *five to six years report*, depending on the geographical scope of the process. This long lead time could be partly overcome by a staged reporting procedure, but issues of integration and comparison with other on-going initiatives would need to be carefully managed. In operational terms, it might be difficult to lead or commission work that some organisations thought overlapped with their area of concern or responsibility. It would require a strong management structure and expertise would be required to weave a wide range of information together. Detailed outputs would be summarized through a series of headline reports synthesising findings around cognate themes and localities. A particular issue that may arise is the additional reporting 'burdens' that this option would tend to place on organisations. Stakeholders working at the regional and local levels may therefore need to be convinced of the additionality of the process. There is danger too that, despite the comprehensiveness and robustness of the assessment, the process could do "too much, too quickly" in terms of empowering stakeholders. In fact, the detail of the process could be lost on wider groups, and paradoxically, its impact and legacy risks being relatively short-lived.

Given the complexity of structuring such an endeavour and the high costs associated with implementation we judge that it is far more logical to view a broad and deep assessment as the outcome of a linked and iterative process of assessment, initiated through a broad and shallow approach, and completed through a cycle of narrow and deep assessment. In other words, a broad and deep ecosystem vision would emerge by default rather than design.

4.2 Evaluation of options and a recommendation

The four options outlined above are of course highly idealised, and would need considerable elaboration before they could be considered as a proper 'blueprint' for a national assessment.

Nevertheless, they are sufficiently detailed to begin to answer the question about what form an 'appropriate' assessment might take, given the needs identified in Parts 2 and 3 of this report (see **Appendix 1**). They are also sufficiently well specified to begin to identify the sorts of benefit each design strategy might have compared to the 'option' of *doing nothing* – that is, of not undertaking a national MA-style assessment of any kind.

The consequences of the 'do nothing' option are perhaps most easily gauged by reviewing the current evidence base and how, given planned initiatives, it is likely to change in the future. As we have shown in Part 3, despite increasing interest in the issues surrounding ecosystem services, evidence is fragmented, and initiatives tend to be uncoordinated, and the links to human well-being difficult to make. Those consulted during this study confirmed that the lack of clear focus was a problem, both for those concerned with policy at national

scales, and in terms of promoting more holistic styles of decision making through the ecosystems approach.

It is unlikely that the position in relation to evidence about ecosystem services is any different to that of environmental monitoring data more generally. The need for coordination of monitoring and research effort more generally is confirmed by the recent report to the Environmental Research Funders Forum (ERFF, 2007). The study recommended that not only should there be a close association between strategic planning for environmental monitoring, research and policy in environmental, but also that a clear vision, strategy and framework was required if progress was to be made in the long-term. These recommendations have been accepted by the ERFF Board and now shape its future work programme.

The need for more joined-up decision making has also explicitly been recognised as a pre-requisite for achieving sustainable development in the UK, and a national assessment that followed the model of the global MA would clearly support such policies. More specifically, it is difficult to see how many of the goals set out in Defra's *Action Plan for Embedding the Ecosystems Approach* could be realised without the higher profile that a national assessment might give to these issues. Although the costs of the 'do nothing' option are difficult to specify, they are clearly those associated with the perceived short-coming of current sectoral styles of decision making that tend to separate environmental issues from questions of human well-being, overlook the economic and other values that ecosystems have for society, and fail to consider the wider impacts of development.

