CASE STUDY TO DEVELOP TOOLS AND METHODOLOGIES TO DELIVER AN ECOSYSTEMS APPROACH – HEYSHAM TO M6 LINK

DEFRA RESEARCH PROJECT NR0110

FINAL REPORT

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Executive Summary

This case study forms part of a suite of research projects commissioned by Defra to look at how the ecosystems approach may be incorporated into future policy.

It is important to understand that it is not a critique or criticism of any of the work that has been done in the planning, design and evaluation of impacts of the proposed Heysham to M6 link. This study has been produced for research purposes only.

This case study is made up of three main elements:

a) A review to establish how well the planning, and in particular the Environmental Impact Assessment (EIA), process that has been followed delivers an ecosystems approach. To do this, the guidelines published by the Convention on Biological Diversity (CBD) have been used (Appendices 1 & 2). These guidelines identify 12 tasks that should be considered when adopting an ecosystems approach. The case study examines how well each of these tasks has been accomplished for the proposed Heysham to M6 link.

b) Taking account of the findings of the first part, identify tools and methodologies that are needed to address the weaknesses and gaps in the current EIA approach. Following this either develop the tools and methodologies or detail the research that is needed to allow this development.

c) A retrospective application of the tools and methodologies developed.

Strengths and weaknesses of the Heysham M6 link EIA

A number of strengths and weaknesses were identified as a result of using the 12 CBD tasks to evaluate the Heysham M6 link:
Strengths of the current EIA process

- Based on a well developed democratic process with a strong policy and legislative framework.
- Decision making and management bodies have a wealth of experience and this was certainly true of the Heysham EIA.
- Public consultation and stakeholder involvement is part of the process. The Heysham M6 link EIA was particularly strong in how consultation was carried out at some points in the process.

Weaknesses of the current EIA process:

[NB: Most of these are generic and not especially unique to the Heysham case study]

- There is very little consideration of ecosystem goods and services and how we enjoy them and their importance to our quality of life.
- Future management of environmental assets within the study area, beyond the effective functioning of a new road, is barely considered.
- The concept of ecosystem health and function, limits and thresholds does not form part of the impact assessment, which can narrowly focus on species, features and “quality” of habitat.
- Limited valuation of environmental assets is made, and then only at a late stage in impact assessment without any real attempt to integrate the results with social and economic valuations.
- Public and stakeholder consultation is integral to EIA but it is not as inclusive or as wide in scope as for the ecosystems approach, restricting local involvement in and ‘ownership’ of a planning initiative like the Heysham M6 link. The adversarial nature of the English planning system can compound this issue, making it harder to reach consensus between stakeholders.
- The nature of the EIA process in planning for road infrastructure means that cumulative impacts are generally poorly addressed and the
geographic delineation of the route corridor can be relatively arbitrary and does not take ecosystem function or processes into account.

The evaluation of the tasks identified the understanding of the economic context (task 4 in the CBD guidelines – appendix 1), ensuring management of ecosystem within the limits of their functioning (task 6) and addressing the problem at the appropriate temporal and spatial scales (task 7) as being particularly poorly achieved mainly because of the way that boundaries are defined and studies compartmentalised.

Conclusions

The main conclusion of this case study is that the ecosystems approach, that is, having a clear strategy for and commitment to the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, needs to be at the core of planning policy delivery and at the core of the culture of the organisation(s) responsible for the undertaking the EIA process.

To successfully adopt the ecosystems approach for planning and EIA purposes we need a better understanding of ecosystem health and function and the thresholds and limits affecting them. But perhaps more importantly we need to be able to make direct links between people’s quality of life and the benefits that ecosystem goods and services provide. This would create a strong bridge linking cultural values and attitudes to the environment with ecosystem goods, services and function.

The current EIA approach to assessing impacts and identifying mitigation strategies is too reductionist by narrowly focusing on individual species and environmental features (often driven by protected species and area legislation). In contrast, the ecosystems approach enables a more strategic, holistic ‘big picture’ evaluation.

Defining boundaries, both spatial and temporal, for studying and assessing the impacts and effects of a development in the context of the ecosystems
approach is a subject that needs further investigation to develop a practical approach. The most critical aspect is how to define the ecosystems that might be affected by the development at the outset. This could result in a very different route corridor of study for the EIA.

The current planning and EIA approach does not deal very well with the need to understand the economic context so that market distortions that affect biological diversity are reduced, incentives are developed to promote biodiversity and sustainable use, and ecosystem costs and benefits are externalised. Furthermore, the current system finds it hard to deal with non-monetary values of environmental goods and services, especially where these are outside formally designated landscapes and sites of recognised high quality. For example, a meadow within the route corridor study area for a new road link may not be of any national nature conservation interest but it could be highly valued by the local community as a recreational ‘green space’ providing aesthetic benefits and useful as an educational resource as well as somewhere to go for a healthy walk.

Based on our findings for the Heysham M6 link EIA we suggest that there are three different options for embedding an ecosystems approach into the EIA process. These are not mutually exclusive but could be pursued in parallel as part of the Action Plan now under development for realising Defra’s vision for England’s Natural Resources:

**Option 1:** aim towards a more sustainable planning context for EIA by working to place the ecosystems approach at the heart of the formal planning system in England

**Option 2:** work to change the formal EIA process itself by seeking an amendment to the EIA Directive so that the ecosystems approach is formally adopted within the EU regulatory framework

**Option 3:** support the current EIA process towards incorporating the ecosystems approach on a project by project basis by encouraging lead organisations and their partners to follow the CBD tasks and Advanced User Guidance.
1 INTRODUCTION

This case study forms part of a suite of research projects commissioned by Defra to look at how the ecosystems approach may be incorporated into future policy. It is important to understand that it is not a critique or criticism of any of the work that has been done in the planning, design and evaluation of impacts of the proposed Heysham to M6 link.

The ecosystems approach is a strategy or framework for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. In this sense it is also a tool for securing sustainability in practice.

1.1 Study context

An ecosystems approach is key to operationalising the concept of sustainable development, as recognised by the World Summit on Sustainable Development in 2002 and the Convention on Biological Diversity in 2000 (Laffoley et al., 2004a), and carried out during the United Nations international work programme, the Millennium Ecosystem Assessment. The concept underlying the approach is that ecosystems and the biological diversity contained within them provide goods and services that benefit the economy and society as a whole. The Millennium Ecosystem Assessment was born from the need for governments to respond to four international conventions namely the Convention on Biological Diversity, the United Nations Convention to combat Desertification, the RAMSAR Convention on Wetlands, and the Convention on Migratory Species. Conducted between 2001 and 2005, it aimed to assess ‘the consequences of ecosystem change for human well being and to establish the scientific basis for actions to enhance the conservation and sustainable use of ecosystems and their contributions to human well being’ (Hassan et al., 2006). The assessment focuses on
ecosystem services, which are the benefits people derive from ecosystems. There are four categories of services:

- **Provisioning Services** are those obtained from ecosystems such as food (crops, livestock, wild plants), water, timber, fibre, fuel, genetic resources, biochemical, natural medicines, pharmaceuticals, ornamental resources and fresh water

- **Regulating Services** are the benefits obtained from the regulation of ecosystem services such as climate, floods, erosion, air quality, pests, pollination, natural hazards, disease, wastes and water quality

- **Cultural Services** are the non material benefits people obtain from ecosystems and account for landscape values such as recreation, aesthetic experiences, cognitive development, reflection and spiritual benefits

- **Supporting Services** are important for the production of all other ecosystem services such as soil formation, photosynthesis, water cycling and nutrient cycling

The ecosystems approach therefore accounts for multiple spatial and temporal scales, so as to ensure that processes, functions and the interaction between organisms (including humans) and their environment are managed effectively for the sustainable use of the goods and services (Laffoley, 2004a). Economic and social consequences to damaged ecosystems include loss of jobs, (Defra’s rural strategy estimates that 300,000 jobs depend directly on the quality of the natural environment (Huby et al., 2005)), risks to health, decline of resource productivity, loss of amenity and quality of life and at the extreme threats to social stability at local or international scales (Huby et al 2005).

The ‘Millennium Ecosystem Assessment’, not only recognised the multiple benefits that ecological systems provide but realised that policy and planning decisions must also take into account an ecosystems approach. The ecosystems approach provides a way in which the overall health and integrity of ecosystems can be assessed and the multiple benefits society derives from
them better described and managed. The United Nations Convention on Biological Diversity (CBD) produced guidelines for the implementation of the ecosystems approach. These guidelines are attached in Appendix 1 and 2.

Natural resource protection is one of five strategic priorities defined in Defra’s Five Year Strategy published in December 2004. The UK Sustainable Development Strategy “Securing the Future” (Defra, 2005) sets out the direction for how government will work towards achieving sustainable development. This overarching strategy identified natural resource protection and environmental enhancement as one of four priority areas for immediate government action towards “living within environmental limits”.

Through the Natural Environment Programme (NEP), Defra are working with stakeholders to develop a clear and strategic approach for the protection and enhancement of the UK’s natural resources (encompassing biodiversity, air, land, water, soils, recreation and access to the countryside, and ecosystem services), whilst also accounting for the impact domestic policies have on the global environment. In 2006 Defra began an Ecosystems Approach project. The ecosystems approach provides a framework for decision makers to look at whole ecosystems to ensure that we can maintain a healthy and resilient natural environment now and for future generations. This current study is helping to contribute to thinking on how the ecosystems approach could be used to help produce a more sustainable society, economy and environment.

Each of these initiatives provides the impetus and wider policy context for this case study.

In December 2007 Defra published “Securing a healthy natural environment: an action plan for embedding an ecosystems approach”.

1.2 Case study objectives

This project evaluates the planning and development of proposals for a major regional infrastructure development, a trunk road, against guidelines produced by the CBD for the application of an ecosystems approach. Secondly, it
retrospectively considers how the ecosystems approach could be applied to an assessment of the potential impacts of the proposed new M6 trunk road.

By carrying out a case study on a current development proposal, our aim was to establish how well some of the broader issues and principles encompassed in the ecosystems approach are met under current policy guidelines and to examine which tools and methodologies exist for enabling an ecosystems approach to be applied more effectively.

It was outside the scope of this case study to carry out any detailed examination of definitions of ‘ecosystems, ecosystem functions and processes, ecosystem health and the provision of goods and services that contribute to our quality of life. However, the project team drew on definitions and approaches being considered in the parallel NR0107 research project looking to develop a rationale for using the ecosystems approach in English policy development.

By examining the current planning process using a specific case study, we looked at whether the Environmental Impact Assessment (EIA) process could be enhanced by adopting an ecosystems approach, providing a more holistic and better integrated tool of practical use in the overall decision making process.

Specific research objectives were to:

- Review the current process to see how this fits with the CBD guidelines for an ecosystems approach
- Identify which tasks, as listed in CBD guidelines were successfully completed during the Heysham EIA process
- Evaluate how well the tasks were completed
- Produce recommendations for adapting the current process to meet requirements of the ecosystems approach
- Identify areas where further research is needed to allow tasks to be completed
• Identify, gaps, shortcomings and weaknesses in the current approach and tools employed

• Review existing tools and methodologies that could be used to address current weaknesses in the EIA approach

• Develop tools and methodologies or recommend further research and development required to address gaps, shortcomings and weaknesses in the current approach and tools employed

• Produce recommendations based on the experience of this case study for using the ecosystems approach to assess the impact of proposed developments like new road infrastructure

• Consider the implications that adopting the ecosystems approach might have for the current planning policy framework and EIA guidelines

• Produce recommendations about any further work needed for establishing the cost implications to inform an ecosystems approach to assessing the impact of developments

1.3 Project structure and report outline

This case study is made up of three main elements:

• Firstly, a review using the CBD guidelines to establish how far the EIA process followed for the Heysham to M6 link road was able to deliver an ecosystems approach. These guidelines identify 12 tasks or principles that should be used in applying an ecosystems approach. The case study examines how well each of these tasks was accomplished for the proposed Heysham to M6 link.

• Secondly, in taking account of the findings of the review, an identification of tools and methodologies necessary for addressing the weaknesses and gaps at each stage in the current EIA process.

• Thirdly, a retrospective application of the tools and methodologies identified, as far as this was possible given the stakeholder participation
requirements of the ecosystems approach and the sensitive nature of the case study as a live planning application subject to public inquiry.

The study concludes with a series of recommendations for how an ecosystems approach could make a difference to decision-making in the planning process, particularly how an ecosystems approach could support and strengthen the EIA process for achieving more sustainable results.

The case study was carried out by an ADAS research team with the support of both an ADAS expert team and an external expert team of specialists.

The Convention on Biodiversity’s “Beginners Guide” and “Advanced User Guide” to the ecosystems approach are attached in Appendix 1 and Appendix 2. The advanced user guide was used in this case study as the basis for reviewing how well the planning process and EIA delivered an ecosystems approach in respect of the proposals for the Heysham to M6 Link. Throughout the text the advanced user guidelines are in italics in the text. The assessment methodology briefly described in the advanced user guide (Appendix 2) was applied retrospectively to the EIA process followed for the Heysham to M6 link road.

1.4 The Case Study area

This report considers the Heysham to M6 link road as a case study for the application of the ecosystems approach. The study area is the preferred Northern route of the Heysham to M6 Link road (see Figure 1.1). Situated North of Lancaster the current planning application proposes a trunk road that provides an improved transport link between the Heysham port, Morecambe and the M6 motorway. Locally this has been a controversial development since the 1940’s when the design was first considered. Throughout its history there have been significant obstacles to the development ranging from environmental concern through to public opposition. The adversarial nature of the current planning system has possibly amplified and encouraged polarisation of local views.
The site or route corridor is particularly interesting because of the wide variety of issues which have influenced the planning process. Within the wider landscape there are significant environmental features including; Morecambe Bay SSSI, SPA, SAC and Ramsar site to the west, Bowland AONB and Bowland Fells SSSI to the East and the River Lune, which is in the top 5 salmon rivers in England. In the wider social context both Morecambe and Heysham are important regeneration targets both locally and nationally, suffering from similar deprivation problems that have been experienced by other former seaside resort towns. There is considerable scope in the area for economic regeneration through the development of new industry. This is largely influenced by the proximity of the Heysham port, which has been identified as an important regional gateway by the county council’s Structure Plan (Lancashire Structure Plan 1991-2006).

It is the scope and breadth of these issues which has divided opinion and led to the development of highly entrenched and politicised opinions. This has impacted the development in a number of ways but most notably has lead to significant delays and redesigns due to the inability to develop consensus.
regarding an acceptable route design. For this reason it makes a valuable case study for application of the ecosystems approach since it is hoped that the ecosystems approach might offer a stronger framework for decisions which require much greater integration and assessment of social, economic and environmental issues.

1.5 Environmental Impact Assessments

Globally, Environmental Impact Assessment (EIA) is considered a useful decision support tool. Here in the UK, EIA is a well-established statutory planning tool aimed at protecting the natural environment from damage caused by inappropriate development. In England the Department for Communities and Local Government (CLG), with responsibility for the national planning system, describes EIA as:

“a procedure that must be followed for certain types of development before they are granted development consent. The requirement for EIA comes from a European Directive (85/33/EEC as amended by 97/11/EC). The procedure requires the developer to compile an Environmental Statement (ES) describing the likely significant effects of the development on the environment and proposed mitigation measures. The ES must be circulated to statutory consultation bodies and made available to the public for comment. Its contents, together with any comments, must be taken into account by the competent authority (e.g. local planning authority) before it may grant consent.”

1.5.1 EIA strengths and weaknesses

EIA is in widespread use, with more than 500 Environmental Statements typically produced each year in England alone since its introduction, so the strengths and weaknesses of its application are therefore well understood. Some commonly cited weaknesses of EIA (RICS, 2007) that could potentially be addressed through the application of an ecosystems services approach are:
• Tendency for considering the separate aspects of the environment (water quality, ecology, landscape etc) in isolation with inadequate consideration of secondary, inter-related or synergistic impacts.

• Inadequate consideration of cumulative impacts.

• Inadequate assessment of the socio-economic and human health effects of environmental impacts.

• Difficulty in providing coordinated and enforceable mitigation beyond the project/scheme completion date.

These weaknesses can all be attributed in varying degrees to a lack of integrated thinking both from the perspective of the environment and the various government and non-government agencies typically involved in the process. It is usual practice for different aspects of the EIA process to be completed by different specialists (for example, an ecologist preparing the ecology section, a landscape architect preparing the landscape section, and so on), with little over-arching consideration of how these aspects of the environment interact with each other, or with people. As a consequence, EIA can on occasion raise more questions than it answers. For example, if a modification can be made to a development that reduces its impact on ecology, but at the expense of increasing its impact on the landscape, then is that modification justified on whole environment grounds? The answer is often not clear-cut, and hence a weaker, compromised mitigation is often sought. Such issues can only generally be assessed through the strengthening of a whole environment or ecosystems focus in the EIA process.

By contrast, the strength of EIA is that it is a practical and usable tool that can be readily applied to a wide range of development and planning situations, providing relatively simple outputs aimed at informing the decision-making process. This has led to it being widely used by both public and private sector organisations, and despite the acknowledged short comings, it is widely accepted to have brought a large number of environmental benefits in terms of preventing inappropriate development, and in mitigating against the effects of developments that would otherwise have been permitted with little
consideration of environmental impact. Its application, whether good or poor, therefore has an important influence on the long-term protection and enhancement of the natural environment.

1.5.2 Further limitations of the EIA process

The EIA process fits within a wider planning framework which varies depending on the nature of the development options. For a trunk road development the formal EIA process sits primarily in and around stage 3 as outlined by the Highways Agencies Design Manual for Roads and Bridges: Volume 11 (Figure 1.2). The earlier stages in the process undergo various assessments on a relatively broad level to consider development constraints both technical and environmental.

Prior to this the need for an improvement to the transport infrastructure is required at the strategic policy level and is often assessed using Strategic Environmental Assessment (SEA) at this pre-planning stage.

**Figure 1.2. The 3 stages in environmental impact assessment of road design and development.**

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>sufficient assessment to identify the environmental advantages, disadvantages and constraints associated with broadly defined route corridors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 2</td>
<td>sufficient assessment to identify the factors and effects to be taken into account in choosing the route options and to identify the environmental advantages, disadvantages and constraints associated with those routes.</td>
</tr>
</tbody>
</table>

(Design Manual for Roads and Bridges: Volume 11, part 2)

The stages as laid above mean that an EIA for a road development differs from a more standard development EIA in that decisions regarding route
choice are committed at an earlier stage and the full EIA process is only undertaken on the preferred route option. The implications of this are discussed in section 2 below.

The stages to be followed in carrying out a standard EIA are set out clearly in national planning regulations, supported with further advisory guidelines. The process is summarised below in Figure 1.3.

Figure 1.3. The EIA process as outlined by both the EIA good practice guidelines (CLG, 2006) and by the Convention on Biological Diversity (CBD, undated).

Figure 1.3 compares the EIA stages as set out in the CLG best practice guidelines with those set out by the CBD. Unsurprisingly the two are broadly similar. However there are one or two notable differences which potentially
relate to the greater focus of the CBD on impact assessments concerning resource management and not development.

The CBD does not include a project preparation stage although as already discussed this is a highly variable process which may be more significantly influenced by other guidance and legislation relevant to the project type. To illustrate this the considerations of alternative route options is approached within the CBD’s EIA process while the EIA good practice guidelines suggest that this is committed at the project preparation stage.

Identifying viable alternatives is an important component of the early planning process, and an essential requirement for an open and equitable approach to planning. This is therefore one of the most significant points in the wider planning process for incorporating the ecosystems approach.

Alternative solutions to the problem identified have to be considered, and where a road is the preferred option alternative routes must be offered. These deliberations will usually be made before the EIA process commences. In the case of Heysham to M6 link, three options were explored,

- The Northern route – running west from the Northern Lancaster junction.
- The Western Route – running north from the southern Lancaster junction.
- A no road option – this involved online changes to the local transport infrastructure.

By necessity one of the options must explore a solution which doesn’t involve a road design. Ultimately this third option was discounted and an EIA was undertaken on two routes for the road in order to inform the decision on which route to adopt.

As discussed previously this process of initial route choice and design is committed before the formal EIA of the preferred route. Currently, this Strategic Environment Assessment is made at a much broader level and will not contain the same weighted approach to significance. This highlights a significant weakness of the subsequent EIA process in that it undertakes the detailed appraisal of impact on only the final preferred route choice thereby
excluding any further, more detailed consideration of alternatives. This means that significant decisions regarding the necessity and sustainability of the route design and choice are made at a point where the interaction with the public and the wider issues is much narrower and restricted.

Another important difference to conventional EIA is that the CBD EIA guidelines place much greater emphasis on managing and monitoring post development operations. This is an important part of the ecosystems approach from the perspective of the development’s sustainability in the longer term management. It has been suggested that a weakness of the current EIA process as used for the Heysham to M6 link, is that involvement in managing mitigation measures towards the long term sustainability of road developments is limited. In particular, project appraisal is often lacking in scope and detail and fails to identify the true successes and failing of a road development (CPRE and Countryside Agency, 2006).
2 DEFINING THE PROBLEM

The CBD guidelines suggest that one of the first steps in adopting the ecosystems approach is to fully define and understand the problem that needs resolving.

It therefore seems appropriate to start this case study with an examination of the definition of the problem the Heysham to M6 link EIA is intended to address.

Using the simple methodology of constructing a problem tree the project team set about defining the problem based on published information. There were two reasons for doing this:

1. to help the project team understand the problem that the EIA they were studying was intended to address

2. to see how well the problem was defined in the EIA and the lead up to it.

The problem tree in Figure 2.1 represents the local problem giving rise to the Heysham EIA as initially defined by the project team in October 2006.

Figure 2.1: Problem Tree initially defined
One of the causes of the problem was identified as “delays and refusals in the planning process”. These have mainly been in relation to ecology and the environment. The effects can certainly impact on ecosystem function, goods and services and on the ability of people to enjoy their benefits. Building a new road is a solution to the “core problem”.

In considering the problem it became clear that the problem changes with time and as the project progresses. At an earlier stage in policy / strategy development, the core problem may well have been traffic congestion and lack of economic growth and investment. Figure 2.2 below illustrates this problem tree.

Figure 2.2: Problem tree at initial planning stage
The core problem once a decision to build a new road has been taken may be very different with ‘Loss of and Severance of Habitat’ as one of the core problems as illustrated in Figure 2.3 below.

**Figure 2.3: Problem Tree – Loss of and Severance of Habitat**

Defining the problem also helps to focus on the benefits available to finding an equitable sustainable solution that provides integrated management of land, water and living resources and promotes conservation.

The information allowing the problem to be defined is contained in the various planning documents at regional, local and project level however a clear, holistic and simple definition of the problem is needed.

In carrying out this case study we had the benefit of defining the problem retrospectively. This may be easier than defining the problem(s) at the outset.

Defining the real problem holistically and reviewing and updating may be more of a challenge.
3 EVALUATION OF THE HEYSHAM EIA PROCESS AGAINST ECOSYSTEMS APPROACH TASKS

Each of the 12 tasks set out in the ecosystems approach advanced user guide (Appendix 2) have been considered individually. The research team considered each task and the guidelines, tools and methodologies suggested in the advanced user guide and collected evidence from the various studies and consultations that have been carried out to assess to what extent each task was completed within the EIA process for the Heysham to M6 link.

Each task was assessed in terms of scope, scale and timing and a score given on a scale of 1 to 5 for each attribute. The attributes and scores are defined in tables 4.1 and 4.2 below.

Table 3.1 Attribute definitions

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>Scale</td>
<td>The boundaries defined for the study, the size in terms of geography or population of the study / survey</td>
</tr>
<tr>
<td>Scope</td>
<td>The depth, range and intensity of the study / survey</td>
</tr>
<tr>
<td>Timing</td>
<td>When the study / survey was done and its appropriateness to the issue being considered</td>
</tr>
<tr>
<td>Technical Content</td>
<td>Technical content with reference to the requirement of adopting an ecosystems approach</td>
</tr>
</tbody>
</table>
Table 3.2 Scoring definitions

<table>
<thead>
<tr>
<th>Score</th>
<th>Definition</th>
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<tbody>
<tr>
<td>1</td>
<td>Fully facilitates the adoption of the ecosystems approach</td>
</tr>
<tr>
<td>2</td>
<td>Achieves good coverage of the issues covered by the task</td>
</tr>
<tr>
<td>3</td>
<td>Some issues addressed but gaps are easily identified</td>
</tr>
<tr>
<td>4</td>
<td>Very limited coverage of the issues</td>
</tr>
<tr>
<td>5</td>
<td>Does not address the task or the issues at all</td>
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</tbody>
</table>

The project team had to assess how well the planning process, and in particular the EIA delivered an ecosystems approach (as set out by the Convention on Biodiversity). To make this assessment it was necessary to establish what studies, surveys, consultations and reports had been completed. This is set out in Appendix 3. This is the main body of evidence on which the evaluation is based.

3.1 Evaluation of Task 1: Societal Choice

Task 1: Involving all members of society in decisions associated with the management of land, water and living resources

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<td>Timing</td>
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<tr>
<td>Technical Content</td>
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</table>

3.1.1 Summary

It is considered that, broadly speaking, all members of society were given ample opportunity to be involved in the decision making process at Heysham. In terms of involvement this broadly corresponds with the ecosystems approach. There has been widespread public consultation and stakeholder involvement over an extended period of time. The scope of the consultation
did not involve key elements of the ecosystems approach so for example stakeholders were not asked about the ecosystem goods and services they enjoyed and the benefits they derive from those goods and services.

3.1.2 Introduction

The guidelines for this task are to involve all stakeholders (interested parties) (including indigenous and local communities) in:

- Clearly articulating, defining and agreeing upon the goals of management defining problems making choices (see Task 12).

- There need to be clearly defined boundaries (in time and space, see Task 7) for the area being managed so that those involved are fully aware of the range/ limitation of the management processes.

- Ensure that those stakeholders who cannot directly represent themselves (e.g. future generations, the natural world) are adequately represented by someone else.

- Ensure that all stakeholders have an equitable capacity to be effectively involved, including equitable access to information, ability to participate in the processes, etc.

- Ensure that the decision-making process compensates for any inequities of power in society, so that those who are normally marginalised (e.g. women, the poor, indigenous people) are not excluded or stifled in their participation.

- Make sure all actions are transparent to everyone concerned. This includes identifying who the decision-makers are for each decision, how the decisions will be taken (what process will be used), and what are the limits on the discretion of the decision-maker (e.g. what are the criteria for the decision in law, and where applicable what is the overall policy guidance within which the decision must fit).

- Ensure that the recognition of stakeholder interests occurs within the full range of decisions over time and space and across the different levels (e.g. local and national government). In doing so, however, ensure that
“stakeholder fatigue” does not develop, by incorporating known stakeholder views into future decisions, and allowing efficient stakeholder input.

- Where possible, use existing societal mechanisms (e.g. existing local groups), or build new mechanisms that are compatible with existing or desired societal conditions. Ensure that decision-makers are accountable to the appropriate communities of interest.

- Develop within the project team the capacity to broker negotiations and trade-offs, and manage conflicts among relevant stakeholder groups in reaching decisions about management, use and conservation of biological resources.

- There need to be mechanisms in place to ensure that, once an appropriate societal choice has been made, the decision can be implemented over the long term, (e.g. policy, legislative and control structures need to be in place).

Also considered in this section are the tools used to meet the above guidelines. The guidance suggests the following tools might be used:

- Workshop based methods
- Community based methods
- Methods for stakeholder consultation
- Local community approaches
- Social analysis
- Conflict management methods

3.1.3 Assessment of Guidelines

The equitable involvement of all members of society in decisions relating to the management of land, water and living resources is central to the goals of the ecosystem process. Equitable involvement requires that all opinions are fully represented and equally weighted. Decisions are a matter of societal choice.
Defining stakeholder groups and fully including their input in the planning decisions has long been part of the democratic process. However, in defining stakeholder involvement the ecosystems approach differs from other strategies in several ways.

i. Through embedding humanity within the natural world it recognises the importance of the natural world as a key factor to be considered at all stages in the decision making process.

ii. By adopting the principals of sustainable management future generations must also be considered.

**Setting goals and boundaries**

In order to define the suitable degree of stakeholder involvement it is necessary to outline goals and boundaries to the area. While the ecosystems approach will by its nature blur boundaries, these still need to be limited and focused to obtain the best outcome in light of limited time and resources. Boundaries aren’t simply geographic but also include populations, subjects and issues.

The ecosystem process sets the definition of the problem as a primary goal of the process. At a strategic level the problem to be resolved must be clearly agreed and set out.

In the context of this project the problem has been defined by a number of central issues:

i. Inadequate road link between Heysham and the M6 motorway.

ii. Barriers to development in Lancaster.

iii. Lack of economic growth in Heysham and Morecambe

While there are clearly interlinking forces and issues here, the debate will be significantly altered depending on which of the above problems forms the central debate.
Without a clear agreement of the problem to be resolved there is the potential that the debate fails to achieve consensus. This would be a result of varying priorities and the weighting given to different factors in the debate.

Below the varying approaches to the problems have been outlined for the different tiers of planning from 1993 onwards.

**The Lancashire Structure Plan 1986-1996**

The purpose of the scheme is to improve the inter-urban network. According to the structure plan such scheme were intended to meet a variety of aims economic, environmental and social.


‘... the purposes of the Heysham to M6 Link are to:

‘Contribute, as one of a number of measures, to solving the traffic problems of Lancaster and improving safety and environmental conditions there. The removal of much through traffic from the bridges over the River Lune will enable existing road space to be used more effectively with priority being given to buses, cyclists and pedestrians.’

‘Provide a direct link for Morecambe/ Heysham traffic (especially port and tourism traffic) to and from the M6 Motorway, thereby avoiding the existing conflict with local Lancaster- Morecambe traffic, facilitating the efficient transport of goods and assisting the regeneration and economic development of the Lancaster- Morecambe area and particularly Heysham.’

**Major scheme business case – at programme entry - 2005**

‘The review of existing conditions indicates that Lancaster currently suffers from high levels of traffic congestion. This results in environmental problems in the study area, including air quality, noise, visual intrusion, severance and safety issues. Traffic congestion also impacts on the economic development of the area constraining the viability and development of the Port of Heysham and the take up of development land.’
'The current road network provides poor linkages between Heysham and Morecambe and the strategic road network, particularly the M6.'


The scheme is seen as playing a key role in improving communications between Morecambe and Heysham and the M6 Motorway, including improved access to the Port of Heysham. Its construction will remove a significant volume of traffic from the River Lune bridges in Lancaster and create opportunities to enhance provision for pedestrians, cyclists and public transport in the center of this historic city.

Lancashire Local Transport Plan 2006-2010

The problem is access to a major port - ‘Traffic congestion restricts the economic regeneration of the peninsula area, both in terms of industry and tourism, and reduces the potential for growth for the Port of Heysham.

Clearly there has been a progressive process of development in the definition of goals and objectives for this project. The central problem is defined as the inadequate road link between the Morecambe and Heysham Peninsula and the M6 motorway. While a number of secondary effects have been identified throughout the process, none of these are the problem to be resolved but are the secondary benefits of identifying a clear resolution. Clearly priorities differ regarding the weight and importance of these issues in the sought resolution of the road scheme. However, this highlights the importance of equitable stakeholder involvement and the need to identify and achieve consensus.

At each stage in the process of identifying goals and boundaries there has been a public consultation exercise. This was in relation both to key strategic policies for the region, which directly and indirectly impact the scheme (Examination in public – 1991-2006; Lancashire Structure Plan & 2001 – 2016 Lancashire Joint Structure Plan). And also in relation to the specific scheme which was discussed as a strategic priority for the region (Examination in
public – 1991 – 2006 Structure plan). At a local level the scheme has also been debated at several public consultation exercises within the district.

Equitable Involvement

Equitable involvement may require that efforts be undertaken to obtain all the relevant opinions. This must account for the fact that not all members of society will have the same capacity to input into the decision making process.

A variety of tools can be used to achieve this. Each has benefits and drawbacks and an ideal consultation would utilise a range of methods dependent on the complexity of the issues and the breadth and depth of response required.

The advanced user guide references a few of these:

- Workshop based methods
- Community based methods
- Methods for stakeholder consultation
- Local community approaches
- Social analysis
- **Conflict management methods**

A variety of methods were utilised in the planning process for the Heysham to M6 link at different stages in the process. These are outlined below.

1. Lancaster Transport Strategy Report – Public consultation – Western route
2. 1998 - Public consultation exercise – Preference regarding 3 possible routes
3. 2001 – MORI poll – Preference regarding 2 possible routes

1. Lancaster Transport Strategy Report – Public consultation – Western route
This was conducted as part of the Examination in public of the Lancashire Structure Plan 1991 – 2006. A variety of businesses, special interest groups and members of the public were invited to make comment.

2. 1998 - Public consultation exercise – Preference regarding 3 possible routes

The consultation focused primarily around 13 public events in five locations. People attending these events were invited to make comment and were provided information on the various routes through a number of information boards and the available guidance of Officers from the County Surveyor’s Department.

The County Surveyor made a presentation to the City Council with representatives from several special interest groups attending. Local people and businesses impacted by the route were also encouraged to attend the meeting. 720 members of the public were surveyed in person, at random within the district, by the county council. Public meetings were also offered to various special interest groups including farmers, MOD and the anglers society.

Critical Assessment:

This consultation involved a variety of different methods to gather public opinion including exhibitions, public meetings and a survey. This consultation could be expected to have gathered opinion from a wide variety of people at a variety of scales.

The 1998 public consultation exercise was initially criticised both for being poorly advertised and for failing, in certain areas, to provide sufficient disabled access for local people (Source: 1998 consultation document).

The public events were in fact widely advertised and well attended by local people. A mail drop was focused to include organisations and in one case an individual directly impacted by one of the proposed routes. Further information was available at 13 public exhibitions held throughout the district along with a
questionnaire. Public press was extensively used during the consultation to advertise dates and to introduce issues.

From the current information available it is uncertain how much effort was made to facilitate the involvement of marginal groups. The criticisms regarding access for people of restricted mobility highlight one area for improvement in this regard.

Without confirmation it is uncertain how the consultation exercise met the aims of social inclusion through the availability of reference information. This could include the availability of translated materials for people whose first language is not English, audio translations for people with poor eyesight and large print. This could also include efforts to make the literature accessible to a wide cross section of society. This may include benchmarking of published materials against the Crystal mark standard.

3. 2001 – MORI poll – Preference regarding 2 possible routes

Following the Government’s rejection of the Green route, the County Council commissioned a public survey to assess opinion in relation to an amended Green route and the Orange route.

A MORI poll was commissioned with the objective of canvassing local opinion. This differed from the 1998 survey by randomly mailing 1000 residents within the local area with a questionnaire style survey. A sample were also visited and interviewed in person.

Critical assessment:

An advantage of this method is that it can reach a potentially representative sample of the population. A disadvantage is that the depth of response will be limited to simple questions and understandings. Little evidence exists to inform this assessment on the extent to which the process was culturally and socially weighted to enable access by marginal members of society.

Involvement over varying scales
The current planning process in England encourages stakeholder input at a variety of scales. The detail of this involvement is dictated by budgetary constraints and the degree to which resolution is required at each stage.

The Heysham bypass has undergone enquiry at a number of scales. The first public consultation informed the local transport strategy for Lancaster. Once a route is decided and detailed plans submitted, all stakeholders have the opportunity to make representations. In January 2007, detailed plans had been submitted and approved by Lancashire County Council and a public enquiry followed in 2007.

Resolution

While all opinions must be represented there will ultimately need to be a process of agreement regarding the chosen course of action. This process must be transparent.

3.1.4 Scores

Scale

Public consultation has been involved at a variety of levels in the decision making process. This includes involvement both in the Lancashire Structure plan and the Lancaster Local plan inquiry. However, the degree of involvement at each level is dictated by cost and the extent of involvement at each level differs greatly. Direct involvement in the planning of the particular road scheme is also supported by involvement in the strategic policy development for the region. Score = 1

Scope

The organisations involved in the decision-making process are considered to be appropriate, although to be wholly compatible with the ecosystems approach, a greater level of community involvement in decision-making may be required. Score = 3
Timing

Public consultation and involvement has been ongoing over a long period of time. Throughout this period the problem, as defined, changes. This extended consultation period may be seen as both a strength and a weakness. The strength is that it allows for thorough and extended debate. The weakness is that issues, legislation, and knowledge change over time which could lead to "out of date decisions and opinions being taken forward. Score = 3

Technical Content

A good quality and comprehensive environmental impact assessment accompanies the planning application. The scope for the project did not embrace the ecosystems approach and was constrained by the need to consult on the planning process. The use and enjoyment of ecosystem goods and services was not fully considered. Future long term management of the wider environment does not form part of the consultation and decision-making process. Score = 4

3.2 Evaluation of Task 2: Decentralised Management

Task 2: How do you ensure that management is decentralised to the lowest appropriate level?

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<td>Technical Content</td>
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3.2.1 Introduction

The appropriate level of management will depend on the problem being dealt with. As discussed earlier, the nature of the problem may change over the life of a project. Whilst the problem is one of strategic regional planning the appropriate level of management will be very different to the appropriate level
of management when the problem becomes the construction and operation of a new road.

In the context of this task it is assumed that ‘management’ refers to management of the decision-making process and the collection of information to inform that process (this assumption is made since this is as far as the current process has gone. It is however recognised that management at the appropriate level is required throughout the life of the project including in this instance the operation of the road in the long term). The decision-making process can be defined as the process from when the proposed scheme was first included in the Lancashire Local Transport Plan, to the time when the planning decision is announced. The EIA is a key document in the decision-making process, as it was fundamental in firstly determining the preferred route, and then in identifying mitigation measures required to ensure that the development does not have an unacceptable environmental impact.

Communities of Interest

The ecosystems approach advanced user guide requires that before evaluating the compatibility of the process adopted at Heysham with the ecosystems approach, it is necessary to identify the communities of interest potentially affected by the scheme. These can be broadly considered as follows:

Local / Regional:

- Local residents
- Local businesses
- Lancaster City Council
- Lancashire County Council
- Port of Heysham
- Transport Solutions for Lancaster and Morecambe (Local Protest Group)
- Locally significant environmental receptors
National:

- National residents
- National businesses
- Statutory Consultees; Natural England and Environment Agency
- Specialist interest groups, such as Campaign for the Protection of Rural England
- Nationally significant environmental receptors

Evaluation of management of the decision-making process at Heysham

Determining the appropriate level of management for a development such as a road is complex. The problem is effectively a local problem, and the potential solution was initially proposed at a regional level through the inclusion of the scheme in the Local Transport Plan. However, the delivery of the solution depends on strategic support and funding at a national level. The final decision whether to grant planning consent could be made locally or nationally, depending on the outcome of the planning process.

The national tier to decision making cannot be removed as it is necessary for the proposal to be evaluated in the context of strategic policy, and in comparison with other schemes which may be competing for a limited source of funding. National level involvement is also necessary to evaluate whether the scheme is in the national interests, for example, in the evaluation of whether it represents an appropriate and good value use of public funds.

3.2.2 Assessment of Guidelines

The performance of the scheme in adopting the lowest appropriate level of management is considered further in terms of the following (from Task 2 guidance in ecosystems approach advanced user guide).

**Whether the body represents the appropriate community of interest**

No one body considers all of the communities of interest in isolation. However, it is considered that the most appropriate body to consider all of these
interests is Local Government, through its electoral accountability and through its function to promote sustainable economic development and environmental protection in the Lancaster area. On these grounds, the existing approach meets the criteria set out in the ecosystems approach.

**Whether the body has a commitment to the intent of the function**

In the context of the planning process for the Heysham to M6 link the democratic nature of the process, the degree of consultation undertaken and the scrutiny to which any decision is subjected ensure that the decision-making body has a commitment to the intent of the function – in this case facilitating economic development in the Heysham area and relieving traffic congestion in Lancaster.

**Whether the body has the necessary capacity for management efficiency**

This relates to whether local bodies have sufficient expertise to enable them to manage the decision-making process. Lancashire County Council and Lancaster City Council, supported by external specialists where necessary, have demonstrated sufficient expertise through the process to suggest that management of the Heysham – M6 project was at the appropriate level.

**Whether the body has other functions which represent a conflict of interest on marginalised members of society**

Objections to major developments, such as Heysham to M6 link often focus on the perception that the decision-making body is overly influenced by the demands of economic development, whereas issues relating to impacts on the environment or local communities can be marginalised. This can lead to accusation of conflict of interest. The purpose of including a separate national tier of decision-making, such as a Planning Inspector, is to place the decision in the hands of an independent and impartial body which removes local conflicts of interest from the decision-making process.
3.2.3 Scores

It is considered that management of the decision-making process at Heysham broadly corresponds with the ecosystems approach. The following scores are attributed:

**Scale**

The decision-making process has been made at a combination of local / regional and national levels. Given the complex range of issues involved with such a development, it is considered that there are few opportunities for further decentralising decision-making. Much of the national level involvement in the scheme is intended to remove local conflicts of interest, and is therefore in keeping with the ecosystems approach. Score = 1

**Scope**

The organisations involved in the decision-making process are considered to be appropriate, although to be wholly compatible with the ecosystems approach, a greater level of community involvement in decision-making may be required. Score = 3

**Timing**

Although decision-making for such a scheme is necessarily complex, the interaction between local and national levels makes the timescale for a decision-making protracted and inefficient. Score = 3

**Technical Content**

A good quality and comprehensive environmental impact assessment accompanies the planning application, and although some gaps have been identified during this case study (for example, ecological valuation), they are not matters that would usually be addressed through the current planning system. Score = 2
3.3 Evaluation of Task 3: Effects on Adjacent Ecosystems

How do you ensure the effects of management actions (potential or actual) on adjacent and other ecosystems are taken into account?

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<td>Scope</td>
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<td>Timing</td>
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<td>Technical Content</td>
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3.3.1 Summary

Where the effects of the proposed development on adjacent ecosystems have been considered, this has been done at an appropriate scale. The scope of the studies to consider the effects of the proposed development on adjacent and other ecosystems is not clearly defined. The result is that, whilst adjacent and other ecosystems have been considered in some cases there is no overview of adjacent ecosystems and possible effects. The core elements of the ecosystems approach are not considered per se although some conclusions may be drawn on some aspects and impacts. Ecosystem function and health are not considered and neither are ecosystem goods or services.

3.3.2 Introduction

The Heysham to M6 link road is a priority infrastructure development with a long history in the planning and development of proposals dating as far back as 1949. In the context of this task the management actions taken since 1993 have been considered. Since 1993 there has been extensive consultation and discussion to try and identify a preferred route for the road. The various studies, investigations and consultations are summarised in section 3.0 “The Planning Timeline”.

For the purpose of this report, the main ecosystems identified adjacent to the proposed road routes include:
• Morecambe Bay Candidate Special Area of Conservation (cSAC), Special Protection Area (SPA), Lune Estuary Site of Special Scientific Interest (SSSI) and RAMSAR Wetland of International Importance

• The River Lune

• The surrounding agricultural land (predominantly improved grassland)

• The adjacent field boundary network

When specifying the scope of the investigations, particularly the ecological investigations, Lancashire County Council identified a “field survey area” in which the surveys would be conducted.

3.3.3 Assessment of Guidelines

The ecosystems approach advanced user guidelines suggest the following:

1. Natural resource managers, decision makers and politicians should consider the possible effects that their actions could have on adjacent and downstream ecosystems (river basins and coastal zones) so that effects inside and outside the ecosystem are determined.

The EIA process was key in assessing any likely effects on adjacent and downstream ecosystems.

One of the findings on the Western Route EIA was that it would risk impacting an adjacent ecosystem. The Western route is adjacent to Morecambe Bay cSAC, SPA, Lune Estuary SSSI and RAMSAR site. These designations are primarily concerned with preserving the integrity of the salt marsh, mud flats, estuarine and marine habitats and features. This includes their maintenance as important habitats for wildfowl, waders and Great Crested Newts. The EIA on the Northern Route anticipated that there would be no impacts to the cSAC/SPA, SSSI and RAMSAR site due to its distance and intervening urban development, so the Highways Cabinet of the County Council chose the Northern route as the preferred route. Therefore the possible effects of decision-makers actions on adjacent ecosystems (namely river basins and coastal zones) were considered in this case.
Effects on the important recreational fishery in the River Lune were considered. Wider ecological effects and dependencies in the River Lune catchment and adjacent ecosystems were not considered in a structured way.

2. Where management or use of one ecosystem has or is projected to have effects elsewhere, bring together relevant stakeholders and technical expertise to consider how best to minimise adverse consequences.

As part of the EIA process there was consultation with other parties concerned with the routes impact on the surrounding ecosystems, namely:

- Natural England (formerly English Nature), regarding the designated sites adjacent to the scheme routes
- Environment Agency, regarding the River Lune, tributaries and Lansil landfill Site
- Anglers and commercial fishermen, regarding the implications of the road construction on fishing including salmon and trout migration.
- Fishing tackle shops and accommodation providers regarding the importance of the Lune fishery to their businesses.
- British Waterways, regarding the implication of the road crossing the canal network
- Atkins, regarding the increased noise created by the proposed road route
- RSPB
- Lancashire Wildlife Trust

The approach taken on the River Lune is considered to be a good example of bringing together relevant stakeholders and technical expertise. Consultations were widespread with national bodies e.g. EA and local interest groups. Expert consultants were employed to develop mitigation strategies.

3. Environmental impact assessment (EIAs), including strategic environmental assessments (SEAs) should be carried out for all developments taking into account all the components of biological
diversity. These assessments should adequately consider the potential offsite impacts. The results of these assessments, which can also include social impact assessment, should be acted upon. When identifying existing and potential risks or threats to an ecosystem, different scales need to be considered.

Lancashire County Council adopted the SEA process, whilst encompassing the requirements of the SEA Directive to assess the long term effects of implementing its second Local Transport Plan (LTP2) on the environment, also taking into consideration the social and economic consequences of the LTP2.

The main findings of the SEA assessment included the following:

- Congestion caused by high resilience of a large proportion of the population on the car, current capacity of the road network and a trend for “out of town” developments
- Poor accessibility in urban areas especially where social deprivation is high and there is a high proportion of car-less households, and in rural areas where the reliance of affluent rural home owners on the car causes a breakdown in the local provisions and services that indigenous rural communities depend on

The LTP presents a number of major schemes and strategies, which aim to reduce congestion, improve accessibility and improve road safety whilst ensuring environmental protection. One of these schemes is the proposed Heysham to M6 Link.

The SEA identified that even though the road scheme aimed to reduce congestion, there is potential for the road scheme to have potentially adverse effects on biodiversity, landscape, cultural heritage, water quality, land use and increased flood risk. The LTP and SEA identified that an EIA would be required to ensure there were no significant adverse effects of the preferred route on biodiversity, landscape, views, cultural heritage, water quality, land use, increased flood risk, local air quality and noise.
In 2002, Lancashire County Council Highways Consultancy commissioned EIAs on two alternative routes, one to the west of Lancaster and one to the north of Lancaster. ADAS undertook the nature conservation and ecology study. The field survey area studied covered approximately 3800 hectares.

The assessments made as part of this study assessed the potential for offsite impacts. The EIA indicated that the Western Route would have significant impacts on European Protected Species (Bats and Great Crested Newts) and the risk of impacts on European protected Special Area of Conservation and Special Protected Area, Lune Estuary RAMSAR Site and Site of Special Scientific Interest. It concluded that it would be unlikely that the Western Route could be built.

4. Establish and maintain national and regional monitoring systems to measure the effects of selected management actions across ecosystems (see also Task 5)

In the Environmental Management Plan drawn up as part of the EIA process, monitoring of ecological impacts during and after construction is proposed. This is for a 20-year programme to cover species and habitats of importance. This would be carried out throughout the scheme corridor and in sensitive adjacent habitats, ponds, watercourses and the Lune Estuary salt marshes. Monitoring is a non-statutory procedure but this may be required as a condition of the planning.

5. Develop specific mechanisms to address trans-boundary issues associated with shared ecosystems and with trans-boundary transfer of ecological impacts (e.g. air and water pollution)

The non-technical summary drawn up as part of the EIA identifies a variety of trans-boundary issues related to the wider landscape and receptors within the landscapes. The report sets an overview of which species and habitats are inter-depandant on each other. It takes into consideration the wide-ranging behaviour of many wildlife species and their dependencies on linear features such as hedgerows, rivers, canals, streams, ditches for food, breeding, protection and navigation. The report highlights that the usage of the wider
landscape can be significantly impacted by road schemes that sever such networks, and highlights where mitigation can reduce risks.

The main trans-boundary issues highlighted include:

- Damage/ loss of habitat
- Fragmentation of habitat
- Disturbance/ disruption
- Road kill
- Barriers to movement including migratory species
- Water pollution
- Air pollution
- Salt deposition
- Disruption to hydrology
- Soil structure damage
- Foreign materials
- Induced development
- Public pressure

The Environmental Management Plan addresses some of these issues through mitigation and compensation measures to be carried out through the design, construction and operational phases of the road. These measures include protecting watercourses from pollution and changes in flow through ensuring the correct design of road drainage and holding pools to control flows and pollutants. Habitat creation such as tree, hedgerow, verge and watercourse bank planting schemes are also included to provide mitigation, compensation and enhancement for lost and damaged habitat to limit fragmentation.
3.3.4 Scores

Scale

Where the effects of the proposed development on adjacent ecosystems have been considered, this has been done at an appropriate scale. The two main examples are:

- The consideration of the potential impact on the Morecambe Bay SSSI and associated protected species for which a detailed report was produced. This set out the issues and was the basis on which the decision to drop the Western Route was taken.

- The consideration of the impact on the fishery. As well as ecology surveys of fish in freshwater watercourses, studies were undertaken to look at potential impacts on the commercial and recreational fisheries in the River Lune.

The survey work and reporting focused on the road footprint and a survey area surrounding this, based on distance from the footprint. This has limited the consideration of adjacent ecosystems to those of high nature conservation value and national importance.

Score = 3

Scope

The scope of the studies to consider the effects of the proposed development on adjacent and other ecosystems is not clearly defined. The result is that, whilst adjacent and other ecosystems have been considered in some cases, there is no overview of adjacent ecosystems and possible effects. There is an implied assumption that the important adjacent ecosystems have been considered and where there is no mention, e.g. of adjacent grassland areas, there is no effect. Score = 5

Timing
The timing of the studies was current in terms of informing the decision making process. Score = 2

**Technical Content**

Where studies have been undertaken to look at the effects on adjacent and other ecosystems, they have been thorough within their terms of reference which are defined by the needs of the EIA i.e. to identify potential impacts, assess the significance of any impact and identify appropriate mitigation, compensation or enhancement. The core elements of the ecosystems approach are not considered per se although some conclusions may be drawn on some aspects and impacts. Ecosystem function and health are not considered, nor are ecosystem goods or services. Score = 4

### 3.4 Evaluation of Task 4: Economic Context

**Task 4: How can the economic context be understood so that:**

- market distortions that affect biological diversity are reduced
- incentives are developed to promote biodiversity and sustainable use
- ecosystem costs and benefits are externalised?

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**3.4.1 Summary**

It is considered that the approach used for the Heysham to M6 link does not correspond with the ecosystems approach for this particular task. Ecosystems operate over a larger scale than was looked at in the Heysham study, which mainly focused on a corridor along the proposed routes. The ecosystems
approach would consider the impacts on the whole ecosystem rather than looking separately at individual species and communities. The valuations in the Heysham study looked at receptors – habitats and species for the ecology assessment. Value was assigned in terms of importance and not in any economic context. Where economic information was collected, (commercial/recreational fishing reports) this was used to assess the financial impact on businesses involved in these activities. Incentives are not considered in the mitigation strategy.

3.4.2 Introduction

Ecosystems provide goods and services, the continued development of which remains key to our economic prosperity and other aspects of our welfare. However, ecosystem services tend to be undervalued by society because they have no formal market, so they are not allocated a price that would give some indication of their economic value to society. There can also be a lack of adequate information and knowledge about ecosystem functions and the benefits they generate for society. Most environmental goods/services have the characteristic of ‘public goods’ in an economic sense, which are difficult to incorporate into markets. In addition, many stakeholders with strong interests in the ecosystem may be marginalised from the relevant economic systems as they have limited political and economic influence.

Ecosystem goods and services are valuable for direct use and also for reasons not related to their use, for example in the contribution to cultural traditions. Goods, such as timber, can be used directly, and services, such as controlling soil erosion, indirectly support human welfare. The combination of these non-use and use values is known as the Total Economic Value of a resource.

Ecosystem goods and services are vital for supporting life at all levels, though it is generally rural communities in developing countries who are most reliant on these for their survival. For example, income from harvesting wild products often represents a significant source of income. In developed countries, and in
this particular case study at Heysham, the ecosystem is used more for pleasure/pastimes rather than depended on for survival.

Often those who benefit from conservation do not pay the costs associated with it, and those who generate environmental costs escape responsibility (e.g. pollution). It is therefore important to align incentives so that those who control the resource benefit and those who generate environmental costs pay. Deriving economic benefits does not need to be inconsistent with attaining biodiversity conservation and improvement of environmental quality, provided that incentives are properly aligned. However there will often be trade-offs between different types of value/economic benefits under different policy scenarios. Some groups are likely to lose out.

Demonstrating the value of ecosystem goods and services is vital to bring about sustainable management of resources, though it is also necessary to capture the value of these services (e.g. by creating markets or payment systems for ecosystem services; providing information and technology exchange; and creating and enforcing property right regimes).

3.4.3 Assessment of Guidelines

Approach used in Heysham M6 EIA

For the Heysham – M6 link proposal, the EIA looked at the value of the habitat or species, in terms of its ecological importance, to assess whether building a road would have a serious effect on wildlife/landscapes etc. As part of this EIA, ecological studies carried out between 2002 and 2004 considered impacts of the scheme on protected species, and other habitats and species. Importance was assessed basically in terms of scarcity at international, national, regional and local levels. Mitigation measures to counter any negative impacts the scheme may have were also identified. For the majority of species and habitats no economic assessment was made.

Two reports looked at financial impacts, one on recreational fishing and associated tourism, the other on commercial fishing. The main purpose of these reports was to identify where compensation for loss of income should
be considered and to give an initial indication of the level of compensation for inclusion in project budgets. These reports were not looking at the economic context in terms of an ecosystems approach.

The financial impacts on fishing and tourism (including spending in hotels and B&Bs; and spending in the local community e.g. on food, fuel and fishing tackle) were also looked at in this EIA process. The Lune catchment is one of the top five sporting and commercial catch rivers in England and Wales. The Environmental Impact study on Fisheries looked at construction impacts as well as impacts from the permanent works (e.g. a new bridge crossing). The major potential impacts were found to be on migratory fish though mitigation measures to reduce the impact were also outlined. The natural fluctuations in catch records over the years made it difficult to measure with any accuracy what impact (if any) the scheme would have on fish catches. Recommendations made in the report included compensating commercial fishermen for their loss of income (for those prevented from fishing in parts of the estuary as a result of bridge construction etc.) and compensating angling clubs adversely affected by the works. Other uses of the river (e.g. use by rowing clubs, shrimp boats and for canoeing) were not evaluated in this study.

Another report looked at the financial impact of the Northern route on the commercial fishing activities in the area, and considered economic effects on tourism and other commercial operations on the Lune (including B&B, hotels, license fees, spending in the local community etc.). Assessments were made of the current economic value of fishing in the area, including the value for tourism and other commercial operations which depend directly on fishing. The net annual value of fishing on the river and the net annual value of spending in the community (as a result of fishing on food, accommodation, fuel, other attractions and retail) were estimated. The potential economic impact as a result of construction of two bridges over the Lune would however be higher than this value because many of the annual costs from fishing clubs are fixed over the short term and cannot easily be reduced. A local multiplier effect on the gross income levels was used to assess the actual economic impact on the local economy over and above the direct, indirect and additional
expenditure on fishing by anglers. No precise figures could be calculated to
determine the economic impact of the physical impact of constructing two
bridges. A more precise figure to assess the economic impact of the proposed
routes could not be quantified because no assessment was made to
determine the level of reduction in migratory fish during the construction or
number of fishing days lost. Much would depend on when the construction
takes place and over how long the work will be spread.

The Environmental Statement briefly set out the socio-economic context and
other documents produced during this process covered the economic benefits
the road would provide, such as allowing development of alternative travel
modes (bus, cycles), industrial regeneration and development, improved
access and links to key business parks, development of adequate
employment, improved safety and environmental conditions, reduced traffic
congestion and air pollution. The County Council also commissioned an
Economic Impact Report (EIR). The purpose of the EIR was to demonstrate
how the proposed scheme would impact on the economy of the Regeneration
Areas. The report found that many wards within the Regeneration Areas were
ranked within the 20% most deprived in England and that these deprived
areas were geographically very well placed to benefit from completion of the
Heysham – M6 link. Morecambe Chamber of Commerce (MCC) stated that
tourism was the only realistic and available mechanism for increasing
economic prosperity in Morecambe due to the historic significance of tourism
in the area and the lack of appropriate available land in Morecambe for any
new developments that would create large numbers of new jobs. MCC
believed the two key factors to ensure that tourism can be a successful driver
for accelerated economic growth in Morecambe were promotion of
Morecambe as a tourist destination by the local authority and other local
agencies; and better access to Morecambe for visitors.

Ecosystems approach

The reports outlined above do touch on the social and economic context of
the proposed scheme, though most of the economic valuation was in terms of
the economic benefits the road would bring to the area rather than the
economic value of the ecosystem itself. The EIA assessed the ‘value’ of the ecosystem to an extent – it looked at the magnitude of impacts caused by the scheme (using a system based on Institute of Ecology and Environmental Management (IEEM) guidelines). Resource value is generally described in geographical terms (local, international etc.). To account for both resource value and impact magnitude, a matrix approach was used in this EIA. One of the proposed routes was considered too high ‘value’ (e.g. for ecological reasons/ impacts on protected species) so this proposal was rejected. The fishing and tourism economic reports assess in monetary terms the value of particular aspects of the ecosystem but conservation and biodiversity in general are not assessed in this way.

The only report that considers financial impact in the Heysham case study was the report looking at the economic effects on fishing and tourism. The environmental impacts (effects of externalities) were looked at in detail in the EIA but using IEEM impact magnitude criteria rather than economic valuation methodologies.

A Cost Benefit Analysis (CBA) was carried out, but this only included costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. The report recognises that where this is the case, this analysis does not provide a good measure of value for money and should not be used as the sole basis for decisions. There is no discussion about equitable sharing of costs and benefits.

The process at Heysham did not fully evaluate direct and indirect economic benefits associated with good ecosystem management. The reports briefly investigate tourism (mainly tourism associated with fishing) and there is commercial fishing in the catchment area which clearly needs good ecosystem management to be sustained, but they don’t look at what could be gained from good conservation measures/ environmental quality in an economic sense. In developed countries, and in this particular case study at Heysham, the ecosystem is used more for pleasure/ pastimes rather than depended on for survival.
There is very little evidence of incorporation of social and economic values of goods and services into accounts, policies, education and resource management decisions in the Heysham proposal. The mitigation strategy does not include use of incentives however mitigation strategy is largely governed by what is deliverable, therefore what can be delivered on land controlled by the developer. One example is proposed hedgerow planting, as compensation for hedgerow removed, lies within the boundaries of the scheme and does not include any commitment to work with neighboring land owners to enhance the hedgerow network.

3.4.4 Scores

Scale

Ecosystems in general will operate over a larger scale than was looked at in the Heysham study, which mainly focused on a corridor along the proposed routes. However the fisheries studies did look at potential impacts on a wider scale more compatible with the ecosystems approach. Score = 4

Scope

The ecosystems approach would consider the impacts on the whole ecosystem rather than looking separately at individual species and communities. The valuations in the Heysham study looked at receptors (e.g. for the ecology assessment), tourism and commercial/recreational fishing i.e. breaking down ecosystem goods and services into separate components. Score = 5

Timing

The parts of the Heysham study that do meet the ecosystems approach cover a range of timescales. These are considered to appropriate. For example the fisheries and tourism economic analysis investigates the potential reduction in catches of fish or income made from fishing both during construction and with
the permanent changes to the river catchment and the resulting long-term impacts. Score = 1

Technical Content

The approach used at Heysham did not cover the entire ecosystem but instead provided a more patchy assessment of certain components of the ecosystem. Where economics were considered it was only in terms of financial impact and not the economic value of the ecosystem goods and services. It therefore falls short of what would be expected using the ecosystems approach. Score = 5

3.5 Evaluation of Task 5: Maintain Ecosystem Services

Task 5: What measures could be used to conserve ecosystem structure and functioning so as to maintain ecosystem services?

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3.5.1 Summary

Preservation of ecosystem structure and function requires an approach on a variety of scales. It must consider local, landscape and global processes. This requires management and research that encompass these scales. For a scheme such as this commissioned research and management must be on the local scale but it must fit well within priorities for landscape and global preservation. The aims and strategic objectives of the development go some way towards considering these varying scales with objectives to conserve locally important biodiversity alongside objectives to reduce emissions and limit the impact on the global climate. In general, although the format of recommended management still fails to comply completely with the ecosystems approach, the scale of the approach in this scheme is sufficient.
3.5.2 Introduction

 Implicit to this task is the necessity that we attempt to understand ecosystem structure and function. Due to the complexity, breadth and subtlety of interactions, ecosystems are more complex than we can know. For this reason research and monitoring are central to this approach with adaptive management techniques utilised to achieve outcomes. Further, previous models of the natural world tended to exclude humanity from the equation. The ecosystems approach now firmly roots humanity within the model with aims relating to sustainability and equitable resource use.

 Before considering the degree to which this scheme has attempted to understand ecosystems, it is important to note that the project sits within a wider regulatory framework. Local, national and international law and regulation impact the decision-making process backed by extensive consultation at each scale.

 As discussed in Task 1, this consultation process differs in scale at the varying tiers of governance with different budgets and resources impacting the degree to which research approaches the issue of ecosystems. For example; on a national scale, backed by international conventions and research, the United Kingdom Biodiversity Action Plan (UK BAP) process provides part of the current framework within which this project sits. The UK BAP steering group co-ordinates research, that informs biodiversity action planning on a local and national level. This research is inter-disciplinary and forms an important part of the decision-making process in such a scheme.

 Larger frameworks such as this provide a wider perspective and a greater resource of expertise than a single project would be able to fund. Within the Heysham to M6 road scheme this information is framed by the technical assessments as part of the EIA. Currently the national framework is incompatible with the ecosystems approach because it is based on an older paradigm where species and habitats can be considered in isolation. In order that schemes such as this are able to achieve compatibility with the ecosystems approach, it is essential that national and international frameworks incorporate the approach.
3.5.3 Assessment of Guidelines

There needs to be an improved understanding of the interrelationship between ecosystem composition, structure and function with respect to (i) to (iii) below:

(i) human interaction, needs and values (including cultural aspects),

Prior to the EIA process several public consultations were used to identify opinion in relation to these schemes. Although not specifically in relation to ecosystem function this information has the potential to assess views, needs and values in relation to the goals of the project.