If we accept the case that 'something needs to be done' then what is the appropriate format for an assessment based loosely on the global MA model? In many respects none of the options represent perfect visions in themselves:

- *A broad and deep approach would be detailed and comprehensive but potentially cumbersome and expensive.*
- *A broad and shallow approach would be high profile, but its impact may be short lived*
- *A narrow and deep approach would be detailed and insightful but its appeal may be limited.*
- *A narrow and shallow approach would produce high profile targeted messages, but audiences for these may be limited, while their impact may be transitory*

On balance, we conclude that initiating a process that moved from a broad and shallow to narrow and deep form of assessment would be a logical assessment aspiration for Defra. The principle that lies behind this recommendation is that, once a shallow "headline" assessment of issues had been conducted and evaluated, assessment sponsors would look to foster more detailed 'sector-specific' forms of assessment. Such assessments would be likely to take place on a rolling programme (we estimate on an approximately 5 year cycle) organised to reflect emerging policy priorities (such as water, air, soil, and so forth). Assessment insight would therefore deepen and broaden incrementally. This is the most desirable of all approaches to assessment since it requires less initial investment and is about winning hearts and minds about the Ecosystems based approach on a gradual basis.

4.3 Costs for carrying out an assessment

As the range of different options offered suggests, the cost of an undertaking an MA-style assessment is likely to vary considerably. However, approaches to assessment that follow the MA model share a number of common elements that allow us to begin grasping underlining resourcing issues and where the burden of costing may lay. Although the detail will vary depending on which assessment option were chosen, all require that a strong conceptual framework is established in which the different elements can be brought together. Thus the cost of this preparatory or framing stage is likely to be similar for all of the options – although the breadth of the exercise may have an influence.

Similarly, some overview report would be required to present and contextualise the headline messages, and like the preparatory phases this is probably most easily achieved through the work of some coordinating group. Once again, it is unlikely that the costs of this overview and reporting element would differ substantially between options, although the reporting ambitions are likely to influence costs to some extent.

In terms of the MA-model, all of the options presented envisage that there would be an assessment of the conditions and trends of a suite of ecosystem services and an analysis of the impacts of these changes on human well-being. For the 'shallow' options, the evidence on which the assessments are based would largely be derived from existing information sources or existing sources re-analysed for the purposes of the exercise. Thus these approaches would be inherently less resource demanding than the 'deeper' options, which are expected to involve the commissioning of new data or analysis. The important point to note, however, is that whatever option is selected it would *have* to include an assessment component, the costs of which will be determined by the duration of the study, its breadth and its depth.

The assumptions that we have made in drawing up our estimates of costs are therefore that:

- **the assessment would be overseen and coordinated by an expert, dedicated team.** As the experience gained though both the MA itself and other assessment exercises such as the STERN report and the EU 'STERN-like Review of Biodiversity' suggests, strong leadership and well resourced scientific secretariat is essential to success.
- **the outcomes are shaped by expert input and peer review.** Again as the experience of other recent assessment exercises demonstrate, the quality and standing out the outputs is heavily dependent on the knowledge gained from the wider science and policy communities. Thus funding for the collection of such evidence is necessary in all the options considered.
- **the assessment is based on the development of partnerships** both in terms of being able to draw upon the outputs of existing initiatives, and to commission new research. We have made the assumption that the amount of new research that Defra might fund is limited, and have suggested a sum that could be used to stimulate or trigger additional resources through new collaborations with partner organisations.
- **outreach is essential.** That to ensure that the results of the assessment are taken up widely, and that the results change the way in which decisions are made, the final reporting stage must be well-funded and be supported by a clear communications strategy.

Table 4.1 Sample costing of options (Assumes a one-off assessment at the England Scale)

	Component	Broad and Shallow	Narrow and Deep	Narrow and Shallow	Broad and Deep
	Assessment duration (years)	2	2	1	5
1	Appointment of assessment project lead (Defra)	Absorbed Cost by Defra	Absorbed Cost by Defra	Absorbed Cost by Defra	Absorbed Cost by Defra
2	Appointment of Desk Officer (Defra)	Absorbed Cost by Defra	Absorbed Cost by Defra	Absorbed Cost by Defra	Absorbed Cost by Defra
3	Appointment (40%) of co-ordinating scientific lead author over lifetime of assessment	80	80	40	200
4	Scientific Secretariate	328	328	164	820
5	Establishment of a steering committee over lifetime of assessment	10	10	5	25
	Commissioned expert papers - number	10	10	5	20
6	Commissioned expert papers - cost	20	20	10	40
7	Wider stakeholder contributions/consultations	30	20	10	25
8	Peer review of outputs by experts	5	5	1	25
9	Production of assessment prospectus	2	2	2	2
10	Production of final report (incl. design)	15	15	15	15
11	Launch, Dissemination and Communications Strategy	20	20	20	20
12	Commissioning of new research		400		1000
13	Total Estimated Costs	520	910	272	2192
	costs p/a	260	455	272	438