It is clear from the consultation process that a selection of values and priorities are represented by the consultation work. However, as has been discussed in Task 1, the public consultation was limited in that it assessed only opinion in relation to scheme choice and not more detailed assessments of needs, values and interactions.

The EIA process examined a number of cultural impacts including heritage, amenity (fishing), land use (agricultural and other) and disturbance. Each of these reports looked at different aspects of the human environment but failed to consider the interconnections with the technical content of the Ecology and environmental reports.

The ecosystems approach to goods and services requires a breakdown of these sectoral and disciplinary boundaries surrounding the cultural and natural environment. In this instance consultation considered environment as a single issue and failed to assess the variety of cultural values associated with environment. This is essential to understanding the variety of goods and services people require from ecosystems beyond the perspective of amenity and resources.

The ecosystems approach would require a variety of tools and a greater depth of enquiry regarding the returns than is evident from this process.

(ii) conservation management of biodiversity
Until the completion of the EIA process there had been no detailed technical assessments of the biological diversity to be impacted by the route choice. Previously route choice had been influenced by legislation, which protected gross features such as designated conservation sites.

The ecological assessment undertaken as part of the EIA mapped the habitats and species along the route highlighting those identified as priority species or habitats by the UK BAP process. In this way local and national priorities for conservation were assessed and the impacts considered. As previously identified this assessment fails because it considers discrete units identifying protected species and habitats but does not consider in detail the inter-relations and linkages essential to an ecosystem led approach.

(iii) environmental quality, integrity and vitality

Concepts of ecosystem limits and capacity are new to environmental study. Understanding the degree to which an ecosystem can sustain disruption or damage is essential to a project such as this, both in the development and completion phases of the scheme.

From the more recent EIA there is good detail regarding environmental impacts of the scheme across a wide array of subject areas. This includes assessments of geology, air, water, ecology and one combined study of fisheries. As has previously been identified the lack of connection between these reports is a key departure from the ecosystems approach and a limit to the assessment of these highly interrelated issues. To understand ecosystem integrity it is important to be able to measure ecosystem function and to accomplish this there must be clearly identified indicators of quality and integrity.

The technical reports go some way to providing these baselines and draw significantly from current knowledge and expertise to identify key disturbances. The Ecology report incorporates a management plan, which includes a breakdown of the monitoring plan needed to assess the impact of the scheme on the local ecology. This has built in mechanisms to allow adaptive management in the period immediately after the project.
Determine and define conservation, social and economic objectives and goals that can be used to guide policy, management and planning using participatory processes:

In order that a comprehensive debate regarding development can take place, it is necessary to fully appreciate the objectives and goals of the project as being driven by equitable choice. The policy framework within which this project sits is complex and is influenced by local concern, national regulation and international conventions. As has already been discussed, at the higher tiers of regulation participation is more exclusive and the opportunity for detailed input by all members of society limited. From a more local perspective county policy is subject to the same degree of consultation as any development.

A Strategic Environmental Assessment (SEA) completed for the County Council’s Strategic Plan began the process of identifying the strategic impacts of local policy on the wider environment. Again this suffered from the same inadequacies as the EIA but began the process of identifying impacts and by association highlighted possible objectives and goals.

The strategic planning policy for the county was then subject to an examination in public before release. In this way the public were able to participate in the setting of policy and the identification of strategic goals for the region.

The SEA offered a framework within which to consider a similar suite of subject areas as the EIA, covering conservation, social and economic objectives. These strategic aims were then translated to the local level and used to justify the requirement for the road scheme and influence the design and choice of the scheme options. The specific consultations commissioned for the Heysham project then involved public participation regarding the objectives of the road scheme. In general objectives and goals for the project were well defined and crossed a variety of boundaries.
Assess the extent to which ecosystem composition, structure and function contribute to the delivery of goods and services to meet the desired balance of conservation, social and economic outcomes:

In line with the guidelines for this task, there is a requirement that schemes such as this aim to identify ecosystem processes. This is important in identifying the relevant goods and services and how they are impacted by the development. As has already been discussed the framework of the EIA limited the degree to which interactions and cross sector issues were considered. Of all the technical assessments, the fisheries report is unique in that it crossed a number of boundaries and considers ecology, environment and cultural aspect of the bridge development.

In the fisheries report there is consideration of the potential of the river to support disruption at different phases of the projects and the impacts this would then have on salmon spawning and the associated economic impacts on fisheries and the local economy. The integration within this report highlights the ecosystem, discusses impacts to the environment, hydrology (pollution and impacts to flood capacity), geology (disturbance of sedimentation processes) and ecology (disturbance to salmon spawning). It then considers the social and economic impacts by discussing the amenity value of the river to fishery clubs, the impact to commercial fisheries and the wider impacts to the local economy.

The lack of this level of assessment and integration within the other technical assessments highlights an area for focus shifting from a siloed approach to consider goods and services of wider processes.

Expand knowledge of the responses of ecosystems, in terms of changes in composition, structure and function, to both internally and externally induced stresses caused by, inter alia, human use, disturbance, pollution, fire, alien species, disease abnormal climatic variations (drought, flood) etc.

Specifically in light of climate change it is important that developments include in their design capacity to cope with future variations in climatic conditions.
This involves understanding how ecosystems compensate, and ensuring that there is capacity to enable this to occur.

Given our current understanding of ecosystem response and process this accumulation of knowledge must occur at a variety of levels. As discussed previously this can occur at the national and international level through research. It may also occur at the local level through the inclusion of monitoring programs into major schemes.

The ecology report produced for the Heysham to M6 link highlighted a number of ways in which monitoring programmes can utilise indicator species and habitats to assess the success of a scheme in mitigating against ecological change. The environmental management plan suggested a 20 year monitoring programme of priority species and habitats.

*Develop and promote management strategies and practices that enable and ensure conservation of ecosystem services and take account of, or minimise, risks/threats to ecosystem function and structure.*

Again there must be a clear understanding of the ecosystem goods and services impacted by the development. Currently the focus of the technical appraisal is fragmented with components of ecosystems separated into EIA categories. For example, within the ecology report is a discussion of water quality and river biodiversity but no discussion regarding the goods and services outside of the immediate requirement of fish diversity on suitable habitat.

The technical reports all provide detailed information and comprehensive suggestions regarding management and preservation. However, there needs to be an integrated appraisal which considers all factors as influenced by ecosystems and the availability of goods and services.

*Apply instruments to maintain and/or restore ecosystem services.*

The complexity of ecosystems restricts the extent to which it is possible to successfully define specific long-term management plans. Interaction with
global ecological processes such as climate change may require that
management be undertaken over indefinite periods with regular monitoring
utilised to assess the effectiveness of the plan. The key phrase in the
ecosystems approach is adaptive management plans.

These instruments will be in the form of monitoring programmes allied with
flexible/adaptive management plans. From the ecology management plan
report it is possible to see an element of adaptive management programmed
in. However, the requirement is to monitor priority species and there is no
comment regarding what happens when a species is no longer priority.

**Where required, develop management strategies and practices to
facilitate recovery of ecosystem structure and function (including
threatened components) to generate or enhance ecosystem services
and biodiversity benefits.**

Mitigation strategies and an environmental management plan have been
developed. These focus on biodiversity and do not specifically look at
ecosystem structure and function. Many of the mitigation strategies e.g.
strategies to protect and enhance aquatic habitats and strategies to protect
and enhance the hedgerow network, will facilitate recovery ecosystem
structure and function.

**Develop and apply instruments that contribute to achievement of
conservation management goals through a combination of managing
protected area networks, ecological networks and areas outside of such
networks to meet both short-term and long-term requirements and
conservation outcome.**

The criteria for designation of sites at all levels, from internationally important
sites down to local sites, do not embrace the ecosystems approach and in
most case is constrained by the site boundaries. The RAMSAR site
designation for Morecambe Bay does identify a wider range of ecosystem
goods and services though the SSSI designation for the same site is
carried solely with biodiversity.
Monitoring of population sizes of vulnerable and important species should be linked to a management plan that identifies appropriate response measures and actions.

The identification of important or vulnerable species is informed on a national and international level by designations for protected species. The Heysham EIA undertook surveys on a variety of protected species and developed management plans that included programmes of monitoring and adaptive management. These surveys have become standard for development projects due to the risk of prosecution under the Wildlife and Countryside Act 1980. Appropriate response for protected species is often seen as either exclusion or avoidance.

The current system struggles to identify appropriate and proportionate responses to the presence of protected species because of the risk of prosecution. For this reason it is rare that the considerable sums of money spent avoiding direct impact to protected species are not directed at cheaper minimisation strategies and habitat enrichment. At Heysham, further work was undertaken when Biodiversity Action Plan species were identified (e.g. pink wax cap fungi).

The Environmental Management Plan includes recommendations for future monitoring, however it does set not set out a framework for decision-making and action if plan objectives are not achieved.

3.5.4 Scores

Scale

Preservation of ecosystem structure and function requires an approach on a variety of scales. It must consider local, landscape and global processes. This requires management and research, which encompass these scales. For a scheme such as this, commissioned research and management must be on the local scale but it must fit well within priorities for landscape and global preservation. The aims and strategic objectives of the development go some way towards considering these varying scales with objectives to conserve
locally important biodiversity, alongside objectives to reduce emissions and limit the impact on the global climate. In general, although the format of recommended management still fails to comply completely with the ecosystems approach, the scale of the approach in this scheme is sufficient. Score = 3

Scope

As with previous tasks, while the level of detail showed good compliance with the ecosystems approach, the scope of the project fell short in that it was limited to a planning boundary. This reduces the capacity of the scheme to consider impacts to ecosystems where the effect is measurable outside the predefined area. Score = 4

Timing

Most of the studies dealing with ecosystem structure and functioning are relatively recent and look at current and predicted impacts to some extent. Score = 3

Technical Content

Whilst the technical content of the studies carried out is high quality, the weakness identified in the scope of the studies and the limited extent to which broader effects on ecosystem structure and functioning are considered result in the technical content only covering a few of the issues e.g. fisheries, hedgerow connectivity. Score=4

3.6 Evaluation of Task 6: Limits to Ecosystem Function

Task 6: What measures can be taken to ensure ecosystems are managed within the limits of their functioning?
### 3.6.1 Summary

Although the EIA does cover quite a few of the issues required to be considered in this task it is very limited with the focus being very much on biodiversity. The concept of ecosystem threshold and limits and the wider range of function, goods and services are not well dealt with. By substantially limiting the survey area to the “field survey area” the importance of affected habitat within the wider local area may not be fully assessed. Ecosystem functioning and limits would need to be considered on a bigger scale if effective consideration is to be given to adequate mitigation.

### 3.6.2 Introduction

Ecosystems, including their processes and functions, are complex and dynamic and their functioning is not yet fully understood. Management of ecosystems must be adaptive in order to be able to respond to uncertainties. The Environmental Management Plan drawn up as part of the EIA process is a key document in assessing some of the components in ecosystem function and identifies mitigation measures to ensure the development does not have an unacceptable environmental impact.

### 3.6.3 Assessment of Guidelines

**Identify practices that are not sustainable and develop appropriate mechanisms for improvement involving all stakeholders**

Practices that are not sustainable in connection with the Heysham to M6 link pre- and post-construction include:

- Habitat fragmentation
• Impacts on hydrology
• Loss of habitat
• Species disturbance
• Pollution and contamination

The Environmental Management Plan proposes mechanisms for improvement in the form of mitigation, enhancement and compensation measures, compiled from the individual survey reports. These measures are proposed following environmental best practice and involvement from stakeholders.

Some impacts cannot be fully mitigated such as species disturbance and loss of habitat. Veteran trees for example cannot be replaced by new plantings as they take years to develop. Given the uncertainty associated with defining the limits to ecosystem functioning under most circumstances, the precautionary principle should be applied.

The Environmental Management Plan is not regarded as a definitive document but a working document to be reviewed, refined and developed as the scheme is developed. In some aspects the precautionary principle has been applied by putting in place proposals to prevent impacts occurring.

A monitoring programme is proposed to monitor impacts before and after construction. But this proposal only applies to sensitive habitats including ponds, watercourses and the Lune Estuary salt marshes. Not all ecosystems and their functioning have been considered.

**Implement an adaptive management approach.**

Adaptive management is used to cope with uncertainty and involves learning from outcomes.

This project has not yet been approved and is still in the design and planning stages. Some elements of adaptive management have been applied and others are proposed throughout the project. The Environmental Management
Plan acknowledges uncertainty as it is not a definitive document, but a document to be reviewed, refined and developed as the scheme is developed.

During the design phase there has been thoughtful selection of best practice operations and the plan identifies the need for strategies to be developed to reduce environmental impact. The Environmental Management Plan is being implemented into the design phase.

Monitoring is a key action of adaptive management and is proposed during and after construction. A 20 year programme to cover species and habitats of importance and significance has been proposed. This is to include the scheme corridor, sensitive habitats, ponds, watercourses and the Lune Estuary salt marshes. Due to the uncertainties associated with ecosystem function should more than the key habitats and species be monitored?

Lancashire County Council has analysed the plan as it has resulted in changes to the design of the road. But as the scheme is still awaiting approval a lot of the management outcomes have yet to come to fruition. The same can be said for the incorporation of the results into future decisions.

**Develop understanding of the limits of ecosystem functioning and the effects of various human use on the delivery of ecosystem goods and services**

This is a subject area that the current studies and surveys do not deal with.

**Where permissible limits to alteration of specific ecosystem components can be agreed, manage within these limits but monitor and assess the ecosystem response. Make sure the information is given at regular intervals to those responsible for setting the off-take or other limits.**

The Environmental Management Plan proposes a suitably qualified project ecology manager be appointed to report directly to LCC. The plan proposes where alterations to specific ecosystems should be made and that specific
habitats and species are monitored. It does not cover the assessment of ecosystem response.

Encourage the use of environmental assessments and monitoring to establish ecosystem responses to disturbance, in order to provide management feedback and develop appropriate responses.

Throughout the project, from the design, construction and operational phase, assessments and monitoring of particular habitats and species are proposed. It is assumed that the results from this will be fed back to management to develop appropriate responses (the plan does not state this will be the case).

Develop and promote management strategies and practices that sustain resources and maintain ecosystems within the limits of their functioning.

The plan proposes compliance with relevant environmental legislation and the Code of Environmental Good Practice be carried out at all times. Where possible practices that maintain ecosystems within their functioning are proposed, but with all developments some of the practices cannot be fully mitigated against and only compensation measures can be proposed.

Sustainable use management goals and practices should avoid or minimise adverse impacts on ecosystem services, structure and functions as well as other components of ecosystems.

The current requirements for EIA do not consider ecosystem services, structure and function as such. A mitigation strategy is part of the assessment, though the aim of this is to limit impact on biodiversity, particularly habitat and species. Whilst this may go a long way towards minimising impacts on services structure and function these issues are not directly considered.

Formulate, review and implement regulatory frameworks, codes of practice and other instruments to avoid using ecosystems beyond their limits.
The concept of ecosystem thresholds and limits does not form part of the current assessment. In assessing the impact of loss of habitat it is likely that many of the principles that may be applied are considered. The general objective of the mitigation strategy is to achieve minimal long term impact, the assumption being that this will avoid using ecosystems beyond their limit.

3.6.4 Scores

Scale

By substantially limiting the survey area to the “field survey area” the importance of affected habitat within the wider local area may not be fully assessed. Ecosystem functioning and limits would need to be considered on a bigger scale if effective consideration is to be given to adequate mitigation. Score=4

Scope

The issue of managing ecosystems within the limits of their functioning does not form part of the scope of the assessment carried out. Where it has been addressed this has been very limited. Score=4

Timing

The assessments that have been carried out are timely. Score =1

Technical Content

The EIA does not directly address the issues of ecosystem limits and thresholds and the effects any impact here may have on their functioning. However, key habitats e.g. hedgerows have been identified and a mitigation strategy has been put forward that will eventually increase the amount of this resource. Score=4
3.7 Evaluation of Task 7: Appropriate Spatial/ Temporal Scale

Task 7: What actions can be taken so that the problem is addressed at the appropriate temporal and spatial scales?

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<td>Technical Content</td>
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3.7.1 Summary

Existing EIA is delineated by pre-set geographic boundaries. Ecosystems will in most cases operate over a much larger scale. Scope of the EIA is based on geographic boundaries, and on sub-ecosystems receptors. An ecosystems approach would take a more detached view and consider the impact on the ecosystem as a whole rather than separate species / communities that make up the ecosystem or specific aspects of the environment, for example, air quality, landscape, ecology.

3.7.2 Introduction

Determining the appropriate spatial and temporal scope of an EIA is key to the quality of the output. This would usually be set during scoping, although it will often be the case that a different spatial scale is adopted for each of the environmental aspects considered (e.g., air quality, landscape, ecology etc).

The following provides an overview of the spatial and temporal scales adopted for the different environmental aspects included in the Heysham – M6 EIA. The temporal scale considered in an EIA is usually discussed in terms of construction and operational impacts, with the latter referring to the life of the scheme – in this case indefinitely.
The temporal and spatial scope of the EIA by subject area is as follows:

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Temporal Duration</th>
<th>Spatial Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Considers impacts in 2010 and 2015</td>
<td>Lancaster District for total emissions assessment, 200m corridor for local emissions assessment.</td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Life of the scheme</td>
<td>Route corridor 1.5 – 2km wide.</td>
</tr>
<tr>
<td>Ecology</td>
<td>Life of the scheme, mitigation measures focus on 10 – 15 year timescale.</td>
<td>2km route corridor</td>
</tr>
<tr>
<td>Landscape</td>
<td>Life of the scheme</td>
<td>Morecambe Coast &amp; Lune Estuary Countryside Character Area</td>
</tr>
<tr>
<td>Noise &amp; Vibration</td>
<td>15 years from opening</td>
<td>Up to 300m from road</td>
</tr>
<tr>
<td>Water &amp; Drainage</td>
<td>Life of the scheme</td>
<td>Watercourses crossed by road</td>
</tr>
<tr>
<td>Geology &amp; Soils</td>
<td>15 years after opening</td>
<td>Route corridor (variable width)</td>
</tr>
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3.7.3 Assessment of Guidelines

Temporal Scale: existing Approach used in Heysham – M6 EIA

With a major long-term infrastructure development like a road, it is usually appropriate to consider the temporal duration of any operational impacts as permanent. Separate consideration is often also given to construction impacts, although these by their nature will tend to be temporary and of lower significance.

This approach has been followed in the Heysham EIA. The exceptions are mainly where quantifiable year-on-year changes in baseline conditions are anticipated, such as with air quality. In such circumstances, it was necessary to specify a particular year, often the opening year of the scheme, and assess the impacts at this time.

Mitigation measures required by the EIA are typically long-term, particularly in respect of landscape and ecology. For example, some of the ecological mitigation measures proposed such as the establishment of new hedgerows may take 15 years of more before significant benefit is provided.
Ecosystems approach to Determining Temporal Scale

The ecosystems advanced user guide talks in terms of ensuring that “the time frames of major ecosystem processes” are considered. Applying this principal to the EIA case study suggests that the EIA should not focus on short-term impacts or short-term mitigation, but instead take a more balanced view on how the proposed scheme may affect the long-term functioning of the ecosystem.

It is considered that the timescales used in the EIA are broadly compatible with this objective, in that where appropriate, most of the environmental aspect chapters look at impacts over the life of the scheme, and propose long-term mitigation strategies. The exception to this is where the receiving environment may be subject to unquantifiable change in the future, such as for example through climate change, which may alter the conclusions drawn in the Environmental Statement. However, it is not certain that this could be fully accounted for by the ecosystems approach either.

Overall, in determining temporal scale it is concluded that the Heysham EIA is largely compatible with the ecosystems approach and it is considered that the application of the ecosystems approach would have changed little in respect of the temporal scale considered.

Spatial Scope: existing Approach used in Heysham – M6 Link

For some of the topics included in the EIA, environmental impact follows very well-defined scientific rules that enable the setting of geographic boundaries to the study area. Noise is one example, as the physics of the attenuation and decay of sound waves traveling through the atmosphere are such that traffic noise will rarely be heard beyond a certain distance from the source.

In other cases, such as ecology, setting geographic boundaries to the study area can become a necessary yet quite arbitrary process. Setting fixed geographic boundaries for dynamic receptors, such as bird or mammal
species, has little actual scientific basis but is instead determined by a combination of individual expert judgment, and the practicalities of the size of area that can realistically be covered by baseline surveys.

The Heysham – M6 EIA reflects this approach, with most of the environmental aspects considered focusing on a corridor either side of the proposed scheme. In some cases, this corridor is very well defined and based on hard science, in others, its definition is somewhat more subjective. The main exception to this is landscape, which considers impacts and mitigation in terms of the Landscape Character Area which the scheme falls within.

**Ecosystems approach to Determining Spatial Scale**

Adopting an ecosystems approach at Heysham would entail focusing on impacts at an ecosystem level, and not being constrained by a pre-defined study area. For subjects such as noise and air quality it would generally still be appropriate to focus on a limited geographic area, although there may be a greater need to consider how these interact with the wider ecosystems, through for example disturbance of wildlife or reduced tranquility. Even for spatially well-defined factors such as these, the ecosystems approach would require a fundamental shift of thinking in terms of the impact of the scheme on ecosystems goods and services.

For subjects such as ecology, where it is more difficult to assign spatial boundaries, the ecosystems approach would focus more on whole ecosystems. These would typically occur at a regional scale, and may for example consider the River Lune ecosystem as a whole rather than break it down into individual species and species groups. This would not completely eliminate the question of defining spatial boundaries, as the definition of ‘an ecosystem’ may in itself be open to varying interpretations.

In the wider context, the application of the ecosystems approach would entail moving away from the current standard methodology of considering the different environmental aspects in isolation, so that consideration of landscape, ecology, air quality and the other topics is considered more
holistically. This in turn would ensure greater consistency of spatial scales throughout the EIA.

The removal of spatially restricted study boundaries from the EIA may change the conclusions made by the EIA, and may mean that some of the existing impacts predicted in the Environmental Statement may become more significant, whereas others may become less significant.

The ecosystems focus for example would place more importance on species with a very strong ecosystem function. An example relevant to Heysham would be the otter, which as a top predator has a major role in the successful functioning of its ecosystem. In areas outside of its strongholds, it may only occur sparsely and in such circumstances the loss of even one or two individuals as a result of a development, for example through road kill, may therefore be felt at an ecosystem level. In this sense, restricting the impact assessment to an arbitrarily defined geographic corridor may under-estimate the impacts at an ecosystem level as it cannot account for the movement of species within the wider ecosystem.

The other side of the argument; the exaggeration of local features that in the ecosystems context may not be significant is highlighted by the identification of local features of interest such as individual veteran trees or assemblages of fungi that will be impacted by the scheme. Whereas the loss or alteration of such features may undoubtedly impact on the local ecology, it may be that the wider ecosystem has the capacity to absorb change to or loss of those features without impacting its overall function.

In conclusion, it is considered that the application of an ecosystems approach in the Heysham – M6 EIA case study would focus more on whole ecosystems and less on species or features on local interests.
3.7.4 Scores

Scale

Existing EIA is delineated by pre-set geographic boundaries. Ecosystems will in most cases operate over a much larger scale. Score = 5

Scope

Scope of the EIA is based on geographic boundaries, and on sub-ecosystems receptors. The ecosystems approach would take a more detached view and consider the impact on the ecosystem as a whole rather than separate species / communities that make up the ecosystem. Score = 5

Timing

Temporal duration considered by the EIA is mainly focused on long-term impacts that will occur for the duration of the scheme. This is consistent with the ecosystems approach, which requires impacts to be assessed on the timescales of natural systems rather than artificial timeframes set by the scheme timeline. Score = 1

Technical Content

An ecosystems approach would take a much more holistic view to assessing the impact of the scheme rather than looking in isolation at specific aspects of the environment, for example, air quality, landscape, ecology etc. Score = 5

3.8 Evaluation of Task 8: Long-term Management

Task 8: How can varying temporal scales and lag effects be taken into account when considering the sustainable use of ecosystems?

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3.8.1 Summary

On balance, the existing approach is broadly compatible with the ecosystems approach. The differences identified are generally due to practical constraints that would still apply to varying extents for the ecosystems approach. The temporal scale considered is broadly compatible with the ecosystems approach, although the ecosystems approach would generally require greater consideration of change over time. The scope of the EIA may change if it were possible to identify how future changes in habitats and land use may change the relative importance of predicted impacts, or highlight other potential impacts.

3.8.2 Introduction

As outlined in Task 7, for a road development such as Heysham – M6, the EIA will consider that any impacts associated with its operation are effectively permanent. However, by necessity, impact predictions are based on the state of the environment as it was at the time the baseline surveys were completed. Over time the baseline environment is likely to change even if the road scheme does not proceed. This is partly due to natural processes such as ecological succession and competition and partly through anthropogenic influences such as climate change, changing agricultural practices and the cumulative impact of other developments. As different receptors operate over different timescales, this means that varying temporal scales and the lag effects of future change must be accounted for.

3.8.3 Assessment of Guidelines

Existing Approach used in Heysham – M6 EIA to Varying Temporal Scale

As identified in Task 7, the Heysham – M6 EIA takes the approach that the proposed road scheme will have a permanent impact on the receiving environment. In doing so, varying temporal scales are recognised on the basis of the ability of different receptors to respond to change. For example, vascular plants or invertebrates may re-colonise compensation habitat such
as road verges in a relatively short time period, whereas the recovery or replacement of veteran trees can only truly be effective over a period of many years.

This is recognised in the predictions of impact magnitude, where the reversibility and permanence of the impacts predicted are key factors in determining significance. In this way a major adverse impact that can quickly be recovered by the receiving environment is assigned much less weight in the decision-making process than a similar impact that has a much longer recovery period.

The mitigation measures proposed in the EIA, and in the accompanying Environmental Management Plan also take account of varying temporal scale, striking a balance between short term ‘quick win’ gains such as the erection of bat boxes to replace potential roosts lost, to more long-term measures.

**Existing Approach used in Heysham – M6 EIA to Lag-effects**

A consequence of the existing approach to EIA is that future impacts are judged against the habitats that are present now, rather than what may be present in the future. This does not recognise the fact that ecological characteristics may change over time, and that sites or habitats may therefore become more or less valuable than they are at present. Examples at Heysham – M6 include the consideration of impacts on the fungi community at Valley Meadow, and the grassland / vascular plant community adjacent to M6 Junction 34. Whilst these sites are undoubtedly of interest, they are in effect temporary communities that over time would be susceptible to loss or modification through changes in management or through natural succession. This may mean that their ecological value, and hence their significance to decision making process may decline over time.

The inverse may be true in other cases, where land of relatively little existing ecological value but with considerable long-term potential is undervalued in the decision-making process.
The EIA also focuses on immediate and direct change, for example the loss of a particular site or habitat due to the road. Such impacts are readily predicted and can be quantified relatively easily. More subtle changes occurring over a longer time period, such as reduction in habitat quality through severance of connectivity, are generally less well accounted for. This is partly because of the lack of confidence and certainty that can be attached to such impacts.

**Ecosystems approach to Varying Temporal Scale**

The ecosystems approach advanced user guide refers to the need for adaptive management, and to take into account trade-offs between short-term benefits and long-term goals. It is considered that this has been successfully achieved in the existing Heysham – M6 EIA approach through the mitigation measures proposed. These range from short-term measures likely to produce quick results to much longer term measures intended to operate over the ecosystem timescales, such as the identification and protection of future veteran trees.

There are certain limitations in the existing approach in forecasting ultra long term effects, such as the impact on future generations but this is largely due to the lack of confidence that can be attached to such predictions rather than due to deficiencies in the process. The ecosystems approach itself would still encounter the same limitations of scientific understanding.

Monitoring of change is a key feature of the User Guide Task 8 guidance, and the rigorous application of the ecosystems approach would entail more comprehensive monitoring and evaluation of the proposed mitigation and compensation measures than is currently allowed for. This is predominantly a matter of financial and budgetary constraints, and again, these would still apply even if the ecosystems approach had been followed.

**Ecosystems approach to Lag-effects**

Accounting for future changes in habitat type and quality is likely to become increasingly important due to climate change, the proliferation of invasive species and other anthropogenic influences. In addition to changing the
nature of the receiving environment, this may mean that impacts themselves become more or less important. For example, an impact on a particular butterfly or moth species may become relatively more significant if climate change sees its range contract, or vice versa if its range expands due to climate change.

Likewise as greater understanding about the goods and services provided by ecosystems emerges, it may become apparent that the importance of certain receptors has been under or over stated. Such issues are not fully accounted for in the existing approach, although as discussed above this is mainly a reflection of the uncertainties involved in making such predictions.

3.8.4 Scores

On balance, the existing approach is broadly compatible with the ecosystems approach. The differences identified are generally due to practical constraints that would still apply to varying extents for the ecosystems approach.

Scale

The temporal scale considered is broadly compatible with the ecosystems approach, although the ecosystems approach would generally require greater consideration of change over time. Score = 3

Scope

The scope of the EIA may change if it were possible to identify how future changes in habitats and land use may change the relative importance of predicted impacts, or highlight other potential impacts. Score = 3

Timing

The mitigation and compensation measures proposed as part of the scheme have been designed to strike a balance between short-term gains and long-term management. Score = 1
Technical Content

Any change in the scope of the assessment resulting from the application of the ecosystems approach would result in alteration to the technical content. Score = 3

3.9 Evaluation of Task 9: Adaptive Management

Task 9: How can adaptive management be used to address the problem(s) identified?

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3.9.1 Summary

Much of the management proposed in the environmental management plan could be seen as adaptive, however there are obvious gaps in the approach in meeting the guidelines set out. The management plan is very much limited by the scheme footprint and doesn’t look at the wider area for management opportunities. This is driven largely by the need to have control to exercise management. The management plan deals largely with biodiversity although avoidance of pollution is also well covered. Wider socio-economic issues are not covered and the period over which management should be applied is not specified. The plan does not deal with how success or failure of mitigation will be assessed and what actions would follow.

3.9.2 Introduction

The problem identified in this case is the inadequate road link between Heysham and the M6. The new road scheme proposed impacts on a variety of ecosystems. It is important to note that ecosystems functions and structures change naturally over time, but certain human practices can speed
up this process. There are still uncertainties with how ecosystems function and evolve over time.

Adaptive management is a flexible approach to handling uncertainties. It involves problem assessment, design, implementation, monitoring, evaluation and adjustment. It is a long term process which starts in the planning stages of a project and runs right through until well after completion. In this case the project it is still in the planning phase and therefore an assessment can only be made on what has been done and planned so far.

Adaptive management is needed to respond to changing social and ecological conditions, and to allow management plans and actions to evolve in light of experience. The Environmental Management Plan drawn up as part of the EIA process is a working document to be reviewed, refined and developed as the project develops. To that extent it is adaptive.

3.9.3 Assessment of Guidelines

Natural resource managers must recognise that natural and human induced change is inevitable and take this into account in their management plans.

The Environmental Management Plan does not really take into account natural change. It mainly concentrates on human induced change brought about by the development of the road. This is accounted for by the proposals for mitigation, enhancement and compensation.

Adaptive management should be encouraged when there is a risk of degradation or loss of habitats, as it can facilitate early actions in response to change.

The Environmental Management Plan identifies some adaptive management principles as it assesses the impacts includes design principles to overcome some of the issues and proposes monitoring of key habitats and species. It doesn’t state what will happen with the results of the monitoring, therefore it lacks evaluation and proposed adjustment at this stage.
Monitoring systems, both socio-economic and ecological, are an integral part of adaptive management, and should not be developed in isolation from the goals and objectives of management activities.

The Environmental Management Plan does include proposals for ecological monitoring. It is not clear at this stage what, if any, action would be taken if the results of monitoring indicated a potential failure of mitigation measures. At this stage it is not clear what, if any, socio-economic monitoring may take place linked to scheme objectives.

Adaptive management must identify and take account of risks and uncertainties.

In assessing impacts and identifying mitigation measures, the precautionary principle tends to be applied. This is often necessary to meet legislative requirements protecting wildlife and habitats. The mitigation measures and Environmental Management Plan do not identify risks that may require further action to limit effects on ecosystems. It is likely that such risks would fall into the low risk category otherwise they should have been identified as an impact requiring mitigation.

Traditional knowledge and practice should be used to enable better detection and understanding of ecosystem change, and to develop appropriate adaptation measures.

The mitigation measures proposed use tried and tested techniques based on a great deal of experience.

Adaptive management should recognise the resilient capacity of ecosystems in response to natural disturbances, and should be aimed at maintaining or restoring this capacity so as to reduce the risk of adverse social and economic consequences of natural variability in ecosystems.

The current approach to mitigation of impacts broadly corresponds with this guideline.
** Awareness-raising measures are needed to enhance public knowledge that ecosystem change is a natural phenomenon, and to build support and capacity for adaptive management.  

Whilst for the Heysham – M6 scheme it is probably too early to assess the achievement of this guideline, it is probably fair to say that a weakness of the current approach is that the public are not made aware of and involved in the ongoing management. There are many groups who may well welcome the opportunity to be involved from land managers to local wildlife or sports / activity groups.

3.9.4 Scores

Much of the management proposed in the Environmental Management Plan could be seen as adaptive; however there are obvious gaps in the approach in meeting the guidelines set out.

**Scale**

The management plan is very much limited by the scheme footprint and doesn’t look at the wider area for management opportunities. This is driven largely by the need to have control to exercise management. Score=3

**Scope**

The management plan deals largely with biodiversity although avoidance of pollution is also well covered. Wider socio-economic issues are not covered and the period over which management should be applied is not specified. The plan does not deal with how success or failure of mitigation will be assessed and what actions would follow. Score=4

**Timing**

If the management plan is kept under review and regularly updated it potentially provides for timely adaptive management. Score=2
Technical Content

The Environmental Management Plan covers a lot of the management issues and as a document to be developed as the project proceeds; it offers the opportunity for adaptive management. However it was not created as an adaptive management plan and could probably be improved on in this respect, for example by setting targets for achievement of environmental objectives and requiring review and action plans if not met. Score=3

3.10 Evaluation of Task 10: Integration of Conservation and Use

Task 10: How can an appropriate balance be sought between, and integration of, conservation and use of biological diversity?

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3.10.1 Summary

The scale of approach adopted by the Heysham to M6 link for this task, was good. Consultation was adopted at a local and strategic level through the wider legal mechanisms of the planning process. The scope of the Heysham to M6 process showed little compliance with the ecosystems approach. The scheme utilised current planning guidelines that have been shown to be largely incompatible with the ecosystems approach. This is because there is a categorisation of issues, which encourages a siloed approach to the relevant issues. Involvement was limited to consultation and didn’t consider a more participatory approach especially in relation to future management. Overall there was a lack of consideration for landscape scale processes outside the immediate area impacted by the works. Only the fisheries report showed
evidence of integration, with a variety of use options considered alongside issues of ecosystem function and conservation concern.

3.10.2 Introduction

The ecosystems approach acknowledges that development requires difficult choices to be made regarding the use of resources. While a road development isn't interactively utilising biological diversity, it will displace and impact species habitats and processes as a result of land take. The question then becomes how can a balance be sought between land use and conservation of biological diversity?

3.10.3 Assessment of Guidelines

Develop policy, legal, institutional and economic measures that enable the appropriate balance and integration of conservation and use of ecosystems components to be determined.

Within the context already set for this task, there are various planning regulations supported by strategic policy which define the use of space. Protection from development is currently afforded to national or European designated sites. Local sites of interest have less protection but still retain some status in the discussion regarding development. Protected species are also afforded protection in their places of refuge or in key habitats.

The Heysham to M6 link has been impacted in a number of ways by this legislation. The Morecambe Bay SSSI and RAMSAR site has raised doubt over the suitability of the Western route. This has contributed significantly to its rejection on several occasions by both the planning inspector and national government. The national and international legislation protecting sites is also supported by the Lancashire County Council structure plan 1991-2006 which lays in policy Lancashire’s commitment to preserving protected sites.

As well as protection afforded to sites of conservation concern, protected species also heavily influence development. Along the Heysham to M6 link - Western route Great Crested Newts weighted the argument against this route
due to the likely impact identified to active newt breeding ponds. The Great Crested Newt and its habitat are protected under national and international law (Langton et al, 2001).

Our current legal framework is incompatible with the ecosystems approach because it places species and habitats under a protective umbrella regardless of context and situation. The current paradigm suggests that the best method for conservation is to avoid disturbance. However, it may be that methods which encourage enrichment as a compensation may benefit the species more than a non-disturbance policy which may still impact ecosystems and alter the quality of the environment for the habitats and protected species.

Other legal mechanisms for protecting and conserving ecosystems include less strict designations that relate primarily to controls on planning and development. These include designations such as Green Belt and the agricultural land classification. The protection of Green Belt land aims to reduce the extent of urban sprawl while the agricultural land classification identifies the most productive agricultural land. The more recent strategic planning policy for the study area (Lancashire Joint Structure Plan) identifies the aim of protecting the extent of Green Belt land throughout the region. Also supported by planning policy is the protection of prime agricultural land classified as grade 1 or 2.

**Promote participatory integrated planning, ensuring that the full range of possible values and use options are considered and evaluated.**

The ecosystems approach requires equitable use of resources through access to ecosystem goods and services. In order to achieve this it is necessary to understand the variety of benefits people derive from environmental resources. Expressed values in relation to environmental systems differ at varying scales from individual to society.

A participatory approach is essential in discovering the range of values and use options considered by people in relation to the environment. Because of the range of possible services and benefits people and organisations derive
from the environment; the process requires consultation methods which can offer an open unbiased interrogation of the issues.

The consultation process for the Heysham to M6 link was good in that it conducted unbiased consultation of a wide variety of stakeholder groups at a number of levels. However, the MORI survey followed a process heavily influenced by the restrictive topics of the EIA. For example, issues relating to the environment were interrogated under the banner of environment without discovering the values people associated with environment.

The closed nature of this questioning suits the purpose of gathering opinion to drive the decision-making process. However, the ecosystems approach involves less guided questioning and requires more of a dialogue regarding the perceived impacts of the development, ideally without first assuming what these will be.

Seek innovative mechanisms and develop suitable instruments for achieving balance appropriate to the particular problem and local circumstances.

There is no evidence from the available documents that any innovative mechanisms were sought to approach the issues raised by this development. The process has at each point followed the recognised planning guidance. This is especially true of the EIA, which in light of the ecosystems approach can be criticised for encouraging a restrictive treatment of the issues.

The ecosystems approach is far less structure-driven than previous approaches to land management. It recognises the importance of an open participatory process and understands that for each project there will exist a number of locally relevant methods for tackling the issues. Through encouraging an open appraisal of the issues, the ecosystems approach invites connections with local schemes and enables a wide array of options and inputs.

Of particular value is the consideration of these schemes in relation to mitigation and future management. Currently the process for preserving
natural systems involves an avoidance of disturbance. Through preserving goods and services the ecosystems approach would allow disturbance to natural systems as long as the goods and services of the wider ecosystem are conserved.

**Manage areas and landscapes in a way that optimises delivery of ecosystem goods and services to meet human requirements, conservation management and environmental quality.**

As already discussed the planning framework within which this project sits does to some degree incorporate an aspect of scale. This is particularly true of the public consultation process, which has been widely used both at the project scale and at the strategic scale. However, from the EIA perspective this scale is lacking. The environmental report in particular highlights these issues.

The current planning process adopted by this scheme is limited in that it considers only the immediate environment impacted by the scheme. Areas of focus include a very local easement considered by the environmental report, which is dictated by defined species ranges (e.g. 250m from Great Crested Newt pond) and possible direct impacts (e.g. Pink Wax Cap – Valley Meadow).

From the ecosystem perspective, what is lacking is consideration of landscape level processes and a relationship between the goods and services these provide to people.

The fisheries report went much further to consider the various issues in an integrated manner and at a wider scale. This is representative of the fact that our current understanding of aquatic ecosystems is by necessity on a landscape/seascape level. It also displays that current debates regarding fisheries have been framed on an international scale and have been some of the first to consider the ecosystems approach in resolving conflicting priorities.

**Determine and define sustainable use objectives that can be used to guide policy, management, and planning, with broad stakeholder**
participation. Identify solutions which relieve sectoral pressure on existing resources.

In the justification of the route there is the acknowledgment of objectives relating to the County Council’s sustainable transport strategy. This references the importance of reducing congestion in enabling alternative forms of public transport and supporting sustainable communities.

However, the proposals for the routes also acknowledge that both roads will, following current projections, reach capacity in the foreseeable future. This is particularly true of the Western route, which is forecast to reach capacity shortly after opening. With such an acknowledgement this project’s sustainable objectives should also include a consideration of future works and possible mitigation to retain the benefit of the road into the future.

The current process encourages an attitude of no impact or mitigation. It doesn’t encourage an attitude of long-term sustainable use of a feature. This could include accessing multiple benefits from a scheme such as this. It would go further than just providing increased public access but would also include measures which connect/ reconnect with ecosystem services severed by the introduction of the road route.

3.10.4 Tools

The use of innovative tools was limited due to a general adherence to national planning guidelines:

Environmental assessment tools

An SEA was used to assess the county strategic planning policy and an EIA was used to assess the environmental benefits of the schemes. However, the paradigm upon which this framework is based is generally incompatible with the ecosystems approach.
Public participation

A number of public consultations were held utilising a range of techniques including exhibitions, public meetings, questionnaires, interviews and mail drops.

3.10.5 Scores

Scale

As is true of previous tasks, the scale of approach adopted by the Heysham to M6 link is good. Consultation was adopted at a local and strategic level through the wider legal mechanisms of the planning process. Score: 2

Scope

The scope of the Heysham to M6 process showed little compliance with the ecosystems approach. The scheme utilised current planning guidelines that have been shown to be largely incompatible with the ecosystems approach. This is because there is a categorisation of issues, which encourages a siloed approach to the relevant issues. Overall there was also a lack of consideration for landscape scale processes outside the immediate area impacted by the works. While the scale of consultation was generally good the scope of involvement was limited to consultation and didn't consider a more participatory approach especially in relation to future management. Only the fisheries report showed evidence of integration, with a variety of use options considered alongside issues of ecosystem function and conservation concern. Score: 5

Timing

The timing of surveys and consultation served the requirements of the planning process well. However, at the early planning stage the ecosystems approach would require further, more detailed, consideration of the management plan for the works. Score: 2
Technical Content

The identification of impacts and proposed mitigation strategy is comprehensive and goes a long way towards meeting the requirements of the guidelines for this task. Score: 2

3.11 Evaluation of Task 11: Consider All Forms of Knowledge

Task 11: How do you ensure all forms of relevant knowledge including scientific, indigenous and local knowledge, innovations and practices are included?

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3.11.1 Summary

The EIA consultation process, including mail shots, meetings, exhibitions etc., was carried out throughout the Lancaster District to ensure anyone affected by the proposed routes was given their chance to comment. The Council tried to reach as wide an audience as possible, and included residents, businesses, stakeholders and other interested parties (e.g. fishermen using the Lune catchment). This follows an ecosystems approach fairly well. The EIA process at Heysham involved consultations throughout the various iterations of the route, as well as surveys to identify potential physical impacts. Potential impacts at baseline, 2010 and 2025 were identified, as well as impacts during the construction phase and at baseline. Some studies did not focus on particular timelines but looked at the impact over the course of the scheme. This approach is broadly consistent with the ecosystems approach, though this would not use artificial timeframes but instead would involve assessment over a longer timescale. Although an ecosystems approach would tend to follow a more holistic way of assessing the impact of the scheme, the Environmental Statement collates all the different surveys and
research carried out and forms a good information source for interested parties, stakeholders and decision makers.

3.11.2 Introduction

In order to accurately inform decisions, it is essential to have a good knowledge and understanding of ecosystem functions and the impact of human use. This information and knowledge should be taken from all available sources including stakeholders, to ensure ecosystem management strategies are effective.

There were three main phases to the Heysham – M6 link EIA. There have been a number of consultation phases to scope opinion on the various routes which have been investigated over the years. There have also been ground surveys of the proposed route corridors, and detailed reporting of findings.

Guidelines

The ecosystems approach involves sharing relevant information with stakeholders and making technical/scientific information available (in accessible form). The advanced user guide states that the assumptions behind proposed management decisions should be clearly explained (based on the best available expertise, scenarios of change and knowledge and views of stakeholders). Using this approach, appropriate mechanisms should be developed to document and make more widely available the information from all relevant disciplines and from relevant knowledge systems, especially those based on local and traditional practices. It should also evaluate implications for ecosystem management of different ‘world views’ based on different knowledge systems. These guidelines should be followed in a way that is consistent with Article 8(j) of the CBD, which refers to knowledge, innovations and practices of indigenous and local communities.

Consultations

As part of the EIA, there were numerous consultations and exhibitions to explain the proposal to the public as well as consultation with official bodies
and other interested parties. All issues and concerns raised throughout this process were documented and reported. Local residents were consulted through display of documents and route proposals during a number of public consultations and at public exhibitions. There have been four main public consultations throughout this time (in 1993, 1997, 2001 and 2005). Brochures outlining the route proposals were distributed to local residents and press releases issued by the County Council. Advertisements appeared in a number of local newspapers and advertising posters were erected in various locations to ensure that as many people as possible were made aware of the events.

The public exhibitions consisted of display boards outlining the proposals and displays of large-scale plans of each of the alternative routes, together with plans illustrating the environmental issues, a route comparison table and forecast traffic flow. An additional one day exhibition was held after amendments were made to proposals in one area. These amendments were made partly as a result of comments received at the earlier exhibitions, so the public were given a position of influence in this process.

The County Council’s proposals aroused a great deal of interest locally and response rates for questionnaire surveys were good. During the consultation phase, several members of the public did however voice their criticism of the exhibition venues (e.g. lack of disabled access) and the lack of advanced publicity. This criticism of the perceived lack of advanced publicity perhaps demonstrates the limitations of this method of consultation, though in this case, further press releases were issued to thank those that had already contributed and to remind others that they still had the opportunity to do so. A number of petitions for and against the proposed routes were presented after the 1997 consultation, and two bodies boycotted the public consultation process. Overall, there seemed to be support for a Heysham-M6 link road in some form.

In addition to the consultations and questionnaire surveys, the County Council commissioned MORI Social Research Institute to carry out a structured survey of around 1000 residents at randomly selected locations within the Lancaster District. The survey was conducted by face-to-face interview in
August and September 2001 among a representative cross-section of residents. Statutory consultees, experts, key organisations and other external stakeholders were also consulted. This included city, parish and neighbourhood councils, Central Government departments and other local and national organisations likely to have an interest. Commercial bodies and official organisations were given an opportunity to comment at this stage. The Consultation brochure was also sent to local Members of Parliament and the local Member of the European Parliament. Consultations were held with English Nature, the Environment Agency, Lancashire Wildlife Trust, RSPB and other interested parties about the choice of route, scope of assessment and the survey and assessment methodologies. Statutory consultees and external stakeholders were also consulted in June 2006 for the revised Planning Application plan.

To gain a better understanding of the issues facing the local economy, and the relationship between transport and the economy, a survey of local businesses in the area was undertaken. A questionnaire was distributed to businesses in the Lancaster District (390 were sent out; 155 were returned, giving a high response rate of 40% which demonstrates the importance that businesses attach to the completion of the Heysham to M6 link). Stakeholder interviews were also held to identify any issues that may not have been identified in the business questionnaire and to ensure a more in-depth response from some of the key stakeholders. Meetings were also offered to farmers affected by the proposals through the National Farmers Union (NFU).

**Surveys**

Consultants were commissioned to investigate, identify and assess the biodiversity issues associated with the western and northern routes. Experts and specialist ecologists were used for the ecological surveys and for the many other surveys carried out for the EIA and some of these experts were local so had valuable local information on the Study Area in particular. Ecological assessment was carried out with reference to the Institute of Ecology and Environmental Management (IEEM) guidelines for ecological impact assessment, the professional body that represents and supports
ecologists and environmental managers. Surveys were carried out using standard methodologies and were conducted at the optimal time of year to ensure accurate and reliable results. The Council then took legal advice from leading Counsel on these reports to make their decision on which route to proceed with.

**Reporting**

Reports and brochures produced as part of the process outlined the reasons for choice of route and alternative options. The reports contained non-technical summaries, summarising the principal sections of the main report in non-technical language, to ensure the material was accessible to a wide audience.

Scoping Opinion was provided in November 2000, by the Planning Section of the Environment Directorate, to Highway Consultancy (for the Western route) and for the Northern route in 2002. They identified aspects of the environment likely to be significantly affected by completion of the Heysham to M6 link (e.g. air quality, cultural heritage, ecology/nature conservation).

Prior to many of the surveys, desk research was carried out to ensure all relevant local information was collated and reported. For the ecology and nature conservation section, this included a review of the extent of past and present information on the distribution of species and habitats within the relevant area. This included information on the location of statutory and non-statutory wildlife sites and provided vital information for surveyors on potential locations of rare, protected, threatened, scarce and uncommon species where known. The landscape survey used a standard methodology and additional data was collected from Lancaster District Local Plan, Joint Lancashire Structure Plan and other key reports. A desktop study and field survey visits were used to estimate the extent of the Study Area. The geology and soils survey used information sources such as aerial photographs, geological maps and memoirs in addition to a ground investigation. Reports contained non-technical summaries to make them accessible to members of the public.
3.11.3 Assessment of Guidelines

Guideline 1: Information sharing with stakeholders in accessible form

Information was shared with stakeholders and technical/scientific information was made available throughout the consultation and reporting stages. The information made available described the reasons behind the routes proposed by the Council and expertise and views of stakeholders were incorporated. This information was in an accessible form (e.g. non-technical summaries) so it was available to a wide audience.

Guideline 2: Assumptions based on best available expertise, scenarios of future change and knowledge/views of stakeholders

Scenarios of future change were included – studies of traffic flows, predicted journey time savings, road safety assessment, emissions (pollutants), geology and soils looked at baselines and modeled or predicted changes by 2010 (anticipated scheme opening year) and 2025 (15 years after anticipated scheme opening). Forecast changes in employment by 2020 were also reported. Little consideration is given in terms of foreseeable future change in the natural environment, for example, through climate change.

Guideline 3: Mechanisms developed to document/make available information from relevant disciplines/knowledge systems

Information was documented and made widely available in the Heysham study. The County Council adopted an ‘open-book’ approach to the scheme, with all possible information being made available on their website. The ecosystems approach talks about implementing these mechanisms consistent with Article 8(j) of the CBD, which refers to traditional knowledge, innovations and practices. Traditional knowledge can make a significant contribution to sustainable development and in this case, extensive knowledge of local environments potentially affected by any development is important to include in any decisions made. Article 8(j) of the CBD also involves engaging indigenous and local communities. The local communities and businesses were engaged in this project, as can be seen from the high response rates of
the questionnaire surveys and attendances at exhibitions and public meetings. Fishermen who fish on the Lune catchment were also consulted during this exercise. They were concerned about restrictions to their access during the construction phase, and on the effects of migratory fish ascending the River Lune. The potential effect on the environment was a fairly common reason given for rejection or support of the proposed routes during the consultation.

**Tools**

The ecosystems approach mentions public participation and knowledge sharing, education and awareness campaigns and adaptive management methods as potential tools to be used. The EIA process covers public participation and knowledge, as well as education and awareness campaigns to an extent (exhibitions, consultations and questionnaires). The consultation process could also be considered as an adaptive management method, as constructive criticism from the general public resulted in changes to the proposed route.

3.11.4 Scores

**Scale**

The EIA consultation process including mail-shots, meetings, exhibitions etc. was carried out throughout the Lancaster District to ensure anyone affected by the proposed routes was given their chance to comment. The Council tried to reach as wide an audience as possible, and included residents, businesses, stakeholders and other interested parties (e.g. fishermen using the Lune catchment). This follows an ecosystems approach fairly well. Score = 2

**Scope**

The EIA process at Heysham involved consultations throughout the various iterations of the route, as well as surveys to identify potential physical impacts. The practice of utilising local expertise is well developed. The extent to which
this occurs would need to be broadened in terms of subject areas to fully deliver an ecosystems approach. Score = 3

**Timing**

Potential impacts at baseline, 2010 and 2025 were identified, as well as impacts during the construction phase and at baseline. Some studies did not focus on particular timelines but looked at the impact over the course of the scheme. This approach is broadly consistent with the ecosystems approach, though this would not use artificial timeframes but instead would involve assessment over a longer timescale. Score = 2

**Technical Content**

Although an ecosystems approach would tend to follow a more holistic way of assessing the impact of the scheme, the Environmental Statement collates all the different surveys and research carried out and forms a good information source for interested parties, stakeholders and decision makers. Score = 3

### 3.12 Evaluation of Task 12: Involve Science and Society

**Task 12:** What measures can be taken to facilitate the involvement of all stakeholders including all sectors of society and scientific disciplines?

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale</td>
<td>2</td>
</tr>
<tr>
<td>Scope</td>
<td>4</td>
</tr>
<tr>
<td>Timing</td>
<td>4</td>
</tr>
<tr>
<td>Technical Content</td>
<td>3</td>
</tr>
</tbody>
</table>

#### 3.12.1 Summary

The scale of stakeholder involvement was generally good with a wide array of issues represented. The scope of stakeholder involvement in the project has been identified as a significant departure from the ecosystems approach. While the scale of stakeholder involvement was good, evidence suggests that this involvement was limited to certain aspects of the planning process.
Stakeholder involvement has focused primarily on the process of scheme choice and approval. Compliance with the ecosystems approach requires that stakeholder involvement be encouraged throughout the project. This should include identifying future management and where appropriate incorporating stakeholder involvement in achieving the goals of said management. There is also a lack of linkage between disciplines. In particular there is a failing of the EIA process to consider the cross-cutting issues and therefore facilitate an inter-disciplinary communication. This siloed approach to technical assessment further complicates the necessary assimilation and cross analysis of issues, thus reducing the degree to which difficult decisions can be judged.

In respect of this task, the ecosystems advanced user guide states that:

*Increased communication and co-operation is required:*

(i) *between sectors,*

(ii) *at various levels of government (national, provincial, local), and*

(iii) *among governments, civil society and private sector stakeholders*

*Increased communication among international and regional organisations is also needed.*

The incorporation of the ecosystems approach principles as an integral part of planning in, among others, the agriculture, fisheries, forestry and other natural resources management sectors potentially affecting biodiversity and ecosystem functioning, should be encouraged, following the example, for instance, of the Code of Conduct for Responsible Fisheries, Sustainable Forest Management or others.

Sectors other than the primary production sectors may also have major effects but are often less recognised in this respect. These include sectors such as the judicial sector, which affects governance, as well as those such as energy and transport, which are managing or affecting resources either directly or indirectly.
Procedures and mechanisms should be established to ensure effective participation of all relevant stakeholders and actors during the consultation processes, decision making on management goals and actions, and, where appropriate, in implementing the ecosystems approach.

The effective implementation of the ecosystems approach may require involving multidisciplinary professional and scientific expertise, including such disciplines as economic, social and natural sciences. When assessing the costs and benefits of conserving, maintaining, using and restoring ecosystems, the interests of all relevant sectors should be taken into account for equitable sharing of the benefits according to national law.

3.12.2 Introduction

This task focuses primarily on stakeholder involvement in the achievement of management. This relates specifically to issues of biodiversity and the mitigation of the developmental impact during and following construction. With the focus of this task on future management the scope of this assessment will look primarily at the current planning application.

The Heysham to M6 link, like all major developments, will have a variety of impacts on the environment, which will vary in scale, scope, timing and focus. The current Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 require that an environmental assessment be undertaken to identify the possible impacts of development.

For the Heysham to M6 link the scope and format of the assessment followed The Design Manual for Roads and Bridges, Volume 11: Environmental Assessment (Highways Agency).

This process is important in the strategic assessment of the proposed routes, and is also central to informing the possible and suggested future management of the route to compensate for and mitigate against the adverse impacts of the development. The Highway Consultancy Section (now Highways and Environmental Management) of the Lancashire County Council
Environment Directorate undertook a scoping exercise to identify the likely areas impacted by the proposed schemes.

They laid the requirements of the environmental assessment based on these broad subject headings:

a. Air quality
b. Cultural heritage
c. Disruption due to construction
d. Ecology and nature conservation
e. Landscape effects
f. Land use
g. Traffic noise and vibration
h. Pedestrians, cyclists, equestrians and community effects
i. Vehicle travelers
j. Water quality and drainage
k. Geology and soils

[Source – Planning application – Volume 1 Part D Appendices].

The generalised headings were passed to various different internal and external agencies for completion or comment. The assessments of the ecology, cultural heritage and noise were completed by external organisations (ADAS, Oxford Archaeology North and Atkins respectively). A brief assessment of the impact on fisheries was also commissioned (ADAS). Lancashire County Council’s Environment Directorate handled all other assessments internally.
3.12.3 Assessment of Guidelines

The extent to which there was evident communication and co-operation varied over the life of the project. Different stages would incorporate different issues and therefore necessitate involvement of different bodies. This would include individuals or groups both as stakeholders and/or advisers. Planning regulations provide a framework within which national and international expertise influence the process but do not offer a substitute for direct co-operation and communication.

The EIA process clearly involved communication regarding a wide range of opinions and expertise. The EIA deals with a variety of subject areas encompassing a number of disciplines and sectors (as is evident from the list above). However, from the evidence available it is uncertain to what degree there was cross sector communication. Only in the fisheries report was there a communication regarding the environmental, cultural and commercial impacts of the proposed works. This was the only report that considered issues relating to a variety of sectors; all other reports are grounded in single disciplines and subject areas.

In particular, the ecosystems approach requires open communication between and within disciplines regarding the approach to mitigation and future management. Clearly a road scheme will have immediate benefits intrinsic to the improvements to the road network. However, there must be a compensation or mitigation for the necessary disruption to natural processes and resources. This requires discussion and communication beyond the simple choice of route.

A number of consultations (outlined in Task 1) were successful in gathering opinion cross sector; with a process involving communications with businesses, special interest groups, parish councils and the public. However, it is not clear to what degree involvement was encouraged beyond offering opinion regarding the choice of route and potential impacts. For this reason, stakeholder involvement was limited. In particular there is no evidence of open discussions regarding the future management of the site post-construction.
When considering the degree of involvement of the different tiers of government, it is necessary to consider the current framework laid out in the planning process. The planning process, as set out in law, requires the involvement of national, regional and local government in decisions relating to development. These tiers of government exert a strong influence on the decision-making process in relation to the choice of the route. However, in a process such as a road development, it is not apparent how the varying tiers of government are directly involved in the continuing management following the completion of the development.

At all levels of involvement communication appears strongest where decisions relate to scheme choice. Here, good consultation enables the assessment of opinion and supports the process of planning application. Linkages between local and national government are good with the planning process encouraging and expecting decisions to pass through the correct approval process.

However, as discussed, a key deficiency is the extent to which consultation and communication are incorporated in the future management process for the scheme. The current EIA process still encourages a siloed approach to assessment with few if any cross issue/ discipline assessments. From the perspective of the ecosystems approach there would need to be strong linkages identified between disciplines to allow the assessment and comparison of impact in a holistic way.

As identified in Task 1, in complying with this guideline it is essential that there is a good understanding of the relevant stakeholders and actors. Stakeholders are defined by their vested interest in the project either because they are benefited or disrupted by it. Actors would include representative bodies such as the Environment Agency or Natural England who act on behalf of legislation and issues (including the natural environment).

The current planning process encourages stakeholder involvement at all key stages in the process. However, there may be a limit to the degree to which stakeholder involvement is accessed and utilised. Effective participation
requires that relevant stakeholders be incorporated at all the relevant points in the project. During the early process of the Heysham to M6 link, stakeholder involvement was actively encouraged with stakeholder meetings and a number of public consultations. Various tiers of government also expressed their opinions at the different iterations of the proposed route. This is evidenced by the changing route preference over time. Here a variety of actors (including the government) represented international legislation and law, which in turn represented aspects of the natural world (in particular the Morecambe Bay SSSI and RAMSAR site). More recently, the Environment Agency have been involved in influencing the road through objections regarding bridge design.

This process has organically incorporated a variety of issues and opinions over its life. However, until the EIA there was little evidence that these issues had been framed, and while the EIA did this, it did not consider the cross-cutting issues or involve a wide variety of stakeholders. Stakeholder involvement was used to answer different and much broader questions than the technical assessments. Both were used to inform the planning process but neither were communicated beyond publication of the reports on the internet. The future management of a project such as this requires a variety of stakeholder input to identify and then implement strategies to manage the impact of the development beyond the project. This could include involving fisheries and farmers in monitoring and managing resources to support ecosystems in compensating or recovering from short-term and long-term impacts.

**Tools**

The ecosystems approach mentions public participation and knowledge sharing, education and awareness campaigns and adaptive management methods as potential tools to be used. The EIA process covers public participation and knowledge, as well as education and awareness campaigns to an extent (exhibitions, consultations and questionnaires). The consultation process could also be considered as an adaptive management method, as
constructive criticism from the general public resulted in changes to the proposed route.

3.12.4 Scores

Scale

There have been a number of public consultations and stakeholder meetings throughout the life of the project. These have varied in scale from small group meetings with farmers to large cabinet sessions with businesses, special interest groups and local residents. National and international opinion has been represented both directly and indirectly through adherence to frameworks of law, while some specific environmental issues have been advocated by organisations such as the Environment Agency and Government. Various disciplines were also well represented both directly through the EIA process, and again indirectly through the mechanisms such as the UKBAP process and law. The scale of stakeholder involvement was generally good with a wide array of issues represented. Score = 2

Scope

The scope of stakeholder involvement in the project has been identified as a significant departure from the ecosystems approach. While the scale of stakeholder involvement was good, evidence suggests that this involvement was limited to certain aspects of the planning process. Stakeholder involvement has focused primarily on the process of scheme choice and approval. Compliance with the ecosystems approach requires that stakeholder involvement be encouraged throughout the project. This should include identifying future management and where appropriate incorporating stakeholder involvement in achieving the goals of said management. There is also a lack of linkage between disciplines. In particular there is a failing of the EIA process to consider the cross-cutting issues and therefore facilitate an inter-disciplinary communication. This siloed approach to technical assessment further complicates the necessary assimilation and cross analysis.
of issues, thus reducing the degree to which difficult decisions can be judged. Score = 4

Timing

As previously discussed, stakeholder involvement was more comprehensive during the earlier phase of the project. There is currently no evidence to suggest that there will be continued stakeholder involvement beyond the project. Score = 4

Technical Content

Although an ecosystems approach would tend to follow a more holistic way of assessing the impact of the scheme, the Environmental Statement collates all the different surveys and research carried out and forms a good information source for interested parties/ stakeholders/ decision makers. Score = 3
4 ANALYSIS OF REVIEW FINDINGS

4.1 Introduction

“Ecosystems are not only more complex than we think; ecosystems are more complex than we can think” (Golley, 1993)

Having examined the process, studies, surveys and consultations that were undertaken to develop the proposals for a Heysham to M6 link road to see how well this delivers an ecosystems approach one factor is abundantly clear. The ecosystems approach, that is having a clear strategy for and commitment to the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, needs to be at the core of planning policy and at the core of the culture of the organisation(s) leading a development initiative. A critical aspect of this is that everyone involved in the development process needs a clear and consistent understanding of what local ecosystem goods and services are, why they are important to the local economy and health and well being of local communities, and how a proposed development like a new road is likely to affect the continuing supply of important goods and services into the future. This is a key aspect of making more sustainable land use planning decisions for achieving more sustainable communities.