An estimate of the costs of the four different options is provided in Table 4.1. The "Broad and Shallow" approach, which is our preferred option would cost about £520,000 and take about two years to complete. In comparison, the "Narrow but Shallow" option would cost around half this sum, while the "deeper" variants in excess of £900,000. Their costs depend heavily on the volume of new research commissioned, and the length of time period over which the assessment is conducted.

The estimates have been made on the basis of the broad assumptions outlined above, an England-only focus, and the following additional recommendations (see Table 4.1):

Component 1, Project Director: it is recommended at the study should be led by the Defra Chief Scientist, and so it is assumed that these costs can be absorbed.

Component 2, Desk Officer: a dedicated Desk Officer will be required within Defra and it is assumed that these costs will also be absorbed.

Component 3, Scientific Lead and Coordinator: it is recommended that an external senior researcher is appointed as lead scientist for the assessment. They will be responsible for managing the day to day aspects of the work, the drafting and editing of published output, and representation of the project at any meetings with partner organisations. It is assumed that the Scientific Lead would be a 40% appointment, which with organisational overheads at, say, Research Council levels would be around £40k per annum. Salary costs include employer's contributions.

Component 4, Scientific Secretariat: it is recommended that a scientific secretariat is required for the work, consisting of three post-doctoral researchers at an average salary cost of around £43k per researcher, and one Secretary/PA, at a salary cost of £35k/pa. At the same expected level of overheads assumed for Component 3, this would demand an expenditure of around £164k per annum. The Secretariat would manage the project website.

Component 5, Steering Committee: it is recommended that a steering committee consisting of Defra's key external partners be established, and that this should meet at least twice each year. The meetings may include the possibility of invited speakers to brief the Committee, which with resources for accommodation and room hire etc. would require support of around £2.5k per meeting.

Component 6, Expert Papers: commissioned expert input will be an essential element of any assessment and would serve in part as briefing material for the project team. It is assumed that the cost of an expert review will be around £2k, and that the number of reviews will vary depending on the option pursued. Indicative numbers are suggested in Table 4.1.

Component 7, Stakeholder Consultations: it is recommended that the assessment should draw widely on stakeholder input, and that these meetings should be structured and deliberative, so that evidence can be reviewed critically. It is estimated that each meeting would cost around £5k, with facilitation, accommodation and travel. The numbers of such meetings will vary according to the option pursued.

Component 8, Peer Review: Peer review of final assessments and documents is essential; it is assumed that the costs of such reviews will be around £2k each, and that the number required will vary according to the option.

Component 9, Assessment Prospectus: since so much of the work of the assessment will depend on partnerships and external input of evidence it is essential that the aims and objectives of the exercise are set out clearly, and the form of inputs be specified so that it is easily usable. It is also important to recruit other organisations to the exercise. This could be achieved by the creation and design of an assessment "prospectus". The work will be undertaken by the scientific secretariat, but some design input is assumed and included in this component. The design should carry over to the project website.

Components 10 and 11, Production of Final Report and Launch: since dissemination of the outputs of the assessment is essential, resources have been allocated to the production of the final report and its launch. These costs are assumed to be similar for all the options considered.