4.2 Assessment Of Action And Tools Used For Each Task

Table 4.1 below is based on a table in the ecosystems approach CBD Advanced User Guidelines for assessing how far an ecosystems approach has been successfully adopted. From this it can be seen that many of the tools and methods suggested were used in the Heysham EIA process.
### Table 4.1 Assessment Of Action And Tools Used For Each Task

<table>
<thead>
<tr>
<th>Task</th>
<th>Recommended action / project activity</th>
<th>Tools / method being used for Heysham</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1 Societal choice</td>
<td>Decision making</td>
<td>Strategic Environmental Assessment, Stakeholder involvement, Public consultation, Democratic decision making and review,</td>
</tr>
<tr>
<td></td>
<td>Choice of route</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Operation and management</td>
<td></td>
</tr>
<tr>
<td>Task 2 Decentralised Management</td>
<td>Decision making</td>
<td>Stakeholder involvement, Public consultation, Democratic decision making and review</td>
</tr>
<tr>
<td></td>
<td>Choice of route</td>
<td></td>
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<tr>
<td></td>
<td>Design, Build</td>
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<tr>
<td></td>
<td>Operation and management</td>
<td></td>
</tr>
<tr>
<td>Task 3 Effects on adjacent ecosystems</td>
<td>Design, Build</td>
<td>Stakeholder involvement, Environmental Impact Assessment, Environmental Management Plan</td>
</tr>
<tr>
<td></td>
<td>Operation and management</td>
<td></td>
</tr>
<tr>
<td>Task 4 Economic context</td>
<td>Decision making</td>
<td>Business case, Economic Impact Assessment, Stakeholder involvement, Public consultation</td>
</tr>
<tr>
<td></td>
<td>Choice of route</td>
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<tr>
<td></td>
<td>Design, Build</td>
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<td></td>
<td>Operation and management</td>
<td></td>
</tr>
<tr>
<td>Task 5 Maintain ecosystem services</td>
<td>Choice of route</td>
<td>Environmental Management Plan, Stakeholder involvement, Public consultation, Legislation and policy</td>
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<td></td>
<td>Design, Build</td>
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<td></td>
<td>Operation and management</td>
<td></td>
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<tr>
<td>Task 6 Limits to ecosystem function</td>
<td>Choice of route</td>
<td>Environmental Impact Assessment, Environmental Management Plan, Stakeholder involvement</td>
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<td></td>
<td>Design, Build</td>
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<td>Operation and management</td>
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<tr>
<td>Task 7 Appropriate spatial / temporal scale</td>
<td>Decision making</td>
<td>Monitoring Stakeholder involvement, Public consultation Modeling</td>
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<td></td>
<td>Choice of route</td>
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<td></td>
<td>Design, build</td>
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<td>Operation and management</td>
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<td>Task 8 Long-term management</td>
<td>Design</td>
<td>Environmental Management Plan, Monitoring, Stakeholder involvement</td>
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<td>Operation and management</td>
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<td>Task 9 Change is inevitable</td>
<td>Design</td>
<td>Environmental Management Plan, Monitoring, Stakeholder involvement</td>
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<td>Operation and management</td>
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<td>Task 10 Integration of conservation and use</td>
<td>Design</td>
<td>Environmental Management Plan, Stakeholder involvement</td>
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<td></td>
<td>Operation and management</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Assessment of tasks; scope and technical content

Table 4.2 below summarises the scores attributed to each of the tasks to indicate how well each has been dealt with. In both scope and technical content the current approach is particularly weak. This is not surprising since the approach did not seek to deliver an ecosystems approach. In terms of scale and timing the current EIA process is much stronger leading to the conclusion that it has the inherent capacity for delivering the ecosystems approach.

Table 4.2. Summary of Scores for Each Task

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Task</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>Scope</td>
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<tr>
<td>Timing</td>
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<td>Technical Content</td>
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</tr>
</tbody>
</table>
4.4 Strengths and Weaknesses

Table 4.3 attempts to identify the strengths and weaknesses of the current Heysham EIA process in delivering an ecosystems approach.

**Table 4.3 Strengths and Weaknesses for Each Task**

<table>
<thead>
<tr>
<th>Task</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1 Societal choice</td>
<td>Based on a well developed democratic process with strong policy and legislative framework.</td>
<td>Did not take the opportunity to broaden discussion and seek views on ecosystem health, function, goods and services. How inclusive is the process?</td>
</tr>
<tr>
<td>Task 2 Decentralised management</td>
<td>Decision-making and management bodies have a wealth of experience.</td>
<td>The ecosystems approach is not at the core of the process. Management beyond the effective functioning of a new road may be limited.</td>
</tr>
<tr>
<td>Task 3 Effects on adjacent ecosystems</td>
<td>Designated areas and protected species covered by strong legislation.</td>
<td>EIA tends to be restricted by defined boundary. Whilst key in making the final choice of route, environmental effects were not considered in detail until relatively late in the debate.</td>
</tr>
<tr>
<td>Task 4 Economic context</td>
<td>A significant amount of information exists on economic activity and prosperity.</td>
<td>Limited “valuation” of environmental assets in relation to the local economy, and then only at a late stage in impact assessment.</td>
</tr>
<tr>
<td>Task 5 Maintain ecosystem services</td>
<td>Designation and protected species legislation has a very significant effect.</td>
<td>The wider range of goods and services is hardly considered.</td>
</tr>
<tr>
<td>Task 6 Limits to ecosystem function</td>
<td>A well developed process of mitigation, enhancement and compensation measures form part of the EIA.</td>
<td>The concept of ecosystem function, limits and thresholds does not form part of the impact assessment. The precautionary principle applies and provided there is no long term impact on all is assumed to be well.</td>
</tr>
<tr>
<td>Task</td>
<td>Strengths</td>
<td>Weaknesses</td>
</tr>
<tr>
<td>------</td>
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<td>------------</td>
</tr>
<tr>
<td><strong>Task 7</strong> Appropriate spatial/temporal scale</td>
<td>The assessment of impacts and effects addresses a range of time scales covering both the building and ongoing operation of the road. Long-term view on impact predictions &amp; mitigation – not dictated by timescales of the scheme.</td>
<td>Spatial scale for EIA is closely defined and relates to a small area around the development – exaggerates the importance of local features, and under-estimates ecosystem scale receptors.</td>
</tr>
<tr>
<td><strong>Task 8</strong> Varying spatial and temporal scales</td>
<td>Varying temporal scales accounted for in impact predictions – evaluation of significance depends on permanence &amp; reversibility</td>
<td>Focus on immediate and direct change. Indirect impacts less well considered. Inability to predict interaction with long-term change in baseline environment, e.g., through climate change.</td>
</tr>
<tr>
<td><strong>Task 9</strong> Adaptive management</td>
<td>Environmental Management Plan designed to be flexible and adaptive to change. Monitoring included as a key feature of EMP.</td>
<td>Lack of public involvement in future management. Inability to account for long-term change in baseline environment.</td>
</tr>
<tr>
<td><strong>Task 10</strong> Integration of conservation and use</td>
<td>Choice of route and findings of EIA based on local and national legislation / planning policy. Extensive and unbiased consultation.</td>
<td>Legislative framework and planning policy are in themselves not always compatible with the ecosystems approach. Lack of participatory involvement in future management. Consultation did not explore the goods and services that people derive from the existing environment.</td>
</tr>
<tr>
<td><strong>Task 11</strong> Consider all forms of knowledge</td>
<td>‘Open-book’ approach to route selection and EIA. Sharing of information with interested parties. Inclusive of local knowledge. Use of appropriate scientific knowledge through commission of external experts.</td>
<td>Inability of scientific knowledge to account for future change in baseline environment.</td>
</tr>
<tr>
<td>Task</td>
<td>Strengths</td>
<td>Weaknesses</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Task 12 Involve science and society</td>
<td>Transparent and inclusive decision-making. Clear interaction between national and local decision-making.</td>
<td>Strategic decisions based on legislative and planning systems which are themselves not always compatible with ecosystems approach. Single issue reports make up EIA with little cross-sectoral analysis.</td>
</tr>
</tbody>
</table>

4.5 Conclusions

The ecosystems approach obviously needs to be at the core of planning policy and at the core of the culture of the organisation(s) leading a development initiative. This culture needs to feed through to all those involved in the project so that the ecosystems approach becomes a way of working on an ongoing basis through to ensuring that mitigation measures are successful in the monger term, and not just a task to be completed.

Since the ecosystems approach is a relatively new and untested concept within the English planning context, it would be unreasonable to expect this to be the case for the Heysham to M6 link. However if the thread of the ecosystems approach had been woven into the EIA process from beginning to end, and if the ecosystems approach had been at the core of the culture of Lancashire County Council and other statutory authorities and agencies, the Heysham EIA process certainly had the inherent capacity to deliver an ecosystems approach.

We must remember that the ecosystems approach is a strategy not a ‘stand-alone tool’ or new appraisal methodology and is designed to work alongside existing tools and methodologies.

The current approach to assessing impacts and identifying mitigation strategies tends to focus down to individual species (often driven by protected species and designated area legislation). In assessing many of the tasks it was concluded that there was a need to look at the bigger picture.
To adopt the ecosystems approach we need a better understanding of ecosystem health and function and the thresholds and limits that affect health and function.

The “problem” – traffic congestion and delays on the existing network - which the Heysham EIA is dealing with needs to be kept under review to ensure that the scope and timing of any further action is as appropriate and sustainable as possible.

In a development of this type there is, and has been, very widespread public consultation, but there are questions over how inclusive this was in scope and timing to meet the CBD principles and guidelines for good practice. The challenge in delivering an ecosystems approach within the EIA process is to:

- broaden the scope of the consultation to include examination of local ecosystem goods and services and how communities enjoy and value them, or benefits derived from them.
- build on consultation so that it becomes active stakeholder involvement continuing through the planning phase, construction phase and on into participation in the adaptive management of mitigation measures and ecosystems affected in the operational phase.
- consider issues far more holistically using more integrated methods for looking at how subject areas or ecosystems interact e.g. what are there links between economic prosperity, local quality of life and the condition and ‘health’ of local habitats?

Consultation informs decisions which are made by a democratically elected council. However it does seem that once a decision has been made, for example on the choice of route for the road, the consultation becomes more adversarial with the developer proposing a course of action and the community either supporting or objecting to the proposal. This invariably presents problems in maintaining and building positive stakeholder involvement throughout the life of the project.

Defining boundaries, both spatial and temporal, for studying and assessing the impacts and effects of a development in the context of the ecosystems
approach is a subject that needs further investigation to develop a practical approach.

The current approach does not deal very well with the need to understand the economic context so that market distortions affecting biological diversity are reduced, incentives are developed to promote biodiversity and sustainable use, and ecosystem costs and benefits are externalised.

5 USING THE CBD OPERATIONAL GUIDANCE FOR APPLYING AN ECOSYSTEMS APPROACH TO EIA

In applying the 12 principles of the ecosystems approach which are embodied in the twelve tasks that have been considered, the CBD also proposed the following five points as operational guidance. These are a good place to begin looking at ways of resolving weaknesses in the Heysham EIA process given the findings of our analysis above.

i. Focus on the relationships and processes within ecosystem.

The many components of biodiversity control the stores and flows of energy, water and nutrients within ecosystems, and provide resistance to major perturbations. A much better knowledge of ecosystem functions and structure, and the roles of the components of biological diversity in ecosystems, is required, especially to understand: (i) ecosystem resilience and the effects to biodiversity loss (species and genetic levels) and habitat fragmentation; and (ii) underlying causes of biodiversity loss; and iii) determinants of local biological diversity in management decisions. Functional biodiversity in ecosystems provides many goods and services of economic and social importance. While there is a need to accelerate efforts to gain new knowledge about functional biodiversity, ecosystem management has to be carried out even in the absence of such knowledge. The ecosystems approach can facilitate practical management by ecosystem managers (whether local communities or national policy makers).

From the assessment carried out we conclude that the current EIA process has significant shortcomings in achieving this. The EIA's focus is very much on biodiversity loss and habitat fragmentation, the overriding aim being to avoid causing any significant long-term impact on local biodiversity. Despite
this, the capacity of the local ecosystem(s) to absorb and adapt to change as a result of the development is not really considered, neither are the quality and ongoing supply of ecosystem goods and services, because this is not currently a requirement of the process.

Where the current planning and EIA process does meet this CBD aim is through the incorporation of management plans and monitoring programmes. However, the ecosystems approach requires a more holistic way of monitoring changes over time, with the focus on some existing and also more novel units of measurement.

While overarching themes such as water, air and biodiversity could still be used to frame issues, the ecosystem concept of equitable and sustainable use through the equitable sharing of benefits from ecosystems requires a more thorough appraisal for establishing all potential goods and services. There are a number of sustainability appraisal methods and frameworks that would meet this need. However, although they are in widespread use within the recently revised planning system for England, there is considerable variation in approach and consistency of application, i.e. there is no standard, recommended method for sustainability appraisal for planning purposes.

Part of this process should be undertaken via an appraisal of the current knowledge base available. However, our understanding of ecosystems is limited, the complexity of interactions so diverse that they defy accurate predictions. For this reason the ecosystems approach departs from the previous paradigm by suggesting that management should be achieved through an adaptive process, one which accepts that systems will often react differently than we expect, with constant monitoring and research informing the direction of management.

Although currently the planning process incorporates a POPE analysis (Post Opening Project Evaluation), involving a 5 year analysis of the project impacts, this is generally seen as an evaluation process and not an opportunity to inform any adaptive management for ongoing mitigation. The ecosystems approach requires adaptive management for developments such
as the Heysham to M6 link to continue long beyond the initial construction phase. This often seems to fail (CPRE & Countryside Agency, 2006) and can be a costly task if not accomplished in partnership with local communities and stakeholders affected by the development. In summary:

- Active and ongoing community involvement is essential (covering all communities of place, age and interest). To avoid any one group having an undue influence this process must be well-managed and carefully facilitated to be as inclusive and non-partisan as possible.

- National frameworks for data collection and research are essential (e.g. BAP research groups, academic institutions, Biodiversity Partnerships and other recognized local environment and social networks.

- Developments must incorporate a wider knowledge base but also undertake novel research to identify goods and services before the development, then monitor and manage the impacts afterwards.

Local collection of data must be available to feed back into national datasets for future projects.

**Problem:** Ecosystems are complex, and current understanding of them is limited.

**Solution 1:** Develop a stronger understanding of ecosystems.

1. Identify and utilise existing sources of information:

   a. Locally

      i. Community research – discover what goods and services people derive from the environment. Access local knowledge.

      ii. Local data holdings (Wildlife Trusts, local enthusiast clubs/ ecologists).

   b. Nationally
i. Access national data sources (National Biodiversity Network, BAP research groups, Natural England data holdings, the Met Office, Office for National Statistics, Environment Agency).

c. Internationally

i. Access international data sources (climate change research, records of globally endangered species, case studies from similar developments).

2. Gather novel data to identify goods and services:

d. Locally

i. Community research – focus groups to identify a breadth of knowledge.

ii. Undertake surveys to identify baseline data such as location and distribution of habitats, archaeological features.

3. Monitor impacts of development following construction:

e. Locally

i. Develop a sustainable management and monitoring programme. This must involve local communities and businesses and utilise novel approaches to reduce the cost of these methods and ensure their continuation.

ii. Undertake formal monitoring.

f. Nationally/ Internationally

i. Gather data from local projects to feedback data. Benefits would include contribution as a case study to other projects. This would also feedback into our understanding of ecosystem functionality.
Solution 2: Develop flexible adaptive management.

1. Using the available data identify key signifiers of environmental change and quality.

2. Identify initial management programme using gathered data.

3. Build in a monitoring programme to assess change in key indicators.
   a. This could be accomplished using novel approaches including utilising community involvement to undertake monitoring.

4. Build in a management plan which is flexible to respond to monitoring that indicates objectives are not being achieved.

ii. Enhance benefit-sharing.

Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystems approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity building, especially at the level of local communities managing biological diversity in ecosystems; the proper valuation of ecosystem goods and services; the removal of perverse incentives that devalue ecosystem goods and services; and, consistent with the provisions of the Convention on Biological Diversity, where appropriate, their replacement with local incentives for good management practices.

Enhanced benefit sharing within the context of the ecosystems approach first demands that we re-assess the array of benefits identifiable from ecosystems. As mentioned previously, the current paradigm assesses benefits from a purely sectoral perspective, following highly prescribed methods to assess the value of the route choice. Under the ecosystem paradigm there must be an open appraisal of derived benefit, which must first question the available data, to establish the scope of impact, then question the people, to establish the variety of potential benefits derived from the systems. The approach must then be flexible enough to fairly consider the varying data sources without significant bias.
In the case of the Heysham survey, the fisheries report highlights the deficiencies in the rest of the survey by showing that benefits aren't simply defined as commercial, environmental or social. It accepts that the impacts on fish stocks due to changes in river bed structure and water quality will have knock-on effects for hobbyist fishermen, the tourist economy and to commercial fisheries. Although this still misses a variety of use options and doesn’t incorporate an open appraisal of goods and services, it clearly represents a more holistic and cross cutting view of impact assessment, more consistent with the ecosystems approach.

One of the drivers behind the cross-cutting nature of the fisheries report was the strong lobby evident in the local fisheries and fishing clubs. Groups such as these offer valuable input into the planning process, however a truly equitable process aims to actively facilitate involvement from all members of society at all stages in the process. As mentioned previously the Heysham project succeeds at involving a wide and representative cross section of society in the decision-making process. However, within the ecosystems approach, involvement should not be limited to the decision-making process alone. Projects such as this must be considered as community projects and should clearly offer the widest benefits.

By opening and closing the public consultation the project shifts from an inclusive process to one that often encourages an adversarial attitude. Projects such as this should be public partnerships involving the public throughout the process in initiation, choice and implementation.

**Problem:** Ecosystem goods and services are the property of no-one but all depend on them. How do we ensure that there is fair access/ utilisation and fair shares for all?

**Solution 1:** To know how people use/ rely on goods and services it is necessary to identify who uses what and how they use it:

1. Develop strong community involvement.
   a. Facilitate the development of community groups
b. Access existing community groups

2. Identify goods and service through focus groups and consultation.

3. Consult other communities including private sector businesses regarding goods and services.

**Solution 2:** Once goods and services are identified they must be conserved either through retention or translocation.

1. Encourage community involvement to drive planning.

   a. Utilise novel techniques to reinstate or protect goods and services

**iii. Use adaptive management practices.**

*Ecosystem processes and functions are complex and variable. Their level of uncertainty is increased by the interaction with social constructs, which need to be better understood. Therefore, ecosystem management must involve a learning process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. Implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties. Ecosystem management needs to recognise the diversity of social and cultural factors affecting natural-resource use. Similarly, there is a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This "learning-by-doing" will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.*

The Heysham to M6 link study does consider long-term management of ecosystems incorporating monitoring programmes to aid the planning of future management in response to change. However, the ecosystems approach would require this to go further and inform not only the specific on-going development but also to provide an information source to aid with the interpretation of ecosystem function. In this way all developments would aim to increase our understanding of ecosystem functioning and limits and the associated impacts of anthropogenic change.
A key deficiency of the Heysham EIA process and proposed road development is the approach to the core problem. As we have discussed, this has changed throughout the planning process but to resolve the issue of congestion there must be a long-term solution. While strategically this road project was considered as part of a wider transport policy for Lancashire, there is a danger that a large development becomes a focus in itself. The predicted obsolescence of the varying route choices suggests that the effectiveness of the road in resolving the core problem is limited. This reflects a short-term approach to the issues and does not display evidence of a sustainable planning. While a suite of transport solutions are to accompany this development, they should be at the heart of it, providing a packaged solution.

iv. Carry out management actions at the scale appropriate for the issue being addressed, with decentralisation to lowest level, as appropriate.

An ecosystem is a functioning unit that can operate at any scale, depending upon the problem or issue being addressed. This understanding should define the appropriate level for management decisions and actions. Often, this approach will imply decentralisation to the level of local communities. Effective decentralisation requires proper empowerment, which implies that the stakeholder both has the opportunity to assume responsibility and the capacity to carry out the appropriate action, and needs to be supported by enabling policy and legislative frameworks. Where common property resources are involved, the most appropriate scale for management decisions and actions would necessarily be large enough to encompass the effects of practices by all relevant stakeholders. Appropriate institutions would be required for such decision-making and, where necessary, for conflict resolution. Some problems and issues may require action at still higher levels, through, for example, trans-boundary cooperation, or even cooperation at global levels.

Although the problem identified in this project has implications which go wider than the local area (the issue of congestion and climate change, national infrastructure – access to a major port), it is clear that the primary issues are local and that the solution to the problem is going to have the greatest impact on local communities. For this reason while strategic consideration of the route is best dealt with on a national level, the final route choice and the management of its impact is primarily a local issue.

From the perspective of the ecosystems approach there are significant advantages to effective decentralisation. For developers alone the potential
costs from the ecosystems approach are significant if borne only by the developing body. For large projects such as this to achieve the requirements of the ecosystems approach there must be involvement of stakeholder groups in not only the development of the project but also the future management of the scheme. While this can include direct management of resources and monitoring of indicators, it can also include responsible use of the available resource. In a road development such as this, that can include encouraging local people to adopt alternative methods of travel to ensure the longevity of the scheme benefits (i.e. keeping the road congestion-free). The ecosystems approach encourages novel and integrated solutions which incorporate existing capacity rather than unnecessarily utilising further resource and creating waste.

v. Ensure intersectoral co-operation.

As the primary framework of action to be taken under the Convention, the ecosystems approach should be fully taken into account in developing and reviewing national biodiversity strategies and action plans. There is also a need to integrate the ecosystems approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystems approach, calls for increased intersectoral communication and co-operation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the Government or the creation of networks for sharing information and experience.

The need for cross-sectoral co-operation highlights the need for a change in culture so that policy makers and stakeholders at all levels approach problems with the ecosystems approach as one of the drivers for the agenda. It also highlights the need for a flexible, far more integrated approach that blurs sectoral boundaries and encourages organisations, agencies and groups to find closer ways of working together.

The conclusions from this comparative analysis are summarised below and expanded on in section 8. They clearly identify some of the key challenges for adopting an ecosystems approach in the EIA process. In particular they raise questions about ways of incorporating a more holistic approach within the limitations of the current planning and EIA processes, how the study
boundaries may need to be re-defined and how this would impact on project costs:

- For an ecosystems approach to be successfully applied to the Heysham to M6 link EIA, the concept of goods and services must be central to the process and must replace the siloed categories currently offered by the EIA.

- For the process to be equitable there must be a well-planned programme of participation that encourages all stakeholders to identify the benefits they get from local ecosystem goods and services, and how these can be secured into the future.

- There need to be considerations of “value” of goods and services in a wider non-monetary sense that are equitable and informed, not just by technical opinion but also by stakeholder beliefs, attitudes and concerns and how these values may change at a variety of spatial and temporal scales.

- The principals of the ecosystems approach would need to be adopted throughout the decision making process for effectively influencing projects long before and long after completion, i.e. influencing the initial options for problem resolution so that this then determines what type of EIA may be needed as well as how the EIA process would be carried out.
6 EMBEDDING THE ECOSYSTEMS APPROACH INTO PLANNING AND THE EIA PROCESS

6.1 Aspects of the EIA process that would need little change

Having established the weaknesses in the Heysham to M6 link EIA in relation to the ecosystems approach Advanced User Guide, the next stage of our research was to identify which tools and methodologies would be useful in dealing with and resolving these shortcomings. However, before considering these it is useful to briefly revisit the EIA process and consider which tools within it can be retained with little alteration.

6.1.1 Environmental Statement

In accordance with current standard approaches to EIA, the completion of an assessment using the ecosystems approach would retain the following stages, but simply introduce the concept of ecosystem goods and services into the:

**Description of existing environment** – but moving away from a topic by topic basis by separate individuals or organisations with little crossover to an exercise ideally be undertaken by a single, multi-disciplinary team including social scientists, working to a common project specification and co-ordinated programme of work.

**Assessment of the impact** of the scheme on the environment (see 7.1.2 below) – but introducing a new focus on the likely impacts to the continuing supply and quality of ecosystem goods and services as a result of the road scheme.

**Recommendations for mitigation**, for avoiding or reducing any negative impacts a scheme may have to ones of little if any significance – again, the focus would shift from species and features, but could remain focused on
habitats and landscape units for mapping and describing ways, including incentives, of ensuring the supply and quality of important ecosystem goods and services.

6.1.2 Assessment of Impacts

Table 6.1 below shows how this exercise is currently undertaken for EIAs, including the Heysham case study, but with a new column requiring information about the description of the impact on identified ecosystem goods and services. Another modification could be the inclusion of which habitats and/or landscape units were affected by an impact, rather than simply doing this on a site by site basis.

Table 6.1. Proposed impact assessment summary table based on cultural heritage section of the Heysham M6 Environmental Statement

<table>
<thead>
<tr>
<th>Description of Impact</th>
<th>Impact on identified goods and services</th>
<th>Impact Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>The site/habitat will be completely or mostly destroyed.</td>
<td>The supply will cease completely</td>
<td>Severe</td>
</tr>
<tr>
<td>A large part of the site/habitat will be damaged or destroyed.</td>
<td>The supply will cease or be heavily reduced, <em>(but there may also be cases when there is little impact on the good or service)</em></td>
<td>Major</td>
</tr>
<tr>
<td>A small part of the site/habitat will be damaged or destroyed.</td>
<td>There will be little disruption to the supply <em>(but there may be instances when the impact could still be major or severe).</em></td>
<td>Minor</td>
</tr>
<tr>
<td>The site/habitat is unlikely to be affected at all because of its distance from the development although related structures might be depending on the scale of the deposits, or the exact location of the site is uncertain.</td>
<td>There will be no effect on the supply of goods and services</td>
<td>Minimal</td>
</tr>
</tbody>
</table>
Typically each chapter of the Environmental Statement (ES) considered the impact in these or similar terms on particular features or receptors that were identified for each topic during the description of the existing environment. For example, in the case of cultural heritage, receptors included buildings, monuments or archaeological remains in the route corridor. For ecology, receptors included habitats, species and sites of ecological interest. Using an ecosystems approach would mean that receptors for agreed goods and services important over whatever area providing them would need to be established or agreed with stakeholders and assessed.

6.1.3 Impact Significance

Identifying significant environmental impacts is a key aim of the EIA process. Significance is an important determinant in the decision-making process and is usually expressed as a measure of the weight that should be attached an impact. Using an ecosystems approach to EIA would not change how significance was measured, i.e. the significance of an impact depends on the magnitude of that impact, and the importance of the receptor (good or service) being impacted.

Where significant impacts are predicted, the design of the scheme would be modified to mitigate these through a combination of impact avoidance, reduction and offsetting. If significant impacts cannot be satisfactorily mitigated then they should be taken account of in deciding whether or not a planning consent should be granted.

6.1.4 Determining Impact Significance in the Heysham M6 case study

Methods of determining significance of impacts for the Heysham M6 proposal varied between the different specialist assessments. However, most followed the accepted principle that significance is a function of the importance or sensitivity of the receiving environment and the magnitude of the predicted impact. In this way it is recognised that a major impact on a resource (good or service) of limited importance may not be seen as significant, while a lesser
impact on a resource (good or service) of greater importance could be significant.

An example of how significant impacts were identified in the ecology and nature conservation chapter of the ES is provided in Table 6.2 below. The resource value descriptions refer to the IEEM guidance on Ecological Impact Assessment, which advocates that the value of the receiving environment is described in terms of being of local, regional or of national importance. This would remain unchanged using an ecosystems approach, however the receptors used and ways of defining impacts could change.

Table 6.2 Showing the impact significance over a range of scales.

<table>
<thead>
<tr>
<th>Magnitude of potential impact ( + or -)</th>
<th>Resource Value (from IEEM criteria)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>International</td>
</tr>
<tr>
<td>Major</td>
<td>High</td>
</tr>
<tr>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Slight</td>
<td>Medium</td>
</tr>
<tr>
<td>Negligible</td>
<td>Very Low/None</td>
</tr>
</tbody>
</table>

In this example, a significant impact was considered to be one that scored Medium or High.
6.2 Additional or alternative tools and approaches for applying an ecosystems approach to EIA

The sub-sections that follow explain how the current weaknesses in the EIA process could be resolved using tools and methodologies not currently part of the EIA ‘toolkit’.

6.2.1 Using Appreciative Inquiry for putting the concept of goods and services at the core of the planning and EIA process

**Weakness:** there is very little consideration of ecosystem goods and services, how we enjoy them and acknowledge their importance to our quality of life. This whole concept is largely absent from local decision-making processes and EIA despite the policy emphasis on conservation of species and habitats, especially where these are highly valued and, or designated for their high quality and importance to biodiversity.

**Possible methodology and tools:** In order to fully consider how ecosystem goods and services enrich and add to our quality of life within a given area or locality we first need to identify what they are and how much they matter to people. The easiest way of doing this is to run surveys, events and carry out investigative processes into what benefits people who live and work in the area value most. Ideally these sorts of activities could be run as an ongoing process of ‘Appreciative Inquiry’ for monitoring local quality of life by the County and Local Strategic Partnerships as part of their Sustainable Community Strategy development. However, a one-off Appreciative Inquiry exercise could be conducted prior to or at the outset of an EIA for establishing local views on the quality and supply of ecosystem goods and services and benefits derived from them before any scheme options are put together.

**Why Appreciative Inquiry?**

Recent research undertaken by Defra\(^1\) into public perceptions about the environment revealed that:

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\(^1\) Project NR0115 “Public understanding of the concepts and language around ecosystem services and the natural environment” (2007).
• It is best to avoid terms such as 'ecosystems', 'biodiversity' or 'green infrastructure' - the idea of living in a system where components interrelate makes sense [only] if explained in a very simple way.

• Respondents expressed little belief or concern that the environment was under serious threat within the UK - most respondents displayed a poor awareness of domestic environmental issues.

• Respondents connected most strongly to the natural environment via aspects that enhance the quality of people's life - placing real value on those aspects of the natural environment that they relate to and use day-to-day (e.g. greenspace), helping them engage in the concept in the first instance.

• Costs implications of environmental damage for individuals increased interest significantly.

Thus ecosystem terminology or technical language is a real barrier to its uptake in the planning process and public acceptance of its importance.

A technique that may help considerably in overcoming this barrier is Appreciative Inquiry (AI). It was conceived in the late 1980's as both a method for changing social and organisational systems (Bushe & Coetzer 1995) and an approach for researching the impact of change. This makes it particularly relevant to the CBD principles of local, democratic governance and equitable sharing of benefits from ecosystem goods and services. It is an excellent way of brokering change in more positive ways. It can be used for helping to define not so much the basic "problem" affecting an area and its communities, but the means of visualising and working towards the most sustainable options or solutions for an area. Marks-Maran & Fergy (2007) explain the purpose of AI as being to ensure that action research fulfils its true potential in the development of organisations and innovative organisational change.

This is why Appreciative Inquiry is being used as a tool for community regeneration in Scotland by public agency Communities Scotland through the Scottish Centre for Regeneration. The technique is about focusing not on what is wrong but on what is best for a community or area, what it would look
like and how to achieve it. By introducing the ecosystem goods and services concept in terms of environmental benefits behind quality of life, this technique could be an ideal way of introducing the ecosystems approach into local decision-making, particularly through the mandatory groups and partnerships set up to deliver Sustainable Community Strategies and Local Area Agreements, many of which still remain too biased towards economic growth although they hold enormous potential as mechanisms for integrated assessment for moving towards a more sustainable way of life.

6.2.2 Mapping and quantifying ecosystem goods and services to enable better decision-making

**Weakness:** The nature of the EIA process in planning for road infrastructure means that cumulative impacts are generally poorly addressed and the geographic delineation of the route corridor can be relatively arbitrary and too narrow for taking ecosystem function or processes into account.

**Possible methodology and tools.** Research project NR0107\(^1\) explored ways of defining ecosystems, goods and services. Taking a lead from the approach used in NR0107 a good proxy for mapping ecosystems would be to use Broad Habitats supplemented with local Phase 1 survey data held by local Environmental Record Centres. These data could be correlated with landscape units from detailed local landscape character assessments (where these exist). River catchment and sub-catchment boundaries may also be useful, together with habitat and landscape units (as sub-units nested within Landscape Character Areas and linked to indicators of landscape change) for mapping ecosystems, depending on the scale of development and its likely sphere of influence in terms of impacts on ecosystem function and the ongoing supply of goods and services.

Whilst mapping habitats and natural resource units at different scales is well-established using Geographic Information Systems (GIS) the real challenge is to find a meaningful and accurate way of mapping the levels of supply or

\(^1\) Project NR0107 England’s Terrestrial Ecosystem Services and the Rationale for an Ecosystems approach
 provision of goods and services identified as important by local stakeholders. This is because functional units that form the framework for the analysis are likely to vary from one service to another and may be defined at far broader scales than the individual habitat patch’ (Haines-Young & Potschin, 2006). A landscape-scale approach will be necessary for mapping the impacts of a development on ecosystem goods and services that takes account of the multiple ecosystem benefits for an area of land in a given locality. Multiple benefits from ecosystem services should be a key aim for local sustainability. But this is a complex task requiring a clear vision that recognises the multi-functional nature of the landscape in the context of the many constraints that restrict the opportunity to realise that vision: ranging from the interest and engagement of the local community and other groups; differences in the physical environment and cultural landscape; prevailing policy at all levels; national, regional and local priorities; patterns of land ownership and proposals for new development.

Ideally a consistent approach to ecosystem service mapping across the country using a common method and shared data layers would be preferable, thus avoiding discontinuities between adjoining local authority areas, and between comparable development schemes, giving a seamless picture of the provision of goods and services across the landscape.

Local knowledge and expert opinion could then be sought to establish how the development, in this case new road infrastructure, would impact on the current levels of supply of goods and services well into the future. This could involve using different scenarios around levels of use in relation to changing land management regimes and the need to adapt to changing environmental conditions caused by climate change. This far more holistic approach would almost certainly result in a different geography and area of search for the route corridor and timeframes considered for assessing impacts (including cumulative impacts) from construction and use.

Furthermore, in accounting for natural resource systems when making decisions about where to locate new development, properly costed options
should include the costs of changing natural resource systems as a result of each option - this means very careful delineation of study boundaries beyond the immediate siting of new development and built infrastructure.

6.2.3 Measuring ecosystem health and function, defining limits and thresholds for a more integrated appraisal of impacts from development.

**Weakness:** The concept of ecosystem health and function, limits and thresholds does not form part of the impact assessment, which can narrowly focus on species, features and “quality” of habitat.

**Possible methodology and tools:** Current EIA practice can provide a means for embedding ecosystem thinking within it by focusing on the integrity of habitats likely to be impacted by new development, since integrity could almost certainly be directly linked to ecosystem function and the ability to supply goods and services. Project NR0107 was tasked with investigating the state and condition of England’s terrestrial ecosystems. This involved considering how to define ecosystem health and function. As this was outside the scope of this case study we drew on the ideas developed in NR0107 for compiling matrices and habitat condition profiles in relation to service provision. These profiles would be a useful method for encouraging a more holistic, cross-sectoral approach to EIA by using them with the topic-based assessments to construct a better description of the area’s ecosystems as a key part of the Environmental Statement. Condition profiles describing levels of service provision could be developed using locality-specific ecosystem survey worksheets like the ones at Table 6.3a and 6.3b. The information needed to complete the worksheets and final profiles would need to include local information and knowledge about function and likely limits to ‘healthy’ function. This is where added value would almost certainly result through experts and specialists working closely with a wider number of local community interest groups and residents who know their area well.
Table 6.3a: Example ecosystem goods and services EIA Worksheets

Broad Leaved, Mixed and Yew Woodland – Approx 100ha within 1 km of proposed route. No direct loss area stable at local and regional level.

<table>
<thead>
<tr>
<th>Ecosystem Service</th>
<th>Description</th>
<th>Scale</th>
<th>Importance</th>
<th>Impact</th>
<th>Value</th>
<th>Mitigation</th>
<th>Overall Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Food – casual harvest of fruits, berries and game</td>
<td>Local</td>
<td>Low</td>
<td>Neutral</td>
<td>Low</td>
<td>Neat</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Biomass as wood fuel</td>
<td>Local</td>
<td>Low but could rise</td>
<td>Neutral</td>
<td>Low</td>
<td>Low but may rise</td>
<td>Needs further investigation</td>
</tr>
<tr>
<td></td>
<td>Timber for construction</td>
<td>Local</td>
<td>Low but could rise</td>
<td>Low?</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Regulating</td>
<td>Water supply</td>
<td>Local</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flood risk</td>
<td>Local</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Cultural</td>
<td>Recreation - Accessible Green Space</td>
<td>Local</td>
<td>High</td>
<td>Major</td>
<td>High</td>
<td>Alternatives, habitat enhancement, compensation planting</td>
<td>Major Adverse</td>
</tr>
<tr>
<td>Supporting</td>
<td>Soil Formation</td>
<td>Nutrient Cycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.3b: Example ecosystem goods and services EIA Worksheet

<table>
<thead>
<tr>
<th>Ecosystem Service</th>
<th>Description</th>
<th>Scale</th>
<th>Importance</th>
<th>Impact</th>
<th>Value</th>
<th>Mitigation</th>
<th>Overall Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Food – casual harvest of fruits, berries and game</td>
<td>Local</td>
<td>Low</td>
<td>None</td>
<td>Low</td>
<td>habitat enhancement compensatio planting</td>
<td>Negligible</td>
</tr>
<tr>
<td></td>
<td>Biomass/ wood fuel</td>
<td>Local</td>
<td>Very low but has potential to increase</td>
<td>None</td>
<td>Low but could increase as local market develops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulating</td>
<td>Bio-diversity Maintenance of genetic species and ecosystem composition</td>
<td>Local</td>
<td>Low</td>
<td>Major Negativ e</td>
<td>High</td>
<td>Alternatives , habitat enhancement, compensatio planting</td>
<td>Major Adverse</td>
</tr>
<tr>
<td></td>
<td>Maintenance of ecosystem structure</td>
<td>Local</td>
<td>High may affect protected species</td>
<td>Major</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maintenance of key ecosystem processes</td>
<td>Local</td>
<td>High may affect protected species (bat navigation and feeding)</td>
<td>Major</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural</td>
<td>Recreation - Accessible Green Space</td>
<td>Local</td>
<td>High</td>
<td>Major</td>
<td>Medium</td>
<td>Alternatives , habitat enhancement, compensatio planting</td>
<td>Moderate adverse</td>
</tr>
<tr>
<td></td>
<td>Aesthetic – A relatively old field boundary system integral to the landscape</td>
<td>Local</td>
<td>Medium</td>
<td>Major</td>
<td>Medium</td>
<td></td>
<td>Moderate Adverse</td>
</tr>
<tr>
<td>Supporting</td>
<td>Soil Formation Nutrient Cycling</td>
<td>Local</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For considering and recording likely impacts on ecosystem goods and services a worksheet like this example would be suitable. This follows the approach used for the Heysham EIA by looking at impacts by habitat. Some minor modifications were made so that ecosystem goods and services can be assessed. Ideally these would be drafted with stakeholder input, using local knowledge and attitudes to the goods and services most valued by communities likely to be affected by the development. The worksheets could then be refined iteratively during the enhanced participation for the EIA process and finalised for inclusion in the Environmental Statement. Further columns could be added for recording information about the state and condition of habitats or landscape units in relation to specific goods and services and how the proposed development may affect the flow of further supplies. It may then be possible to suggest what the implications might be for specific communities, isolated dwellings and types of business. This might not only be applicable in the immediate locality of the development but downstream in a catchment.

Cumulative impacts are the combined impact of a road scheme or development under consideration with other developments, either existing or proposed, on a particular aspect of the environment or ecosystem goods and services.

In the context of the Heysham to M6 link, cumulative impacts could be taken to include not only other road schemes but also any further commercial or residential development potentially stimulated by the improved transport links that the road will provide. These need to be considered with developments that have already taken place to allow a complete and clear picture of the cumulative impact on local ecosystems and their ability to continue providing goods and services.

The ecosystems approach offers some opportunity for cumulative impacts to be better addressed through the EIA process. Two areas where the ecosystems approach has potential to improve the existing process is through
a greater transparency resulting from easier, shared access to data and information and from increased stakeholder involvement throughout the process. This may well remove some of the obstacles of commercial sensitivities that can currently block consideration of other proposed developments in the area. Identification of other relevant proposed developments could be incorporated as a feature of the public consultation.

Where sufficient knowledge on potential future developments does exist, the ecosystems approach may allow for more meaningful and consistent consideration of cumulative impacts through the application of a ‘whole environment or ecosystem’ approach rather than addressing each topic and site in isolation.

The more consistent and rational definition of geographic areas to be considered in the EIA is also likely to enable fuller consideration of cumulative impacts. By changing the emphasis in setting geographic boundaries from nominal ‘study areas’ towards clearly defined, functioning ecosystems, the identification of other potential developments potentially impacting on that same ecosystem should become clearer. At present, developments or proposals with the potential to breach an environmental limit leading to significant adverse impacts may be excluded from consideration simply because they fall outside of the pre-defined study area.

6.2.4 Managing ecosystems and monitoring changes in the quality and supply of goods and services post development.

Weakness: Responsibility for the future management of mitigation measures within functioning ecosystem(s) across the study area is barely considered, as the overriding priority is the operation and use of the new road development.

Possible methodology or approach: Having established the EIA study area using an approach similar to that suggested in the preceding sub-section, assessing the likely impacts during construction should not really differ from a conventional EIA, as discussed at 7.1 above. Post decision practices following construction of the development, were it to be approved, may also
be very different as a result of the whole ecosystems approach to the EIA and subsequent content of the Environmental Statement. However, given that post-evaluation activities are currently considered to be poor for most trunk road schemes (CPRE and Countryside Agency, 2006) the long-term management of local ecosystems will depend on the level of institutional good governance practiced by those organisations responsible for this following up.

6.2.5 *Linking environmental assets to local community well-being and economic prosperity using different ways of valuing ecosystem goods and services.*

**Weakness:** Limited valuation of environmental assets is made, and then only at a late stage in impact assessment without any real attempt to integrate the results with social and economic valuations.

**Possible methodology and tools:** Researching ways of placing monetary values on ecosystem goods and services was not a part of this case study. However, the nature of the EIA process meant that the study needed to acknowledge the importance of assigning “value”, either cultural or monetary to local goods and services. Value is a key aspect in determining the importance of ecosystem goods and services in relation to the benefits different communities of time, place and interest place on them. This is certainly not within the requirements for a standard EIA but is of critical importance to an EIA using the ecosystems approach. It is important to recognise that value can be expressed in both monetary and non-monetary terms. For example, a woodland can provide timber and wood-fuel products that have a recognisable market value, i.e. these are obviously economic goods. The same woodland could be used by several hundred people on a weekly basis for informal recreation and dog-walking. It is harder, although not impossible, to place monetary costs on the things people value from this type of public ecosystem ‘good’ and the benefits that people feel they get from it. For example, individual “willingness to pay” and contingent valuation techniques are well established. However, where public goods and services are concerned seeking a whole community or consensual agreement between interest groups could be more robust for finding a satisfactory solution.
6.2.6 Ensuring active stakeholder participation throughout the planning and EIA process.

Weakness: Public and stakeholder consultation is integral to EIA but it is not as inclusive or as wide in scope as for the ecosystems approach, restricting local involvement in and ‘ownership’ of a planning initiative like the Heysham to M6 link. The adversarial nature of the English planning system can compound this issue, making it harder to reach consensus between stakeholders.

Possible methodologies and tools: Sub-section 7.2.1 above describes a robust way of achieving an inclusive and more positive approach to stakeholder engagement by couching things in terms of “quality of life” using the technique of Appreciative Inquiry. In addition, stakeholder-mapping to establish who needs to be involved and how they could be involved is an extremely useful tool frequently used in mainstream planning and decision-making processes. It is supported by well-researched guidance, good practice examples and advice from a number of academic and practitioner sources.

Public participation is clearly a priority for successfully applying the ecosystems approach. The CBD guidelines make clear that inclusive and active stakeholder is vital from the initial stage of defining the problem through to managing resources after project completion. Out of the 12 CBD tasks in the Advanced User Guide, eight have direct relevance for direct stakeholder involvement, making it a critical aspect of the ecosystems approach. It serves a number of purposes:

a) It is the mechanism by which current generations are involved in the decision-making process.

b) It enables advocacy for future generations and the environment.

c) It serves to engender a sense of ownership and involvement by including stakeholders in the development and long term management of projects, which can increase the long term sustainability of projects such as these.
The public must be engaged not only on issues of local importance to them but also as advocates for those incapable of interacting with the debate, i.e. those who are hard to reach groups like the very young or some ethnic minorities, or those who live a considerable distance from the immediate study area but may be affected by the loss of ecosystem services resulting from a proposed development. It is significant that in recent years, participatory governance has become much more important in the English planning system since the inception of the Sustainable Communities Programme. The core principal of participatory consultation is to encourage those impacted by policies or development to make their opinion heard and to help shape local decision-making processes and their outcomes: for many this is considered to be an extension of the democratic process.

In discussing the design of an EIA in relation to the ecosystems approach this report considers a small aspect of a much larger process: the regulatory framework for planning which is in part governed by European legislation in the form of mandatory Directives. There are a wide range of proven methodologies and tools and a wealth of good practice case studies illustrating how to undertake successful public participation. The most pertinent question to ask is which combination of tools would work best to strengthen the standard EIA stakeholder engagement process.

Table 6.4 outlines a possible programme that may have helped to increase public participation in the Heysham M6 EIA. Given the scale and complexity of this task it was not possible to carry out a retrospective analysis of what the outcome may have been using a stronger participatory approach relating quality of life to ecosystem services.
Table 6.4 Outlining potential methodologies for developing a suitable participatory approach which complies with the principals of the EA.

<table>
<thead>
<tr>
<th>Purpose of Participation</th>
<th>Questions to be asked</th>
<th>Methods, tools and techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To find a solution to the identified problem (on the basis that the ‘problem’ was defined through a participatory process before the EIA was even necessary).</td>
<td>1. What is the problem to be resolved (or if using AI: what are the possibilities we could achieve by doing things differently? 2. What would people like to see happen to improve local quality of life? 3. Which solutions are most important to the majority of stakeholders, and are who will benefit?</td>
<td>Focus groups – When identifying the problem it is necessary to listen to a wide variety of opinions. For this approach to have value it is important that those involved are not unduly influenced by any current plans but are free to express their opinions about the area within which they live and work. Working groups – In certain circumstances it may be worthwhile to consider methods which directly engage the stakeholders in designing the development and influencing its appearance. Various tools exist to assist this approach however it can be a complex process involving only a few people and does not replace the need for expert design and deliberation. The advantage is that it can identify significant issues early on and is a method for starting the debate regarding impact at an early stage. Planning for real – a specific tool usually run as a workshop exercise in trying to assess what issues are seen to be the most important to the community as a whole, thus highly suitable with Appreciative Inquiry techniques. Questionnaires – When asking simple questions requiring simple answers questionnaires offer an excellent means of achieving this. These are best used to poll large numbers of people on the outcomes of a more deliberative process. Scenario planning – a good tool that uses a few, plausible and contrasting scenarios to systematically explore the uncertainty surrounding the future consequences of a decision, it can be used in any of the above methods. Quality of life assessment - a sustainability appraisal tool developed by the statutory agencies in England specifically for using with a range of stakeholder and community groups for land use planning and land management purposes.</td>
</tr>
<tr>
<td>SCANNING</td>
<td>SCOPING</td>
<td>ASSESSING THE ENVIRONMENTAL IMPACTS</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Screening is simply whether an EIA should go ahead or not, based on the ‘evidence’ of project preparation activities.</td>
<td>Focus Groups – At this point the discussion requires that a representative sample of the communities impacted must be invited/encouraged to describe what they value about an area; what they get from it and how important these things are to them. The groups are uninformed and are required to discuss the area, not the development. This is an open process to define all the relevant goods, services and benefits that different groups value and why. Focus group discussion can also provide information and insights on other relevant stakeholder groups.</td>
<td>This stage in the process requires a more informed stakeholder involvement in order that the participants understand the extent of the impact to them and the wider community. The aim of this is to facilitate a public debate about what is and what is not acceptable in terms of impacts in the full understanding of the potential benefits of the development.</td>
</tr>
<tr>
<td>1. Identify the goods and services impacted 2. Identify the relevant stakeholder groups</td>
<td>1. What do you value about living/working &lt;here&gt; 2. What are the difficulties of living/working &lt;here&gt; 3. How do you use the local areas (e.g. dog walking etc)</td>
<td>1. What is it that is valued about the goods and services. 2. What are the values of</td>
</tr>
</tbody>
</table>
| PREPARING THE ENVIRONMENTAL STATEMENT (ES) | 1. Invite stakeholders to check the content and way that its presented, i.e. is it accurate and representative | these goods and services?  
3. What is an acceptable level of disturbance.  
4. What value would the development have to the stakeholders | final scheme.  
Economic valuation methodologies |
| SUBMISSION AND EVALUATION OF THE ES BY THE LOCAL PLANNING AUTHORITY AND THE DECISION* |  | The public enquiry is not a truly participatory method. With a strong legal rhetoric it is often seen as exclusive and serves the function of presenting evidence for cross examination. The legal rhetoric also serves to define the format within which information is submitted. This limits the degree to which the public enquiry can integrate knowledge which doesn’t meet this definition. An example would be a member of the public who wished to express their feeling for a space through poetry. This is a form of local indigenous knowledge which through the ecosystems approach should be permissible as evidence. Mechanisms therefore need to be in place to facilitate this. |
| POST-DECISION PRACTICES |  | Working groups and local partnerships. The success of involving the wider public as stakeholders in the long term management of a project such as this will be partially dependant on the degree to which the project represents to them something they have successfully influenced to their personal benefit.  
Long term monitoring and management of a scheme is required to meet the sustainability targets of the ecosystems approach. This means that the long term |
management must be an iterative process which responds to a mobile and ever changing stakeholder group and is capable of meeting new challenges such as climate change, i.e. as the local environment also changes. This must be achieved not just on the scale of the road development but also through changing reliance on certain transport forms and encouraging responsible use of the final completed scheme.
7 CONCLUSIONS AND RECOMMENDATIONS: A NEW STRATEGIC CONTEXT FOR EIA

This case study confirms that the three most important aspects of the ecosystems approach for the English planning and EIA process are that:

- people are integral to and part of ecosystems and need to be involved more inclusively throughout the EIA process,
- the concept of ecosystem goods and services needs to be introduced at the core of the planning process before a proposed scheme is even discussed,
- equal access to and sharing of the benefits that we derive from our ecosystems is critical to securing a positive planning scheme outcome

The main conclusion of this case study is that the ecosystems approach, that is, having a clear strategy for and commitment to the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way, needs to be at the core of planning policy delivery and at the core of the culture of the organisation(s) responsible for the undertaking the EIA process.

We can only speculate on what the benefit of adopting the EA approach throughout the planning process for the Heysham to M6 link might have been. The “professionals” driving the process would be aiming to produce a solution that fully meets the objectives of an ecosystems approach. The major identifiable differences in the process would be in scooping and in public and stakeholder participation throughout the process.

The main benefits of the ecosystems approach should be:

- Local consensus and sense of ownership of decisions. This should mean that key decisions, fully addressed by the process and reports
produced, but still being debated at the public inquiry, such as whether a road was the best solution and whether the preferred route was the right one, are supported.

- Ensuring that the process is as inclusive as possible and that all views are considered.
- Producing a solution that optimises local benefits whilst meeting regional, national and international priorities.
- A mitigation strategy that looks at wider more holistic ecosystem function and limits with the result that resources for mitigation are used to produce more effective, sustainable outcomes.
- Providing a framework for ongoing management to ensure that mitigation works.

Consideration of goods and services moves away from the traditional approach that considered the natural world and human world as distinct entities. All of this requires a major revaluation of the value of natural systems and processes within the planning system. Ideologically it places greater responsibility and ownership on human development to ensure the long term sustainability of their actions. Although sustainability and sustainable communities are an explicit goal for the planning framework, there is a need to identify and establish what ecosystem goods and services are derived from an area and how development may impact the long term supply of those goods and services. Perhaps the greatest challenge for adopting an ecosystems approach is that the English planning system and EIA process are currently very clearly placed within a different paradigm to ecosystem thinking. This study shows that whilst there are many existing tools and methods which are wholly or in part compatible with the ecosystems approach, there are significant tensions and incompatibilities that need overcoming in the current planning system, which still remains adversarial in nature. Furthermore, although there appear to be relatively simple steps for adopting the ecosystems approach for EIA, particularly around the use of less technical language and more participatory approaches to EIA, these are likely to prove challenging to institutions, practitioners and decision-makers already using EIA as a planning tool. This is because acceptance and adoption of
ecosystem goods and services will require a huge change in emphasis and approach when it comes to operationalising the concept as there is huge potential for assessments to result in very different outcomes. Adopting the ecosystems approach will mean new ways of collaborative and more interdisciplinary working. Whilst few would argue against this in principle, making it work in practice will almost certainly be difficult on an institutional governance and individual basis for many.

Ideally it would easiest to resolve the issue of adverse and cumulative impacts if the ecosystems approach were involved at the strategic policy stage where national Planning Policy Statements and Regional Spatial Strategies begin setting thresholds and limits to development and disturbance to ecosystems, i.e. cumulative impacts must be considered prior to planning consent and be considered in light of all future opportunities and plans.

Working with the sequential nature of the planning system, by introducing the ecosystems approach principles at a national strategic level, the identification and ‘value’ in both monetary and non-monetary terms of goods and services, could be introduced into the legislative framework and the remits of institutions and agencies tasked with local planning policy design and delivery. This would mean that Regional Spatial Strategies, their Strategic Environment Assessment (SEA) and accompanying Strategic Sustainability Appraisals would adopt and begin using the notion of ecosystem goods and services and the CBD principles or task. This could result in very different ways of defining ‘problems’ and developing spatial planning policies to resolve them, i.e. different planning geographies based on natural resource units like catchments, habitats and landscape units could be more closely aligned with administrative planning processes.

For proposed new road infrastructure like the Heysham to M6 link this would mean that an EIA for a particular route would only be necessary when all other, more sustainable non-road options had been examined as part of ‘defining the problem’ (see section 2). Furthermore, since the notion of ensuring equitable sharing of goods and services at a strategic level would be established, it would be very easy and more straightforward to follow an
ecosystems approach for an EIA. However, whilst this would be the ideal, optimal solution it will almost certainly take the longest to achieve.

7.1 Options for embedding the ecosystems approach into the EIA process

Based on our findings for the Heysham to M6 link EIA we suggest that there are three different options for embedding an ecosystems approach into the EIA process. These options are not mutually exclusive. They could be pursued in parallel as part of the Action plan now under development for realising Defra’s vision for England’s Natural Resources which includes:

- Promoting joined-up working on a ‘whole-ecosystems’ basis
- Valuing ecosystem services in decision-making
- Environmental limits, targets and indicators
- Ecosystems and climate change
- Communications and public awareness
- Developing a robust evidence base

7.1.1 Option 1: aim to towards a more sustainable planning context for EIA

This would be the most radical and far-reaching option as it would entail introducing the concept of ecosystem services and benefits directly into every aspect of the current planning system for England. Planning legislation and Planning Policy Statements would need overhauling, Regional Planning Assemblies or the most appropriate body would need to take due account of this new planning guidance and factor the ecosystems approach into the next iteration of their Regional Spatial Strategies, with the new approach cascading down to Local Development Frameworks, Core Strategies and sectoral policies.

This would be a massive undertaking but it may result in fewer and more straightforward EIAs since a more systematic and integrated approach to land use planning could result, strengthening natural resource protection as
environmental limits were more securely defined. This option may be the most aspirational but it should perhaps be a long term goal for working towards, thus guiding the development of a more integrated, cross-sectoral approach to planning. It would also help bring about a closer relationship between built development and systems of land management.

Greater use could be made of Strategic Environmental Assessment (SEA) since, if done thoroughly, it already takes a holistic approach that considers the projected environmental impacts over time of multiple actions within a region or ecosystem. In contrast to EIA, SEA provides decision-makers with information, strategies and actual and projected information on environmental effects on a large scale. According to WWF, SEA’s wider frame already “enables policy-makers to anticipate effects on species, habitats and ecological processes that site-specific studies do not capture. SEA also facilitates an ecosystems approach, which emphasises the importance of holistic analyses”. By making the ecosystems approach far more explicit in SEA it would be possible to support more holistic, integrated EIAs. Given that many SEAs are now undertaken in tandem with Strategic Sustainability Appraisal (SSA) the potential for integrated assessment incorporating the ecosystems approach is already possible in the current planning system. Ensuring that this potential is met will require considerable institutional and cultural change.

7.1.2 Option 2: changing the EIA process itself
This option is about reforming the EIA process rather than the planning context it is used in. European Directive 2003/35/EC on ‘Public Participation Directive’ came into force in 2005 resulting in amendments to Directive 85/337/EEC for Environmental Impact Assessment. The Public Participation Directive makes amendments to the EIA Directive aimed at developing the public participation and access to justice provisions in EIA. Implementation of the amended EIA Directive has already brought about some change in how planning sector, land drainage and forestry projects are assessed. Thus it should be possible, given the strategic direction by SEA, to work with other EU member states to bring about further amendments EIA for introducing the
ecosystems approach into this aspect of the formal regulatory planning framework at the European level.

7.1.3 Option 3: supporting the current EIA process towards incorporating ecosystems approach

The Heysham to M6 link case study shows that the EIA process is inherently capable of using the ecosystems approach as long as this is explicit and agreed by all of the lead organisations responsible for its execution. There is obviously much that would be achieved by incorporating the CBD principles, even using the CBD’s approach to EIA, process without any further regulatory change. However, this could still be difficult to do in practice without the full, formal commitment of the local authority and its partners, the full range of statutory consultees and all other stakeholders, including members of the public.

7.2 Technical challenges to using an ecosystems approach for EIA

In technical terms perhaps the biggest challenges to resolve are those surrounding the means of adequately mapping and quantifying the provision or supply of goods and services on a meaningful and consistent basis across England: an aspect outside the scope of this study. However, we suggest that this could be done as a phased programme of work in a variety of selected areas chosen for their particular character and local circumstances. As such they would provide a useful suite of ‘land laboratories’ for testing different mapping approaches and combinations of tools to determine what would be most suitable for a given situation, i.e. rural and sparsely populated declining rural areas to peri-urban, coastal lowland undergoing regeneration, to heavily wooded wolds and moorland upland important for tourism and recreation.

Because of the importance of local context and relevance to local communities in using an ecosystems approach to planning, such a mapping exercise is heavily dependent on community understanding of the concept and ensuring community engagement through well designed participation
processes so that local knowledge, values and aspirations for a more sustainable future are fed into the mapping exercise. This emphasis on public participation in EIA would ideally need to be approached as part of wider exercise to raise understanding about the need to place the concept of ecosystem goods and services in the English planning system. Doing so would help support the Government’s Sustainable Communities Programme encourage a more explicit and positive linkage between land use planning and land management systems.

7.3 Recommendations for further work and actions to encourage adoption of the ecosystems approach in EIA

The main themes for Defra’s Action Plan relate directly to the issues uncovered in this case study and are complimented by the suite of recommendations for further work that could be undertaken for embedding the ecosystems approach into the EIA process. These are explained in Table 7.1.

Table 7.1

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Rationale</th>
</tr>
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<tbody>
<tr>
<td>1. Work with Communities and Local Government (CLG) to introduce a new “quality of life” language to the planning system context for EIA so that ‘defining’ the problem is a more integrated, holistic process leading to more appropriate options for new development and road infrastructure.</td>
<td>EIAEs, especially those for road schemes focus solely on the impact of the proposed route. If the preceding discussion and planning process failed to develop more sustainable options (non-road and alternative routes) to the original ‘problem’ in an open and holistic way, the resultant road scheme would be flawed, making the resultant EIA a flawed process.</td>
</tr>
<tr>
<td>2. Work with CLG, Defra’s agencies and other partners to find meaningful and accurate ways of mapping and quantifying the supply and quality of ecosystem goods and services.</td>
<td>For land use planning to work as effectively as possible to deliver really sustainable, long term solutions for commerce and communities, it will be vital to find cost-effective ways of determining the geography of service delivery. The aim will be to find optimal solutions for getting multiple benefits from any one area or locality. This will need a flexible mapping tool able to develop scenarios for different land use combinations based on inherent soil fertility, ecological functions and nutrient cycling abilities for successfully adapting to environmental change, e.g. climate change impacts, and related pressures from development, farming and forestry.</td>
</tr>
<tr>
<td>3. Work with CLG, Department for</td>
<td>Properly costed options should include the</td>
</tr>
</tbody>
</table>
Transport (DfT) and others to develop a better process for accounting for resource use in terms of impacts on ecosystem goods and services when new road infrastructure is put forward as an appropriate option for an area. costs of changing natural resource systems - and their supplies of ecosystem goods and services - as a result of each option. This means that very careful delineation of study boundaries beyond the immediate siting of measures and infrastructure will be necessary.

4. Introduce a new “well being” language to the EIA process based on ideas around the benefits people derive from ecosystem goods and services. This would help to create a shift in focus from simply considering biodiversity (species and habitats) to building links between ecological systems in an area and the goods and services these provide for the benefit, health and prosperity of local communities, i.e. goods and services are assets that need conserving and enhancing. It would also help to reduce misconceptions that environment and economy are in opposition. Any new development would need to be assessed with this ethos at the core of the EIA process.

5. Investigate the use of economic valuation versus more participatory methods for assessing the values of ecosystem services. This may help in conflict resolution particularly where public goods and services are concerned and there are entrenched differences between interest groups.

6. Develop the use of economic valuation of aspects of the natural environment that people relate to and use day to day This would help people understand the benefits and losses they may face from a project and should help with a more informed consensus on decision making.

6. Develop a sustainability ‘integration tool’ as a recommended standard approach for enabling a more integrated EIA process. There are many existing sustainability tools and frameworks that would be suitable for dealing with specific local assets. It should be possible to join-up existing approaches with a sustainability integration tool.

7. Enable greater information exchange and interdisciplinary working within the EIA process. Breaking down the silos between individual ‘topic’ assessment in the EIA process for developing the Environmental Statement will encourage integrated assessment and make better use of local knowledge, concerns and aspirations for the area under study, leading to:

- more robust and sustainable decision-making,
- high quality design and mitigation of approved schemes

8. Invest in and make “standard practice” more inclusive programmes of participation for EIAs. The wealth of information on good practice in participation, and the advice contained in the CBD Advanced User Guide all point towards the need for a far more inclusive programme of public engagement throughout the EIA process. This is especially needed at the outset when information gathering is crucial to the development of an accurate Environmental Statement. Only this kind of engagement will provide information about how ecosystem goods and services likely to be affected are
9. Develop evidence, including a suite of good practice case studies, showing why and how ecosystems approach based-EIAs are more successful than standard approaches:

For example with the CLG and other partners to run one or more joint pilot projects in appropriate locations that introduces the CBD principles and concept of goods and services at the strategic level, e.g. by fully ecosystem-proofing an SEA and then going on to carry out an ecosystem-proofed EIA within the SEA study area.