Component 12, Commissioned Research: It is assumed that only for the “deep” options would there be a need to commission additional research, and so this element has only been included in the estimates for options 2 and 4. This element is the major unknown in this costing exercise. However, it has been assumed that any new, commissioned research would be funded in partnership with other organisations (ERFF or LWEC) and so the sums allocated are assumed to be only part of what may be required overall. It is assumed that a sum of around £200k per annum would be sufficient to stimulate the kinds of investment in new monitoring or analysis required, part of which could be allocated by redirecting some of Defra’s existing research budget.

As noted above, all the cost estimates have been made on an England-only basis, because it is assumed that if a UK assessment were made, this would be done in partnership with the devolved administrations and that the costs for Scotland, Wales and Northern Ireland would be borne elsewhere.

4.4 Conclusions

We have argued that if the case for an MA-style assessment for England is accepted then a “Broad and Shallow” approach is recommended. This approach would be highly integrated in tone, exploring connections between a wide variety of themes. The emphasis of the process would be on producing “headline messages” at the macro scale and on creating a compelling and coherent narrative at the national level, designed to recruit new partners to the exercise. We recommend such an option because, if successful, it could set in place new ways of thinking about ecosystem services that would change the way people and organisations make decisions about them – thus embedding the Ecosystems Approach in a quite general way.

We estimate that the cost of such an exercise would be around £520k and that the exercise would take about 2 years to complete; 2009 would be an appropriate starting point given the timetables of other studies likely to provide information for it. By using the exercise as a platform to review and refine understandings of evidence gaps, new research could be commissioned or encouraged through the Environmental Research Funders Forum or LWEC initiatives, thus deepening the assessment approach in the long term.

Our cost estimates do not cover the resources needed for a UK level exercise. Although we strongly recommend that a UK study be done, the cost estimates presented here only cover that for England. It is assumed that the additional costs of the UK exercise would be met by the devolved administrations. Such an exercise would help Defra build on the partnerships and processes already put in place by the Environmental Research Funders Forum, but at the same time extend its approach by linking mainstream environmental science with economic and social valuation.

Part 5: Recommendations

We suggest that on the basis of the evidence reviewed here there is a strong case for undertaking an MA-style assessment for England, and we recommend that such an initiative be taken forward. The assessment would be highly integrated in tone, exploring connections between a wide variety of themes. However, the emphasis of the process would be on producing a compelling and coherent narrative at the national level only. It would largely draw upon existing evidence or new evidence arising from current initiatives. It could start in 2009 and be completed within two years at a cost of around £520k.

We base our recommendation on the observations that:

- Current evidence and assessment of the state and trends of ecosystem services is fragmented and uncoordinated at the national scale, and that there are particularly strong arguments for better integration across the marine and terrestrial environments;
- It is unlikely that the ecosystems approach will ever be firmly embedded in decision making without such a high-profile exercise of the kind envisaged being undertaken; and,
- Such an exercise would assist in helping Defra meet its international reporting commitments, particularly in relation to proposed assessments at the European and Global scales.

Although the costs of “doing nothing” are difficult to estimate, it is clear that they are substantial. The barriers that a fragmented evidence base and ‘siloes’ approach to decision making have for effective decision making are issues that have been cited both in Defra’s own *Action Plan*, and the UK Sustainable Development Strategy.

We further judge that, while we have focused primarily on the case for an MA-type assessment for England, there is a strong case for undertaking a UK level study, and that an England-only initiative may provide a platform on which the development of such a national scale assessment exercise could be built. The type of assessment approach recommended here is consistent with Defra’s approach to forming partnerships with a wide range of data providers and users through initiatives such as the Environmental Funders Forum (ERFF) and *Living with Environmental Change (LWEC)*.

In terms of the partnerships that will need to be built in order to undertake an MA-style assessment, the mechanisms and processes already set in place through the EFF are a good starting point, and new research initiatives such as *LWEC*, offer the opportunity of extending the evidence base. **We recommend that these opportunities are best realised by:**

- **Placing leadership of the national assessment within the Defra Chief Scientist Group; and,**
- **Establishing a dedicated Scientific Secretariat, consisting of a part-time scientific lead, three researchers and other support staff.**

The dedicated scientific secretariat would enable new partnerships to be developed both within the UK and Europe, and ensure that independent, high-quality outputs that can be used by decision makers will be generated.