Developing the evidence base to underpin a shift in policy approach will help deepen understanding the ecosystems approach and encourage it to flourish.

This would encourage partnership-working across sectors within established working groups, committees and scrutiny groups. The pilot could draw on the relevant Regional Sustainable Development Framework or Integrated Regional Strategy and Regional Spatial Plan for providing an established framework and point of reference for the pilot SEA and sustainability appraisal.

The EIA process (Screening, scoping, assessment, reporting, decision making) provides a framework for delivering an ecosystems approach. Most of the tools and methodologies required are available. Our knowledge of ecosystem goods and services, their health functioning and limits needs to be improved. More information and data on ecosystem goods and services, particularly at local levels, is required. Everybody involved in the driving the process, policy makers, decision makers, planners, people responsible for project design and implementation, needs to understand the ecosystems approach.

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Appendix 1 Beginners’ Guide

Beginners’ Guide to using the Ecosystem Approach

1. Introduction
This guide provides a brief introduction on how to apply the ecosystem approach to a project or issue. Further information can be found under the Advanced User Guide.

There is no single way to deliver the three objectives of the Convention on Biological Diversity. However, there are a number of actions which can be taken which can help this process. Much can be learnt from the experiences of others when attempting to use the ecosystem approach. The searchable component of the ecosystem approach sourcebook can be used to find information on case studies and tools which have met some or all of ecosystem approach principles.

The ecosystem approach is a tool; it provides a framework that can be used to implement the objectives of the Convention on Biological Diversity, including the work on, inter alia, protected areas and ecological networks. There is no single correct way to apply the ecosystem approach to management of land, water, and living resources. The principles that underlie the ecosystem approach can be translated flexibly to address management issues in different social, economic and environmental contexts. Already, there are sectors and governments that have developed guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach (e.g., the Code for Responsible Fisheries, the Sustainable Forest Management approach, adaptive forest management).

There are a number of options for implementing the ecosystem approach. For example, the principles can be included in national and regional policies, planning processes and sectoral plans. The principles can also be applied at a local level to smaller projects.

2. Steps to using the ecosystem approach

Problem Definition
The first task is to define the problem or problems that need to be addressed. For example, the control of an invasive non-native species on an island. If the problem is very complex it might be necessary to break it down into several smaller problems so that each can be addressed more easily. For example, to conserve a wetland ecosystem while facilitating its sustainable use, it might be necessary to address (i) ecological degradation resulting from unsustainable use of wetland resources, and (ii) community well-being such as health, education, food security, and cultural values.

Having identified the issues, the next step is to ascertain what tasks would allow the problem to be addressed. The problem can be assessed against the tasks listed below as an initial step towards identifying a plan of action. This process can also be used to prioritise the actions to be undertaken.

3. Identifying the tasks to meet the problems identified
The tasks below have been drawn from the principles of the ecosystem approach. In each case the ecosystem approach principle has been rephrased into a question which can be asked in relation to the problem(s) being addressed. The tasks are not listed in order of importance, they should be used in a way which best fits the problem. For more information on how to answer the questions posed by the tasks
and the rationale behind each please refer to the Advanced User Guide.

**Task 1**: How do you involve all members of society in decisions associated with the management of land, water and living resources?

**Task 2**: How do you ensure management is decentralised to the lowest appropriate level?

**Task 3**: How do you ensure the effects of management actions (potential or actual) on adjacent and other ecosystems are taken into account?

**Task 4**: How can the economic context be understood so that market distortions that affect biological diversity are reduced, incentives are developed to promote biodiversity and sustainable use, and ecosystem costs and benefits are externalized?

**Task 5**: What measures could be used to conserve ecosystem structure and functioning so as to maintain ecosystem services?

**Task 6**: What measures can be taken to ensure ecosystems are managed within the limits of their functioning?

**Task 7**: What actions can been taken so that the problem(s) is (are) addressed at the appropriate temporal and spatial scales?

**Task 8**: How can varying temporal scales and lag-effects be taken into account when considering the sustainable use of ecosystems?

**Task 9**: How can adaptive management be used to address the problem(s) identified?

**Task 10**: How can an appropriate balance be sought between, and integration of, conservation and use of biological diversity?

**Task 11**: How do you ensure all forms of relevant knowledge including, scientific, indigenous and local knowledge, innovations and practices are included?

**Task 12**: What measures can be taken to facilitate the involvement of all stakeholders including all sectors of society and scientific disciplines?

It is important to remember that whilst there is no single correct way to implement the ecosystem approach, it should be stressed that all its principles need to be considered in a holistic way, and appropriate weight given to each, according to individual circumstances.

**Cross-cutting issues**

In addition to the individual tasks identified above there are a number of cross-cutting issues that need to be considered when applying the ecosystem approach.

*Capacity-building and participation*

Community partnerships, stakeholder engagement, political and institutional willingness to participate and empower, and the commitment of other donors and sponsors is crucial for successful outcomes. Capacity building through financial and infrastructure support are important requirements for success.
Information, research and development
Resource, biophysical, social, and economic information is important to the successful completion of a project using ecosystem approach. Research and development might be required to target gaps in knowledge. Information should be readily accessible to all stakeholders, to allow more transparent decision making and empowerment.

Monitoring and review
Monitoring and review are crucial components of any programme using the ecosystem approach framework. They allow a responsive and adaptive management capability to be developed, and for reporting on performance and outcomes.

Governance
Good governance is essential for successful application of the ecosystem approach to a problem. Good governance includes sound environmental, resource and economic policies and administrative institutions that are responsive to the needs of the people.

Having identified what tasks need to be undertaken to meet the issues raised the next step is to create a management plan.

4. Creating a Management Plan
There is no correct way to create a plan, every situation is different and it is important to modify the plan to fit the circumstances under which the project will operate. The Advanced User Guide provides further information on how to create a management plan.

The following steps are thought key to the development of the management plan.

Identifying the issues
Issue identified and the project plan developed can be difficult to separate. The use of the ecosystem approach should begin with an issue. Having identified the issue (or several) it can be assessed against the tasks set out above in Section 3.

Creating a Draft management plan
The draft management plan sets out the tasks, determines who should be involved and creates a draft timetable for action.

Timing
Choosing the right time to set up a project can be important. Opportunities or circumstances which can help or hinder the project’s success include:
- Political stability
- New government policies and strategies
- Re-organisation of government departments and institutions

The time taken to restore or maintain ecosystems should not be underestimated. Stakeholders should be given realistic timings so that they do not become disillusioned or frustrated by the time taken to put plans into action and for results to be achieved.

Key actors
A primary task is to decide which organisation should lead the project’s development
and implementation. Reliance should not be placed on one organisation as this can jeopardise its success. Successful projects often have one fully-committed organisation (either governmental or non-governmental) which works with other partner organisations.

**Engaging with stakeholders**
Engage with the stakeholders as early as possible. Initial consultations are vital for ensuring people feel they can contribute to the development of the management plan, especially if it might impact on their activities. Stakeholders can provide ideas and reactions to help develop the project.

**Setting Objectives**
All projects need well-defined and readily identifiable objectives. These and any actions should be agreed through discussions with stakeholders so that an understanding of the issues and actions necessary to address them can be agreed and understood.

**Project design**
The development of the project plan should consider
- Adaptive management
- Long-term viability
The ultimate aim for any project should be the continuation of the objectives beyond the project’s lifespan. Financial stability is also key to long-term viability.

**Defining the boundaries, scope and time scale**
Although boundaries lead to limitations these can be necessary for managing ecosystems.

**Producing the project work plan**
The first task of the core work team is to produce a work plan, which should be done in a participatory and collaborative manner, using logical framework techniques to facilitate problem analysis and planning.

**Reducing risk to project outcomes**
Risk analysis should be used to identify critical issues/risks to the project.

**Monitoring and evaluation**
Monitoring can be used to assess progress and determine how future management can be developed to meet the project’s goals. The monitoring of activities, aims and objectives should not be fixed but remain adaptable to changing conditions as knowledge, understanding and issues are raised and resolved.

**Project Implementation**
Key concerns in implementing natural resource management projects include
- Length of time required. Habitats restoration may require 10-15 years of work before results become apparent.
- Staff competence and commitment is vital to project success.
- The creation of a network of partner agencies and interest groups, which will progressively take on the implementation of the project activities are vital.
- Political, institutional and community support must be secured to fulfill the project goals and objectives.

Project implementation generally follows a series of stages, some of which overlap
and can include several steps. For example

Stage 1
   a. build project team
   b. produce work plan and develop links with local community
   c. establish advisory committees

Stage 2
   a. determine project activities
   b. desk-based actions
   c. capacity-building
   d. review project (adapting monitoring and research as required)

Stage 3
   a. putting agreed plan into action

Stage 4
   a. continuation and forward planning
   b. strategic plan for future initiatives

For further information on the application of the ecosystem approach please see the Advanced User Guide.
Appendix 2 Advanced User Guide

The Ecosystem Approach

Advanced User Guide

1. Introduction
This guide provides information on how to apply the ecosystem approach to a project or issue. It does not set out exactly how to deliver the three objectives of the Convention through the ecosystem approach. Instead, it explains the type of actions that need to be taken and why these are important for meeting all the principles of the ecosystem approach. Much can be learnt from the experiences of others when using the ecosystem approach as a basis for projects and programmes. The searchable component of the ecosystem approach sourcebook can be used in addition to this guide to find information on case studies and tools which have been used to meet the principles of the ecosystem approach (https://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/search.shtml).

The ecosystem approach is a tool; it provides a framework that can be used to implement the objectives of the CBD, including the work on, inter alia, protected areas and ecological networks. There is no single correct way to apply the ecosystem approach to management of land, water, and living resources. The principles that underlie the ecosystem approach should be translated flexibly to address management issues in different social, economic and environmental contexts. Already, there are sectors and governments that have developed guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach (e.g., the Code for Responsible Fisheries, the Sustainable Forest Management approach, adaptive forest management). These and the case studies in the searchable component of the sourcebook provide examples of how the ecosystem approach can be used in practice.

There are a number of options for implementing the ecosystem approach. One is the incorporation of its principles into the design and implementation of national and regional biodiversity strategies and action plans. Others include incorporation of the ecosystem approach principles into policy instruments, planning processes, and sectoral plans (e.g., in forest, fisheries, agriculture). At a more local level the principles of the ecosystem approach can be used to guide the development and implementation of individual projects and plans.

This guide explains how the ecosystem approach could be used to address issues that affect the management of land, water and living resources. The following sections cover, steps to using the ecosystem approach (Section 2), Applying the ecosystem approach (Section 3), creating a management plan (Section 4) and assessing a project against the ecosystem approach (Section 5).

2. Steps to using the ecosystem approach

Problem Definition
The first task is to define the problem or problems that need to be addressed. If the problem is very complex it might be necessary to break it down into several smaller problems so that each can be addressed more easily. For example, to conserve a
wetland ecosystem while facilitating its sustainable use, it might be necessary to address i. ecological degradation resulting from unsustainable use of wetland resources, and ii. community well-being such as health, education, food security, and cultural values.

In some cases the problems may not be related to a practical management activity. For example, encouraging the adoption of the ecosystem approach into national and regional legislation or policies. In these circumstances an analysis of the potential policy outcomes can be assessed against the ecosystem approach principles as a way of determining what actions are necessary.

Whatever the issue at hand the use of tools such as decision and problem trees can be extremely useful. These can be used to understand what issues need to be addressed and the linkages between them, see Figure One.

The problem tree below illustrates how the decline of biodiversity within a particular area might be a product of several other problems.
Figure One – Example of a problem tree

Fishing boats are over-exploiting stocks

People are unaware of how to make the best use of agro-chemicals

Increased use of fertilizer, herbicides and pesticides decrease biodiversity in agricultural areas

Illegal fishing

Biodiversity is in an on-going state of long-term decline

Native habitats and species in decline

Loss of endemic species

Declining marine species

Decline in seabird population as food sources reduced

Having identified the issues, the next step is to ascertain what tasks would allow the problem to be addressed. At this point it will be necessary to have identified the problem and to have broken it down into smaller units if it covers a range of issues. The problem can be assessed against the tasks listed below as an initial step towards identifying a plan of action. This process can be used to prioritise the actions to be undertaken.

The tasks below have been drawn from the principles of the ecosystem approach. In each case the ecosystem approach principle has been rephrased into a question which can be asked in relation to the problem(s) being addressed. After each question there is information which explains why considering certain actions would lead to potentially beneficial outcomes (taken from UNEP/CBD/SBSTTA/9/INF/4). The tasks are not listed in order of importance they should be addressed in a way which best fits the problem.

It is important to remember that whilst there is no single correct way to implement
the ecosystem approach, it should be stressed that all the tasks listed below need to be considered together, and appropriate weight given to each, according to individual circumstances. This means that it might sometimes appear that some tasks have higher priority than others, and some may not be regarded as essential to the issue being addressed. When a particular task is not thought to be important for addressing an issue a reason for this should be assigned so as to understand why that decision was taken - this can become a useful tool when evaluating the project outcomes at a later date. Throughout the life of the project it might also be necessary to revisit the tasks to check whether other actions could be taken to address emerging issues.

Often an activity will address more than one task (and therefore more than one ecosystem approach principle). For example, involving stakeholders in decision making processes would meet the following tasks:

- **Task 1** Involving all members of society in decisions associated with the management of land, water and living resources
- **Task 2** Ensuring management is decentralised to the lowest appropriate level
- **Task 4** Ensuring the economic context can be understood
- **Task 6** Considering what measures can be taken to ensure ecosystems are managed within the limits of their functioning
- **Task 9** Using adaptive management to address the problem(s) identified
- **Task 10** Seeking an appropriate balance between, and integration of, conservation and use of biological diversity
- **Task 11** Ensuring all forms of relevant knowledge including, scientific, Indigenous and local knowledge, innovations and practices are included
- **Task 12** Facilitating the involvement of all stakeholders including all sectors of society and scientific disciplines

This means there are often links between the tasks and the actions taken. By using the ecosystem approach it is possible to identify how one activity could be used for several purposes. This can strengthen the project or programme outcomes and alert those involved in the project to additional factors which might be useful to the entire process.

Under each Task there is a list of tools which can be used to meet the actions required. Further information on the tools can be found within the Ecosystem Approach Sourcebook at [http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/tools.shtml](http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/tools.shtml), for many there is a link from the tool to guidance on its use. You can also add tools to the sourcebook to share with others your experiences and methods see [http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/search.shtml](http://www.biodiv.org/programmes/cross-cutting/ecosystem/sourcebook/search.shtml).

At the end of Section Three a table has been developed to help with the application of the ecosystem approach to a particular project. This can be used by project managers to determine if their project meets all twelve tasks, and if not the reasons why this was the case.

### 3. Applying the Ecosystem Approach
The Tasks

Task 1. How do you involve all members of society in decisions associated with the management of land, water and living resources?

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

Guidelines for meeting this task

Involve all stakeholders (interested parties) (including indigenous and local communities) in:

- clearly articulating, defining and agreeing upon the goals of management
- defining problems
- making choices (see Task 12).

There need to be clearly defined boundaries (in time and space, see Task 7) for the area being managed so that those involved are fully aware of the range/limitation of the management processes.

Ensure that those stakeholders that cannot directly represent themselves (e.g. future generations, the natural world) are adequately represented by someone else.

Ensure that all stakeholders have an equitable capacity to be effectively involved, including equitable access to information, ability to participate in the processes, etc.

Ensure that the decision-making process compensates for any inequities of power in society, so that those who are normally marginalized (e.g. women, the poor, indigenous people) are not excluded or stifled in their participation.

Make sure all actions are transparent to everyone concerned. This includes identifying who the decision-makers are for each decision, how the decisions will be taken (what process will be used), and what are the limits on the discretion of the decision-maker (e.g. what are the criteria for the decision in law, and where applicable what is the overall policy guidance within which the decision must fit).

Ensure that the recognition of stakeholder interests occurs within the full range of decisions over time and space and across the different levels (e.g. local and national government). In doing so, however, ensure that “stakeholder fatigue” does not develop, by incorporating known stakeholder views into future decisions, and allowing efficient stakeholder input.

Where possible, use existing societal mechanisms (e.g. existing local groups), or build new mechanisms that are compatible with existing or desired societal conditions. Ensure that decision-makers are accountable to the appropriate communities of
interest.

Develop within the project team the capacity to broker negotiations and trade-offs, and manage conflicts among relevant stakeholder groups in reaching decisions about management, use and conservation of biological resources.

There need to be mechanisms in place to ensure that, once an appropriate societal choice has been made, the decision can be implemented over the long term, (eg policy, legislative and control structures need to be in place).

Tools
Tools that can be used to ensure all members of society are involved in decisions associated with the management of land, water and living resources include:
Workshop based methods
Community based methods
Methods for stakeholder consultation
Local community approaches
Social analysis
Conflict management methods

Further explanation
The objectives for managing land, water, and living resources are a matter of societal choice, determined through negotiations and trade-offs among stakeholders who have different perceptions, interests, and intentions. In this regard it should be noted that:

Human society is diverse in the kind and manner of relationships that different groups have with the natural world, each viewing the world around them in different ways and emphasizing their own economic, cultural, and societal interests and needs. All relevant sectors of society need to have their interests equitably treated, which may involve providing for different outcomes in separate locations or at different times. It is also necessary to ensure that the needs of future generations and the natural world are adequately represented. Given this diversity, good decision-making processes that provide for negotiations and trade-offs are necessary to establish broadly acceptable objectives for the management of particular areas and their living resources.

Good decision-making processes incorporate the following characteristics:

- All interested parties (particularly including indigenous and local communities) should be involved in the process,
- It needs to be clear how decisions are reached and who the decision-maker(s) is (are),
- The decision-makers should be accountable to the appropriate communities of interest,
- The criteria for decisions should be appropriate and transparent, and
- Decisions should be based on, and contribute to, inter-sectoral communication and co-ordination.

- Good decisions depend on those involved having access to accurate and timely information and the capacity to apply this knowledge.

Task 2. How do you ensure management is decentralised to the lowest
appropriate level?

Explanation
Management which is decentralised to the lowest appropriate level may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the wider public interest. The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

Guidelines for answering this question
The multiple communities of interest should be identified, and decisions about particular aspects of management assigned to the body that represents the most appropriate community of interest. If necessary, management functions/decisions should be subdivided. For example, strategic decisions might be taken by central government, operational decisions by local government or a local management agency, and decisions about allocation of benefits between members of a community by the community itself.

The potential adverse effects of fragmented decision-making and management responsibilities should be compensated for by:

- ensuring that decisions are appropriately nested and linked
- sharing information and expertise
- ensuring good communication between the different management bodies
- presentation of the overall combination of decisions/management to the community in an understandable and consolidated form so its members can effectively interact with the overall system
- supportive relationships between the levels

Good governance arrangements are essential, particularly clear accountabilities of the necessary authorities, and accountabilities of competent bodies or persons

Achieving an appropriate level of decentralisation requires taking decisions at a higher level to create an enabling and supportive environment, as well as a commitment to devolve those decision-making responsibilities that are currently situated at too high a level.

In choosing the appropriate level of decentralisation, the following are relevant factors that should be taken into account in choosing the appropriate body.
- whether the body represents the appropriate community of interest
- whether the body has a commitment to the intent of the function
- whether the body has the necessary capacity for management efficiency (e.g., moving a function to a higher level may allow maintenance of the necessary level of expertise to do the function efficiently and effectively)
whether the body has other functions which represent a conflict of interest
the effect on marginalised members of society (e.g. women, marginalised
tribal groups)

In some cases problems could be corrected through capacity-building. If no
appropriate body is available at the level of engagement (e.g. local, regional or
national), a new body might need to be created, or an existing body modified, or a
other methods of engagement sought.

Where functions are to be created or given to an existing body, it is necessary to
ensure that the body receiving the responsibility has sufficient capacity to fulfil that
responsibility (e.g. resources, systems, authority), and that any risks arising from
the transition can be managed. This might require further capacity-building if the
decentralisation to occur.

Institutional arrangements are the key. If the institutional structure that supports
and co-ordinates the decision-making authorities is missing, then their work may be
worthless.

Tools
Tools that can be used to ensure management is decentralised to the lowest
appropriate level include:
Workshop based methods
Community based methods
Methods for stakeholder consultation
Local community approaches
Social analysis
Conflict management methods
Tools for decentralising money and staff resources
Mechanisms for identifying the appropriate community of interest
Tools for building institutional capacity

Further Explanation
Decisions should be made by those who represent the appropriate communities of
interest, while management should be undertaken by those with the capacity to
implement the decisions. In this regard it should be noted that:

There are usually many communities who have an interest in the management of an
ecosystem. These interests can be compatible, complimentary, or contradictory. It is
important to ensure that the level of decision-making and management selected
maintains an appropriate balance among the interests.

Often, but not always, the closer the decision-making and management are to the
ecosystem, the greater the participation, responsibility, ownership, accountability
and use of local knowledge will be, all of which are critical to the success of
management.

Because there are several levels of interests with people who have varying
capacities to address different aspects of ecosystem management, there are often
multiple decision-makers and managers with different roles for any individual place
or resource.
Decisions made by local resource managers are often affected by, or even subordinate to, environmental, social, economic and political processes that lie outside their sphere of influence, at higher levels of organisation. Therefore there is a need for mechanisms to coordinate decisions and management actions at a number of different organisational levels (i.e. between national, regional and local).

**Task 3. How do you ensure the effects of management actions (potential or actual) on adjacent and other ecosystems are taken into account?**

**Explanation**
Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. This may require new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

**Guidelines for answering this question**
Natural resource managers, decision makers and politicians should consider the possible effects that their actions could have on adjacent and downstream ecosystems (river basins and coastal zones) so that effects inside and outside the ecosystem are determined.

Where management or use of one ecosystem has or is projected to have effects elsewhere, bring together relevant stakeholders and technical expertise to consider how best to minimize adverse consequences. Environmental impact assessment (EIAs), including strategic environmental assessments (SEAs) should be carried out for all developments taking into account all the components of biological diversity. These assessments should adequately consider the potential offsite impacts. The results of these assessments, which can also include social impact assessment, should be acted upon. When identifying existing and potential risks or threats to an ecosystem, different scales need to be considered.

Establish and maintain national and regional monitoring systems to measure the effects of selected management actions across ecosystems (see also Task 5).

Develop specific mechanisms to address transboundary issues associated with shared ecosystems and with transboundary transfer of ecological impacts (e.g. air and water pollution).

**Tools**
- Environmental Impact Assessment (EIA)
- Strategic Environmental Assessment (SEA)
- Policy, planning and decision making systems
- Modelling
- Ecological networks
- Protect area system frameworks
- Integrated land use planning

**Further explanation**
Ecosystems are not closed systems, but rather open and often connected to other ecosystems. This open structure and connectedness of ecosystems means that
effects on ecosystem functioning are seldom confined to the point of impact or only to one system. In this regard it should be noted that:
The effects of management interventions, or decisions not to intervene, are therefore not confined solely to the point of impact.
The effects between ecosystems are frequently non-linear and are likely have associated time-lags.
Management systems need to be designed to cope with these issues.
There is a need for this to reflect the fact that impacts are in both directions – into and out of a particular ecosystem. Not just adjacent and downstream, but there are other connections as well (e.g. systems linked by migratory species).

Task 4. How can the economic context be understood so that
- Market distortions that affect biological diversity are reduced
- Incentives are developed to promote biodiversity and sustainable use
- Ecosystem costs and benefits are externalised?

Explanation
The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems. Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay.

Guidelines for answering this question
- Develop an understanding of the social and economic context of the issue to which the ecosystem approach is being applied.
- Apply appropriate practical economic valuation methodologies for ecosystem goods and services (direct, indirect and intrinsic values); and for the environmental impacts (effects or externalities).
- Aim to reduce those market distortions that adversely affect biological diversity and align economic and social incentives to promote biodiversity conservation and sustainable use. Internalize costs and benefits in the given ecosystem to the extent feasible.
- Evaluate the direct as well as indirect economic benefits associated with good ecosystem management including biodiversity conservation and environmental quality.
- Enhance benefits of using biological diversity.
- Ensure equitable sharing of costs and benefits.
- Incorporate social and economic values of ecosystem goods and services into national accounts, policy, planning, education and resource management decisions.

**Tools**
- Participatory methods (see Task 1)
- Environmental Impact Assessment (EIA)
- Environmental valuation methods
- Development of markets for ecosystem services

**Further explanation**
Many ecosystems provide economically valuable goods and services and it is therefore necessary to understand and manage ecosystems in an economic context. Economic systems generally do not make provision for the many, often, intangible values derived from ecological systems. In this regard it should be noted that:

- Ecosystem goods and services are frequently undervalued in economic systems.
- Even when valuation is complete, most environmental goods and services have the characteristic of "public goods" in an economic sense, which are difficult to incorporate into markets.
- It is often difficult to introduce new uses of ecosystems, even where these are less impacting or provide wider benefits to society, because economic and social systems exhibit significant inertia, particularly where strong existing interests are affected by and resist change.
- Many stakeholders with strong interests in the ecosystem, but having limited political and economic influence, may be marginalized from the relevant economic systems.
- Where those who control use of the land do not receive benefits from maintaining natural ecosystems and processes, they are likely to initiate unsustainable land use practices from which they will benefit directly in the short term. To counter this more equitable sharing of benefits is advised.
- International, national and sub-national policies, laws and regulations, including subsidies may provide perverse incentives for unsustainable management of ecosystems. Economic systems therefore need to be redesigned to accommodate environmental management objectives.
- Addressing the issue of market distortions that adversely affect biodiversity will require establishing dialogue with other sectors.

Deriving economic benefits need not be inconsistent with attaining biodiversity conservation and improvement of environmental quality, provided that incentives are properly aligned.

**Task 5. What measures could be used to conserve ecosystem structure and functioning so as to maintain ecosystem services?**

**Explanation**
Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply
protection of species.

Guidelines for answering this question

There needs to be an improved understanding of the interrelationship between ecosystem composition, structure and function with respect to (i) human interaction, needs and values (including cultural aspects), (ii) conservation management of biodiversity, and (iii) environmental quality, integrity and vitality.

Determine and define conservation, social and economic objectives and goals that can be used to guide policy, management and planning using participatory processes.

Assess the extent to which ecosystem composition, structure and function contribute to the delivery of goods and services to meet the desired balance of conservation, social and economic outcomes.

Expand knowledge of the responses of ecosystems, in terms of changes in composition, structure and function, to both internally and externally induced stresses caused by, _inter alia_, human use, disturbance, pollution, fire, alien species, disease abnormal climatic variations (drought, flood) etc.

Develop and promote management strategies and practices that enable and ensure conservation of ecosystem services and take account of, or minimize, risks/threats to ecosystem function and structure.

Apply instruments to maintain and/or restore ecosystem services.

Where required, develop management strategies and practices to facilitate recovery of ecosystem structure and function (including threatened components) to generate or enhance ecosystem services and biodiversity benefits.

Develop and apply instruments that contribute to achievement of conservation management goals through a combination of managing protected area networks, ecological networks and areas outside of such networks to meet both short-term and long-term requirements and conservation outcome.

Monitoring of population sizes of vulnerable and important species should be linked to a management plan that identifies appropriate response measures and actions.

Tools

- Interdisciplinary research
- Monitoring methods
- Legislation and policy
- Management and restoration plans
- Protected areas

Further explanation

Biodiversity conservation and the maintenance of human wellbeing depend on the functioning and resilience of natural ecosystems. In this regard it should be noted that:

- Ecosystem services – the benefits people obtain from ecosystems by way of resources, environmental regulation including, support of biospheric
processes, inputs to culture, and the intrinsic values of the systems themselves—depend on maintaining and, where appropriate, restoring particular ecological structures and functions.

- Ecosystem functioning and resilience depend on inter-relationships within and among species, between species and their abiotic environments, and on the physical and chemical interactions within these environments.

- Given this complexity, management must focus on maintaining, and where appropriate, restoring, the key structures and ecological processes (e.g., hydrological systems, pollination systems, habitats and food webs) rather than just individual species.

- Given that the loss of genetic diversity predisposes populations and species to local extinction, the conservation of ecosystem composition and structure requires monitoring of population sizes of vulnerable and economically important species.

Management of ecosystem processes has to be carried out despite incomplete knowledge of ecosystem functioning.

**Task 6. What measures can be taken to ensure ecosystems are managed within the limits of their functioning?**

**Explanation**

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

**Guidelines for answering this question**

- Identify practices that are not sustainable and develop appropriate mechanisms for improvement involving all stakeholders.

Given the uncertainty associated with defining the limits to ecosystem functioning under most circumstances, the precautionary principle should be applied.

- Implement an adaptive management approach (see Task 9).

Develop understanding of the limits of ecosystem functioning and the effects of various human use on the delivery of ecosystem goods and services.

Where permissible limits to alteration of specific ecosystem components can be agreed, manage within these limits but monitor and assess the ecosystem response. Make sure the information is given at regular intervals to those responsible for setting the off-take or other limits.

Encourage the use of environmental assessments and monitoring to establish ecosystem responses to disturbance, in order to provide management feedback and develop appropriate responses.
Develop and promote appropriate management strategies and practices that sustain resources and maintain ecosystems within the limits of their functioning.

Sustainable use management goals and practices should avoid or minimize adverse impacts on ecosystem services, structure and functions as well as other components of ecosystems.

Formulate, review and implement regulatory frameworks, codes of practice and other instruments to avoid using ecosystems beyond their limits.

Tools
- Monitoring methods
- Interdisciplinary research
- Public participation

Further explanation
There are limits to the level of demand that can be placed on an ecosystem while maintaining its integrity and capacity to continue providing the goods and services that provide the basis for human wellbeing and environmental sustainability. Our current understanding is insufficient to allow these limits to be precisely defined, and therefore a precautionary approach coupled with adaptive management, is advised. In this regard it should be noted that:

- Just as there are limits to the demands (production, off-take, assimilation, detoxification) that can be made on ecosystems, so too there are limits to the amount of disturbance that ecosystems can tolerate, depending on the magnitude, intensity, frequency and kind of disturbance.
- These limits are not static but may vary across sites, through time, and in relation to past circumstances and events.
- Cumulative effects of interventions over time and space should be assessed when considering ecosystem limits. If these limits are exceeded, an ecosystem undergoes substantial change in composition, structure and functioning, usually with a loss of biodiversity and a resulting lower productivity and capacity to process wastes and contaminants.
- There is considerable lack of knowledge and uncertainty about the actual limits (thresholds for change) in different ecosystems. While further research can reduce these uncertainties, given the dynamic and complex nature of ecosystems we may never have perfect understanding.
- Given the pervasiveness of uncertainties in managing ecosystems, management will need to be adaptive, with a focus on active learning derived from monitoring the outcomes of planned interventions using a sound experimental approach that allows the effects of the intervention to be accurately determined.
- Management to restore lost capacities or control use should be appropriately cautious and apply an adaptive management approach.

Task 7. What actions can been taken so that the problem(s) is (are) addressed at the appropriate temporal and spatial scales?

Explanation

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Appropriate spatial and temporal scales should be used to address the problem identified. The ecosystem approach can be applied to issues of any scale. The approach recommends the problem being addressed should set the scale of analysis and action. For example it could be applied to a pond, a forest, a global flyway or the whole globe. The time taken for ecosystems to respond to management changes (positively and negatively) need to be taken into account in any actions taken. Boundaries for management are defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where it is necessary to address the problem encountered.