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Appendix 1. Example Options

Broad and shallow approaches

	Option 1.1 Integrated, single level assessment- <i>UK wide</i>	Option 1.2 Integrated, single level assessment - <i>England only</i>
<i>Level of Detail</i>	"Headline" national messages	"Headline" national messages
<i>Likely outputs</i>	"Light touch" multi-volume document with web interface.	"Light touch" multi-volume document with web interface.
<i>Timescales</i>	3 Years	2 years
<i>Partners</i>	<i>ERFF, NERC/CEH, UKMMAS, FORESIGHT, plus devolved administrations</i>	<i>ERFF, NERC/CEH, UKMMAS, FORESIGHT</i>
<i>Possible reporting approach</i>	Expert panels at the national level with endorsement from key policy stakeholders.	Expert panels at the national level with endorsement from key policy stakeholders.
<i>A better understanding of the links between ecosystems, human well-being and decision making?</i>	Yes – but a fairly generalised conceptualisation.	Yes – but a fairly generalised conceptualisation with some theoretical problems in focusing insight at the England level.
<i>A process in which different communities of interest would interact and co-learn?</i>	National outlook will strengthen collaboration and integration across devolved administrations.	Will consolidate learning among key policy customers but opportunities for collaboration and integration across devolved administrations would be missed.
<i>A way of developing a compelling story using existing evidence?</i>	Yes – high impact and widely disseminated. May appear general and insubstantial to some.	Yes – to a wide audience, but may appear general and insubstantial to some. England only focus could appear partial.
<i>Linked assessment pathway</i>	Could be the initial phase in a broad and deep process, one followed by narrow and deep studies. Alternatively could be "updated" with narrow and shallow assessments	Could be the initial phase in a broad and deep process, one followed by narrow and deep studies. Alternatively could be "updated" with narrow and shallow assessments

Narrow and deep approaches

	Option 2.1 Targeted, multi-level assessment - UK wide	Option 2.2 Targeted, multi-level assessment - England Only
<i>Level of Detail</i>	High resolution and novel information	High resolution and novel information
<i>Likely outputs</i>	Detailed single volume document with synthesis report and web interface.	Detailed single volume document with synthesis report and web interface.
<i>Timescales</i>	Reports in two years	Reports in one and a half years
<i>Partners</i>	<i>ERFF, NERC/CEH, LWEC, UKMMAS, FORESIGHT plus devolved administrations</i>	<i>ERFF, NERC/CEH, LWEC, UKMMAS, FORESIGHT</i>
<i>Possible reporting approach</i>	Nested hierarchy of assessment. Sub panels feeding into a national reporting framework.	Nested hierarchy of assessment. Sub panels feeding into a national reporting framework.
<i>A better understanding of the links between ecosystems, human well-being and decision making?</i>	Yes - great detail in tightly prescribed areas, but could miss the "bigger picture".	Yes - great detail in tightly prescribed areas, but could miss the "bigger picture". Some theoretical problems in focusing insight at the England level.
<i>A process in which different communities of interest would interact and co-learn?</i>	Extensive multi-level interaction - though participation would be restricted by theme. Would strengthen collaboration and integration across devolved administrations in specialist areas.	Extensive multi-level interaction - though participation would be restricted by theme. Opportunities to collaborate across devolved administrations would not exist.
<i>A way of developing a compelling story using existing evidence?</i>	Produces very well targeted messages for relevant stakeholders. Wider stakeholders may not engage with final message.	Produces very well targeted messages for relevant stakeholders. England only focus could appear partial
<i>Linked assessment pathway</i>	Could follow on from broad and shallow assessment as set of targeted case studies	Could follow on from broad and shallow assessment as set of targeted case studies