Guidelines for answering this question

Enhanced understanding is required to analyse and understand the temporal and spatial scales at which ecosystem functions operate, and the effect of management actions on these processes and the delivery of ecosystem goods and services. Identification of spatial patterns and gaps in connectivity should be included in this analysis.

Functional mismatches in the administration and management of natural resources should be avoided by readjusting the scale of the institutional response to coincide more closely with spatial and temporal scales of processes in the area under management. This logic underpins the current global trend towards decentralized natural resource management.

Given that ecosystem components and processes are linked across scales of both time and space, management interventions need to be planned to transcend these scales. Developing a nested hierarchy of spatial scales may be appropriate in some circumstances.

Managing large areas such as river basins or large marine areas may require development of new institutional mechanisms to engage stakeholders across administrative borders and different levels of administration.

Attention to spatial and temporal scales is needed in the design of assessment and monitoring efforts.

Concepts of stewardship, intergenerational equity and sustainable yield need to be applied to considerations of the temporal scale.

Regional collaboration is necessary to deal with large-scale changes.

Tools
- Monitoring methods
- Modeling
- Public participation

Further explanation

The driving forces of ecosystems, including those due to human activities, vary spatially and through time, necessitating management at more than one scale to meet management objectives. In this regard it should be noted that:
Ecosystems are made up of biotic and abiotic components and processes, which function at a range of spatial and temporal scales, within a nested hierarchy.

The dynamics of human social and economic systems also vary across scales of space, time and quality.

How components are perceived spatially depends partly on the scale of observation. At one scale, individuals of a species may seem relatively regularly and continuously distributed; at another the distribution may be discontinuous. Likewise, at one time scale (e.g., monthly, annually) a component or process may appear predictable; at another, longer or shorter time scale, the temporal dynamics may be unpredictable.

Management processes and institutions should be designed to match the scales of the aspects of the ecosystem being managed. More importantly, perhaps, given that ecosystem components and processes are linked across scales of both space and time, management interventions need to be planned to transcend these scales.

Failure to take scale into account can result in mismatches between the spatial and time frames of the management and those of the ecosystem being managed. For example, policy makers and planners usually consider shorter time frames than the time frames of major ecosystem processes. The reverse can also be true, for example, where bureaucratic inertia can delay the quick management response needed to address a rapidly changing environmental condition. Spatial mismatches are also common, such as when administrative boundaries and those of ecosystem properties or related human activities that they are designed to regulate do not coincide.

Task 8. How can varying temporal scales and lag-effects be taken into account when considering the sustainable use of ecosystems?

Explanation

Ecosystem processes are characterized by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

Guidelines for answering this question

Adaptive management processes should include the development of long-term visions, plans and goals that address inter-generational equity, while taking into account immediate and critical needs (e.g., hunger, poverty, shelter).

Adaptive management should take into account trade-offs between short-term benefits and long-term goals in decision-making processes.

Adaptive management should take into account the lag between management actions and their outcomes.

Monitoring systems should be designed to accommodate the time scale for change in the ecosystem variables selected for monitoring. Alternatively, if the monitoring cannot be adjusted, a more appropriately scaled but still relevant variable should be selected to monitor.

The capacity to monitor and detect long-term, low-frequency changes in ecosystem structure and functioning should be strengthened.
To implement long-term management requires stability of institutions, legal and policy frameworks, monitoring programs, and extension and awareness-raising programs.

**Tools**
- Monitoring methods
- Modeling
- Information exchange

**Further explanation**
Time needs to be considered explicitly in formulating management plans, and in longer-scale processes need to especially considered and planned for because these are otherwise often neglected. In this regard it should be noted that:

- People find long-term trends more difficult to detect than short term trends, particularly in complex systems.
- Management systems tend to operate at relatively short time scales, often much shorter than the timescales for change in ecosystem processes.
- Where there is a lag between management actions and their outcomes, it is difficult to take reasoned management decisions.
- Long-term ecological processes, which can be very important, are therefore likely to be poorly accommodated in management systems, unless these are explicitly and carefully designed to address long-term issues.
- Awareness of long-term processes is important because it is the long-term, spatially, extensive processes that both characterize and determine the broad ecosystem properties.

**Task 9. How can adaptive management be used to address the problem(s) identified?**

**Explanation**
Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The utilization of adaptive management is necessary to anticipate and cater for such changes and events. There should be caution in making any decision that may foreclose future options, but at the same time, consideration should be given to mitigating actions that will enable adaptation to long-term changes such as climate change.

**Guidelines for answering this question**
Adaptive management is needed to respond to changing social and ecological conditions, and to allow management plans and actions to evolve in light of experience.

Natural resource managers must recognize that natural and human-induced change is inevitable and take this into account in their management plans.

Adaptive management should be encouraged when there is a risk of degradation or loss of habitats, as it can facilitate taking early actions in response to change.
Monitoring systems, both socio-economic and ecological, are an integral part of adaptive management, and should not be developed in isolation from the goals and objectives of management activities.

Adaptive management must identify and take account of risks and uncertainties.

Where changes occur across national borders, the scale of adaptive management may need to be adjusted.

While ecosystems are inherently dynamic and resilient, special adaptation and mitigation measures are needed for human-induced problems such as climate change that may push ecosystems beyond the limits of natural variation. Capacity-building efforts are needed to address highly vulnerable areas such as small island states and coastal areas.

Traditional knowledge and practice should be used to enable better detection and understanding of ecosystem change, and to develop appropriate adaptation measures.

Adaptive management should recognize the resilient capacity of ecosystems in response to natural disturbances, and should be aimed at maintaining or restoring this capacity so as to reduce the risk of adverse social and economic consequences of natural variability in ecosystems.

Awareness-raising measures are needed to enhance public knowledge that ecosystem change is a natural phenomenon, and to build support and capacity for adaptive management.

Tools
- Monitoring methods
- Modelling
- Participation programmes

Further explanation
Change in ecosystems is both natural and inevitable, and therefore management objectives should not be construed as fixed outcomes but rather the maintenance of natural ecological processes. In this regard it should be noted that:

- Ecosystems change constantly as a result of natural processes. Those changes include shifts in species composition, population abundance, and physical characteristics.
- Such changes are not necessarily constant, rather they are variable, dynamic and usually difficult to predict at any point in time.
- It is therefore difficult to select an appropriate outcome or future state of an ecosystem as a static management goal. Instead, in addressing this and Task 8, management should focus on maintaining the natural processes, which drive those changes.
- This focus on processes requires a management approach that is flexible and adaptive, both as a response to changing circumstances and to take account of new knowledge and understanding. Adaptive management should generate new knowledge and reduce uncertainties, thereby allowing the manager to anticipate and cater for change.
- Ecosystem management must therefore involve a learning process that will help to adapt methods and practices to improve the ways in which these systems are being managed and monitored. Flexibility is also needed in policy-making and implementation. Long-term, inflexible decisions are likely to be ineffective or detrimental.

**Task 10. How can an appropriate balance be sought between, and integration of, conservation and use of biological diversity?**

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

**Guidelines for answering this question**
Integrated natural resource management systems and practices need to be developed to ensure the appropriate balance between, and integration of, the conservation and use of biological diversity, taking into account long- and short-term, direct and indirect, benefits of protection and sustainable use as well as management scale.

Develop policy, legal, institutional and economic measures that enable the appropriate balance and integration of conservation and use of ecosystems components to be determined.

Promote participatory integrated planning, ensuring that the full range of possible values and use options are considered and evaluated.

Seek innovative mechanisms and develop suitable instruments for achieving balance appropriate to the particular problem and local circumstances.

Manage areas and landscapes in a way that optimizes delivery of ecosystem goods and services to meet human requirements, conservation management and environmental quality.

Determine and define sustainable use objectives that can be used to guide policy, management, and planning, with broad stakeholder participation.

Identify solutions which relieve sectoral pressure on existing resources.

**Tools**
- Environmental assessment tools
- Environmental accounting
- Public participation

**Further explanation**
Biological diversity provides ecosystem goods and services on which humans ultimately depend. In this regard it should be noted that:
The ecosystem approach is designed to support the conservation of biodiversity, the sustainable use of its components, and the equitable sharing of benefits derived from the use of biodiversity.

- Sustainable use and management depends on also achieving conservation objectives.
- Management for conservation and sustainable use are not inherently incompatible, and can potentially be integrated.
- Integration can be achieved at various scales and in various ways including both spatial and temporal separation across the landscape as well as through integration within a site.

**Task 11. How do you ensure all forms of relevant knowledge including, scientific, indigenous and local knowledge, innovations and practices are included?**

**Explanation**

Information from all sources is critical for arriving at effective ecosystem management strategies. Much better knowledge of ecosystem functions and the impact of human use is needed to inform decisions. All relevant information from any area under consideration should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

**Guidelines for answering this question**

Relevant information should be shared with other stakeholders and actors and technical and scientific information be made available in an accessible way (Indigenous and local knowledge should be treated with full respect of Article 8(j) and further decisions of the CBD).

Assumptions behind proposed management decisions should be made explicit based on the best available expertise, scenarios of future change and the knowledge and views of stakeholders.

Appropriate mechanisms should be developed to document and make more widely available the information from all relevant disciplines (including natural and social sciences) and from relevant knowledge systems, particularly those based on local traditional practices. This guidance should be implemented consistent with any decision to be taken under Article 8(j) of the CBD.

The implications for ecosystem management of different "world views" based on different knowledge systems should be evaluated.

**Tools**

- Public participation and knowledge sharing
- Education and awareness campaigns
- Adaptive management methods

**Further Explanation**
Ecosystems can be viewed at various scales and from different perspectives, each yielding unique information and insights. Good management should therefore consider all relevant information. In this regard it should be noted that:

- The ecosystem approach is designed to accommodate a range of values and associated goals, and the information and perspectives of the communities that hold those values are therefore important in designing and implementing management.
- There is no single level of organisation at which one can understand and optimize management of ecosystem functioning. Different information sources will address issues at different levels, providing complementary perspectives to support integrated management.
- Good management therefore depends on maximising the information inputs, carefully assessing their accuracy and relevance, and integrating the information into decision-making and management.
- Ongoing support for understanding and information (e.g. research, monitoring, indicators, assessments, etc) is required.

**Task 12. What measures can be taken to facilitate the involvement of all stakeholders including all sectors of society and scientific disciplines?**

**Explanation**

Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

**Guidelines for answering this question**

The integrated management of land, water and living resources requires increased communication and cooperation, (i) between sectors, (ii) at various levels of government (national, provincial, local), and (iii) among governments, civil society and private sector stakeholders. Increased communication among international and regional organisations is also needed.

The incorporation of the ecosystem approach principles as an Integral part of planning in, among others, the agriculture, fisheries, forestry and other natural resources management sectors potentially affecting biodiversity and ecosystem functioning, should be encouraged, following the example, for instance, of the Code of Conduct for Responsible Fisheries, Sustainable Forest Management or others. Sectors other than the primary production sectors may also have major effects but are often less recognized in this respect. These include sectors such as the judicial sector, which affects governance, as well as those such as energy and transport, which are managing or affecting resources either directly or indirectly.

Procedures and mechanisms should be established to ensure effective participation of all relevant stakeholders and actors during the consultation processes, decision making on management goals and actions, and, where appropriate, in implementing the ecosystem approach.

The effective implementation of the ecosystem approach may require involving multidisciplinary professional and scientific expertise, including such disciplines as economic, social and natural sciences.
When assessing the costs and benefits of conserving, maintaining, using and restoring ecosystems, the interests of all relevant sectors should be taken into account for equitable sharing of the benefits according to national law.

Tools
- Public participation methods
- Modeling methods
- Inter-disciplinary research and communication

Further explanation
The complexity of managing an ecosystem for sustained use and conservation requires integrating the activities and actions of many different stakeholders. In this regard it should be noted that:

- The activities of all sectors affect biological diversity, and can contribute to, or detract from, the achievement of the objectives of the CBD.
- The management of biodiversity, because of its complexity, and the significance of human impacts, requires a wide range of scientific and management skills, including those located in sectors that have not traditionally been involved in biodiversity conservation or management.
- For these reasons adopting the principles of the ecosystem approach provides a framework for fostering greater involvement of all relevant stakeholders and technical expertise in planning and carrying out coordinated activities, sharing management of resources, or simply exchanging information.

Cross-cutting issues
In addition to the individual tasks identified above there are a number of cross-cutting issues that need to be considered when applying the ecosystem approach.

Capacity-building and participation
To apply the ecosystem approach successfully it is crucial to investigate what resources and sponsorship are required to undertake the exercise. This can be in the form of capacity-building and fostering alliances.

Alliance can be in terms of community partnerships, stakeholder engagement, political and institutional willingness to participate and empower, and the commitment of international donors or sponsors. An important consideration is the length of time the alliance is required; that is, it may be required in the initiation phase, assessment phase, the phase associated with implementation of outcomes, or all three and beyond. Examples exist where an ecosystem approach has been compromised from a loss of allegiance from one or more of the community, other stakeholders, the political establishment and institutions, or sponsors and donors.

Capacity-building is also important for the success of any programme which is using the ecosystem approach to address the problems at hand. Adequate financial support and appropriate infrastructure support are important requirements for success. So too is access to suitable expertise and the sharing of knowledge and experience. Before embarking on a programme it is useful to build on lessons learnt from other projects which have used tools and methods consistent with the ecosystem approach principles. Technologies, including decision support tools and inventory systems, which have been developed elsewhere may be transferable or
can be adapted.

Information, research and development

The collection of resource, biophysical, social, and economic information is important to the successful completion of a project using ecosystem approach. Research and development might be required to target gaps in knowledge that hinder addressing the exercise at hand. Knowledge derived from research and information from other sources has to be integrated and packaged into information products (including decision-support systems) that allow and provide for interpretation, and which facilitate their use in applying an ecosystem approach. Information products are necessary for communicating with stakeholders, planners, managers and decision makers. Consideration should be given to enhancing the access of stakeholders to information because the more transparent the decision-making is, based on information at hand, the better the ownership of the resultant decisions between partners, stakeholders and sponsors. Priorities for research and development are likely to be clearer once the ecosystem approach begins to be applied and implementing actions are put in place.

Monitoring and review

Monitoring and review are crucial components of any programme using the ecosystem approach as a framework for implementation. They allow a responsive and adaptive management capability to be developed. Monitoring and review are also useful in reporting performance and assessing outcomes, and their links to the use of the approach. Indicators of performance should be defined, developed and implemented. Appropriate monitoring and auditing systems need to be implemented to support reporting on indicators of performance. Periodic reviews of these indicators need to be undertaken to assess performance and allow adaptive management where necessary. Strategies, practices and processes may need to be modified depending upon the findings from monitoring and auditing.

Governance

Good governance is essential for successful application of the ecosystem approach to a problem. Good governance includes sound environmental, resource and economic policies and administrative institutions that are responsive to the needs of the people. Robust and sound resource management systems and practices are required to support these policies and institutions. Decision-making should account for societal choices, be transparent and accountable and involve society. Accountability for making decisions has to be placed at the appropriate level that reflects that community of interest. For example strategic land-use planning and management might be taken by central government, operational decisions taken by local government or management agency, whereas decisions associated with the sharing of benefits could be taken by a community organisation.

Good governance at all levels is fundamental for achieving sustainable use and conservation of biodiversity. It is important to ensure intersectoral cooperation. There is a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystem approach, calls for increased intersectoral communication and cooperation at a range of levels (government ministries, management agencies).
4. Creating a Management Plan
The information that follows provides a guide to creating the structures and processes necessary for implementing the ecosystem approach as part of a project to address a particular issue. It is aimed at those working to achieve sustainable management of ecosystems, although much of the information could also be applied to projects seeking the creation or development of legislation or policy. There is no correct way to create a plan, every situation is different and it is important to modify the plan to fit the circumstances under which the project will operate.

Identifying the issues
The processes through which issues are identified and the project plan developed can be difficult to separate. The use of the ecosystem approach should begin with an issue. Having identified the issue (or several) it can be assessed against the tasks set out above in Section 3.

However, once the potential tasks for action have been identified a draft management plan should be produced before actions have been finalised. This is necessary so that there is an opportunity for stakeholders to feed into the management processes at an early enough stage to ensure they are part of the management process. If the involvement of stakeholders is left too late they might feel they can not contribute to the management process or the issues that concern them might not have been addressed. As a consequence it will be more difficult to develop relationships based on trust between the different people and organisations involved.

Creating a Draft management plan
The objective of the draft management plan is to:

- Set out the tasks that need to be undertaken to meet the issue(s) and the objectives of the ecosystem approach.
- Determine who needs to be involved in the tasks and what mechanisms could be used to encourage participation.
- Set out a draft timetable for actions and target dates for completion (though it is important to keep these as flexible as possible especially during the initiation phase of the project).

Timing
Before setting up a project choosing the right time for its establishment is important. There might be opportunities or circumstances which can help or hinder the project's success. For example:

- Political stability - a return to a more stable political situation can provide an opportunity to develop a new project.
- New government policies and strategies can create conditions under which a project can thrive. Likewise the ratification of international conventions can provide an opportunity for a country to review environmental policies, legislation and practice.
- Re-organisation and re-structuring to government departments and institutions can provide opportunities.
The time taken to put in place actions that can restore or maintain ecosystems should not be underestimated. At the project initiation stage the likely time required for the various elements of project preparation, enactment and follow-up should be evaluated. Stakeholders should be given realistic timings so that they do not become disillusioned or frustrated by the time taken to put plans into action and for results to be achieved.

**Key actors**

One of the first tasks is to decide which organisation should lead the project’s development and subsequent implementation. These roles do not have to be undertaken by the same organisation, for instance a government department might provide the initiative to set up the project but it would actually be run by a local or regional organisation in either the public or private sector, or an implementing body might be created specifically to address the issue.

Reliance should not be placed on one organisation to carry out the project as this can jeopardise the likely success. Successful projects often have one fully-committed organisation (either governmental or non-governmental) which works with other partner organisations. The lead organisation should be able to act as:

- An effective facilitator and co-ordinator working with all stakeholders.
- Provide clear reasons for and evidence of the decisions taken.
- Be willing to listen to the views of others and adapt to their needs if that is required.

**Engaging with stakeholders**

It is important to engage with the stakeholders as early as possible. Initial consultations are vital for ensuring that people feel they can contribute to the development of the management plan, especially if there is any likelihood that it might have an impact on their activities. Stakeholders can provide ideas and reactions to help develop the project. It should not be underestimated how much time is required to fully engage with all interests and care should be taken not to raise expectations of results or when actions will begin. Developing good relationships early on can strengthen commitment to seeing the project through. The development of trust between everyone can help overcome difficulties if they arise in the future.

There are many different ways to encourage stakeholders to participate. Workshops and focus groups can be one way to engage a number of stakeholders at the same time. In other circumstances one-on-one liaison might be the best approach initially before advisory/working groups can be established. Tools such as decision trees can be very useful for explaining the range of issues affecting an area and for capturing new issues. Later on decision trees can also be used to develop pragmatic steps for addressing problems. More information on engaging stakeholders can be found under the sourcebook section on tools and approaches or search for case studies / tools on the database under public participation.

**Setting Objectives**

All projects need well defined and readily identifiable objectives. These and any actions should be agreed through discussions with stakeholders so that an understanding of the issues and actions necessary to address them can be agreed and understood. The objectives should be closely related to the issues identified. The use of decision making tools can be useful in this respect. For example having
established a problem tree when identifying the issues to be addressed can then be used to create an objective tree. In this case each issue is paired with an objective so that if the issue is a decline in native invertebrates, the objective would be to halt the decline and adopt management necessary to increase native invertebrates.

The setting of objectives can also provide a useful starting point for creating monitoring actions.

Project design
The development of the project plan should consider
Adaptive management
The management plan should be flexible, with a clear aim and methodology for reaching decisions and undertaking actions, which in turn are realistic and clearly justified. Progress should be assessed against agreed targets which can be reviewed as necessary to allow for any change in circumstances. All outputs should be agreed and discussed with stakeholders to allow them the opportunity to contribute to this process.

Long-term viability
The ultimate aim for any project should be the continuation of the objectives beyond the project’s lifespan. This includes providing implementing organisations with the resources to continue long-term management after the project has finished. The development of an exit strategy at the beginning of project so that at the end it is agreed who and how organisations can continue to meet the objectives. This can also strengthen commitment to the project as it is clear how it will continue into the future.

Financial stability is also key to long-term viability. Where possible self-financing strategies should be developed to ensure sufficient resources are available. These may come from, income generated from products or services from the ecosystem or where non-tradeable services are generated (eg national park or watershed protection) it might be appropriate for government funding.

Defining the boundaries, scope and time scale
Although boundaries lead to limitations these can be necessary for managing ecosystems. Tasks seven and eight in Section three above identify what issues need to be taken into account when developing the boundaries.

Producing the project work plan
The first task of the core work team is to produce a work plan, which should be done in a participatory and collaborative manner, using logical framework techniques to facilitate problem analysis and planning.

A research plan might also be required; this will cover collecting social, ecological and economic data. Where ever possible links should be made with the academic and research institutions specialising in the area (either geographic or sectoral), and should use the capacity of local communities to provide baseline information.

The creation of the work plan is a unique opportunity to define a clear public image for the project and to communicate it as widely as possible. This is important because the ecosystem approach is still a new concept to many which might not be widely understood or appreciated. The best project image is one that clearly promotes it as a capacity-building and conflict solving exercise, with a group of
unbiased experts working in close association with the various interest groups.

**Reducing risk to project outcomes**

Risk analysis should be used to identify critical issues/risks to the project. For example:

- Is there sufficient scientific and other knowledge available to undertake identified field activities? If not, it might be necessary to undertake surveys etc before moving on to specific activities.
- Is the project expected to have significant environmental or social impacts? All projects should be assessed to ensure negative impacts are not detrimental.
- Has there been previous communication with local groups, organisations or individuals? If not, or where there have been difficulties before, a preliminary consultation phase might be needed to build confidence and good working relationships between the project and the local people.
- Legal barriers to project implementation should be considered. For example Wildlife and environmental legislation might not be compatible with sustainable use of natural resources.
- Land tenure and access to natural resources for local communities - if security of land and access to the benefits is not clear, local communities can not be expected to take responsibility for management.
- Legal boundaries of a protected area which are not clearly defined, making implementation of management measures difficult.
- Do organisations have the correct resources for implementing parts of the project plan identified for them? If not, training and capacity-building might be necessary.
- Do institutional barriers affect project implementation, for instance does an inappropriate agency have responsibility for management? It might be necessary to seek new legislation or work with the agency to find appropriate mechanisms.
- When attempting to restore degraded ecosystems it might be necessary to carry out a pilot project to assess restoration techniques before working on a larger and hence more risky scale.

**Monitoring and evaluation**

Monitoring can be used to assess progress and determine how future management can be developed to meet the project’s goals. The monitoring of activities, aims and objectives should not be fixed but remain adaptable to changing conditions as knowledge, understanding and issues are raised and resolved. Sufficient time should be allowed for effective monitoring and any changes should be supported by evidence as to why the change was made. This provides information to those assessing the project’s success and stops targets being revised down for convenience of action. Monitoring should cover both the short and the long-term to allow initial results and the future sustainability of the ecosystem.

Wherever possible local people and organisation should be involved in monitoring. Local groups will be more likely to collect information which they can analyse and use themselves in managing the ecosystem. This information can be complemented by other monitoring activities.
Indicators can be used to monitor success, for example by showing practical and visible project outputs, such as species distribution maps, new government regulations protecting wildlife, establishment of new partnership organisation. Changes to the abundance of species, increased productivity or access to a resource can also be used as indicators.

It can be difficult to assess changes to attitude, awareness and behaviour, without considerable monitoring effort. This type of monitoring can be very effective for showing how understanding of resource use has changed or whether there has been effective devolution of decision making in resource use to an identified group.

Ecosystem health can also provide a valuable mechanism for assessing a project’s achievements. For example by assessing changes to biological diversity, food chain characteristics, ecosystem productivity or ecosystem functions.

*Project Implementation*

Key concerns in implementing natural resource management projects include:

Length of time allocated to the project to achieve an impact on the health and integrity of ecosystems, is crucial. Improved ecosystem management and natural habitat restoration may require 10-15 years of work before results become apparent.

Staff competence and commitment is vital to project success.

The creation of a network of partner agencies and interest groups, which will progressively take on the implementation of the project activities is vital. This will help empower others and stop the project becoming an institution with its own agenda.

Political, institutional and community support must be secured to fulfil the project goals and objectives.

Project implementation generally follows a series of stages, some of which overlap and can include several steps. For example

**Stage 1**

a. build project team
b. produce work plan and develop links with the local community and other stakeholders
c. establish advisory committees

**Stage 2**

a. determine project activities
b. desk-based actions
c. capacity building
d. review project (adapting monitoring and research as required)

**Stage 3**

a. putting agreed plan into action

**Stage 4**

a. continuation and forward planning
b. strategic plan for future initiatives
5. Assessing a project against the ecosystem approach

Often an activity undertaken to meet a particular problem will address more than one ecosystem approach principle or task outlined above. For example, involving stakeholders in decision making processes could meet tasks 1, 2, 10 and 12. By assessing what activities meet which tasks it is possible to decide if the project is applying the ecosystem approach. Filling in the table below allows the project to be assessed against the ecosystem approach as a framework. It might be necessary to create a series of tables covering the different sub-issues being addressed by the project. The table can also be used to determine whether particular principles are not being met. If this is the case referring back to the tasks and the reasons why they are important to the ecosystem approach might highlight to the assessor whether activities are being missed. Conversely it is also legitimate to view some principles as more important than others. Where this is the case it is can be useful to provide reasons why a principle has not been met for future analysis of the project. By including information on the tools and methods being used to meet the task it is also possible to determine if there are links between particular task and a sub-issue of the project. For example if public participation is being used to meet several sub-issues and tasks it might be possible to combine efforts to reduce costs and the time taken to consult with stakeholders.

Table 1. Assessing a Project against the 12 ecosystem approach tasks

<table>
<thead>
<tr>
<th>Task</th>
<th>Action / project activity</th>
<th>Tools / method being used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task 1 Societal Choice</td>
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<tr>
<td>Task 2 decentralised management</td>
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<tr>
<td>Task 3 effects on adjacent ecosystems</td>
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<tr>
<td>Task 4 Economic context</td>
<td></td>
<td></td>
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<tr>
<td>Task 5 Maintain ecosystem services</td>
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<tr>
<td>Task 6 Limits to ecosystem function</td>
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<tr>
<td>Task 7 Appropriate spatial/temporal scale</td>
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<td>Task 8 Long-term management</td>
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<td>Task 9 Change is inevitable</td>
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<tr>
<td>Task 10 Integration of conservation and use</td>
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<tr>
<td>Task 11 Consider all forms of knowledge</td>
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<tr>
<td>Task 12 Involve science and society</td>
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</tbody>
</table>

References
Appendix 3 Planning timeline of the Heysham to M6 link road

The recent planning timeline of the Heysham to M6 link road is set out in the table below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Outcome</th>
<th>Input to decision process</th>
<th>Route considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan/Feb 1993</td>
<td>Public consultation of the Proposed Western Route</td>
<td>From the comments received the route was modified</td>
<td>Public exhibition</td>
<td>Western route</td>
</tr>
<tr>
<td>1994</td>
<td>County Council approved the amended Western route</td>
<td>The Western route was protected for planning purposes</td>
<td>Internal approval</td>
<td>Modified Western route</td>
</tr>
<tr>
<td>May 1995</td>
<td>Lancashire structure plan 1991-2006 (including Western route) underwent public examination</td>
<td>Sept 1995: the panel investigating the Lancashire Structure Plan suggested deletion of western route from the plan. This was because of the potentially detrimental visual and environment impact of the route. It was suggested that other options should be investigated. This included an alternate route and a less disruptive western route.</td>
<td>Public examination</td>
<td>Modified Western route rejected</td>
</tr>
<tr>
<td>Oct 1997</td>
<td>The County Council held a public consultation and survey into 3 proposed routes. These included two western routes (coded Green and Blue) and one Northern route (coded Orange).</td>
<td>In Jan 1998 the results of the consultation suggested that there was wide spread support for road link, but people were divided over the route choice.</td>
<td>Public consultation</td>
<td>Three routes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Green – Western route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Blue – Western route</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Orange – Northern route</td>
</tr>
<tr>
<td>Date</td>
<td>Action</td>
<td>Outcome</td>
<td>Input to decision process</td>
<td>Route considered</td>
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<tr>
<td>Mar 1998</td>
<td>Following the public consultation the County Council selected the Western (Green) route</td>
<td>By doing this the County Council rejected the Blue and the Orange routes</td>
<td>Internal</td>
<td>Green – Western route</td>
</tr>
<tr>
<td>1998-1999</td>
<td>The Green route was included in the Local Plan and was considered at the Lancaster Local Plan Inquiry</td>
<td>Following the inquiry the Inspector concluded that the benefits of the Green route were unclear and that the route would cause significant damage to the environment. He recommended deleting the Green route from the local plan.</td>
<td>Internal</td>
<td>Green – Western route rejected</td>
</tr>
<tr>
<td>1998-1999</td>
<td>Lancaster City council chose not to reject the Green route after suggested amendments from the County Council rebalanced the costs and benefits in favour of an amended Green route.</td>
<td>Following the acceptance of the amended Green route there was a confidence that the scheme would continue within the current planning period. At this point a need was identified to ensure consistency between the local plan, Structure Plan, Regional Planning Guidance and Regional Strategy</td>
<td>Internal</td>
<td>Green – Western route (amended)</td>
</tr>
<tr>
<td>2001</td>
<td>The Lancashire Local Transport Plan 2001/2 – 2005/6 was submitted to Government with the Western (Green) route (amended)</td>
<td>The Government accepted the need for the Heysham to M6 link road, but raised doubts about the suitability of the proposed route and restated the doubts which had been raised in public enquiry</td>
<td>Government</td>
<td>Green – Western route (amended)</td>
</tr>
<tr>
<td>Date</td>
<td>Action</td>
<td>Outcome</td>
<td>Input to decision process</td>
<td>Route considered</td>
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<tr>
<td>Jun to Sept 2001</td>
<td>The County Council undertook a public consultation (including a MORI survey of 1000 residents) into two alternate routes. A Western (Green) and a Northern (Orange) route.</td>
<td>In December the County Council considered the outcome and recommended detailed environmental impact studies on both the Green and the Orange route.</td>
<td>Public consultation</td>
<td>Green – Western route (amended) Orange – Northern route</td>
</tr>
<tr>
<td>Sept 2004</td>
<td>The highways and transportation Cabinet of the County Council selected the Northern (Orange) route as the preferred route.</td>
<td>The proposed Orange route was referred back for public scrutiny.</td>
<td>Environmental and technical assessments (Including an ecological/environmental assessment and legal advice from the leading counsel.)</td>
<td>Orange – Northern route</td>
</tr>
<tr>
<td>9-13th May 2005</td>
<td>Public exhibitions were held at 5 different locations, displaying the approved Northern route.</td>
<td>Planning application is expected to follow.</td>
<td>Public consultation</td>
<td>Orange – Northern route</td>
</tr>
<tr>
<td>Nov 2006</td>
<td>Planning Application</td>
<td>Lancashire County Council Planning and Development Committee approve planning application</td>
<td>Northern route</td>
<td></td>
</tr>
<tr>
<td>Feb 2007</td>
<td>Consideration by Secretary of State</td>
<td>Secretary of State announces that there will be a public enquiry later in the year</td>
<td>Northern route</td>
<td></td>
</tr>
<tr>
<td>July 2007</td>
<td>Public Inquiry</td>
<td>Secretary of State finds in favour of Lancashire County Council and approves planning permission (Feb2008)</td>
<td>Opportunity for arguments to be heard in favour and against the proposal</td>
<td>Northern Route</td>
</tr>
</tbody>
</table>