Narrow and shallow approaches

	Option 3.1 Targeted, single scale assessment - UK wide	Option 3.2 Targeted, single scale assessment - England only
<i>Level of Detail</i>	"Headline" national messages	"Headline" national messages
<i>Likely outputs</i>	"Light touch" single volume document with web interface	"Light touch" single volume document with web interface
<i>Timescales</i>	Reports in nine months to a year	Reports in six to nine months
<i>Partners</i>	<i>ERFF, NERC/CEH, UKMMAS, FORESIGHT plus devolved administrations</i>	<i>ERFF, NERC/CEH, UKMMAS, FORESIGHT</i>
<i>Possible reporting approach</i>	Expert led process at the national level, like broad and shallow option only this time theme specific.	Expert led process at the national level, like broad and shallow option only this time theme specific.
<i>A better understanding of the links between ecosystems, human well-being and decision making?</i>	Could easily miss the "wider picture" in terms of integrated understandings.	Could easily miss the "wider picture" in terms of integrated understandings. Theoretical problems in focusing insight at the England level.
<i>A process in which different communities of interest would interact and co-learn</i>	Fairly weak and tightly proscribed opportunities for interaction and learning. Some new collaborations across devolved administrations could occur	Fairly weak and tightly proscribed opportunities for interaction and learning.
<i>A way of developing a compelling story using existing evidence?</i>	Yes - to limited audience, but likely to appear very general to specialists and irrelevant to non specialists	Yes - to limited audience, but likely to appear very general to specialists and irrelevant to non specialists
<i>Linked assessment pathway</i>	Wider exemplification and contextualisation will be key to using this option and therefore could follow on from broad and shallow or narrow and deep options	Wider exemplification and contextualisation will be key to using this option and therefore could follow on from broad and shallow or narrow and deep options

Broad and deep approaches

Issues	Option 4.1 Integrated, multi-level assessment <i>UK wide</i>	Option 4.2 Integrated, multi-level assessment <i>England only</i>
<i>Level of Detail</i>	High resolution and novel information	High resolution and novel information
<i>Likely outputs</i>	Detailed multi-volume document with synthesis reports and web interface.	Detailed multi-volume document with synthesis reports and web interface.
<i>Timescales</i>	Reports in five to six years	Reports in four to five years
<i>Partners</i>	<i>ERFF, NERC/CEH, LWEC, UKMMAS, FORESIGHT plus devolved administrations</i>	<i>ERFF, NERC/CEH, LWEC, UKMMAS, FORESIGHT</i>
<i>Possible reporting approach</i>	Nested hierarchy of assessment. Sub-panels feeding into a national reporting framework. Panels could be theme or locality led.	Nested hierarchy of assessment. Sub-panels feeding into a national reporting framework. Panels could be theme or locality led.
<i>A better understanding of the links between ecosystems, human well-being and decision making?</i>	Yes – provides insight to a high level of detail, going significantly beyond existing evidence base.	Yes – provides insight to a high level of detail going significantly beyond existing evidence. Insight of process problematical given the artificial boundaries set around assessment.
<i>A process in which different communities of interest would interact and co-learn?</i>	Yes, extensive, but could appear a burden to those engaged in the process. Could foster new models working based though many stakeholders will need convincing.	Yes, extensive, but could appear a burden to those engaged in the process. Many stakeholders will need convincing. Opportunities for collaboration between different national contexts missing. This may weaken overall impact of process on structures of decision making.
<i>A way of developing a compelling story using existing evidence?</i>	Yes, if synthesised well though risk that many stakeholders will get lost in the detail.	Yes, if synthesised well though risk that many stakeholders will get lost in the detail. England only focus could appear partial.
<i>Linked assessment pathway</i>	Broad and Deep approach could be viewed as the long term outcome of a process of assessment than included broad and shallow and narrow and	Broad and Deep approach could be viewed as the long term outcome of a process of assessment than included broad and shallow and narrow and