



Preparing a detailed project plan for CQuEL

Work package 1: Methodological Review
Final Report

May 2010

Supported by:



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Preface

CQuEL, Character and Quality of England's Landscapes, is Natural England's principal integrated monitoring project. CQuEL will provide place-based evidence about the character and function of landscapes and the provision and quality of selected ecosystem services delivered by England's natural environment.

CQuEL will provide an enhanced and up-to-date understanding of Natural England's contribution to enhancing and improving the condition of the natural environment. CQuEL will also provide evidence to key strategic partners, particularly Defra. Defra has been a funding partner of the project planning stage.

The work to prepare the CQuEL project plan has been carried out by a consortium comprising Countryside, Fabis Consulting and Land Use Consultants. The work has been guided by a Project Board at Natural England. The findings have been informed by Expert Panel workshops and the project team gratefully acknowledge the input of stakeholders at the workshops.

This work package comprises a methodological review. This report is based on both the initial investigations of the project team and outputs from an Expert Panel meeting held on 25th November 2009.

List of reports

Summary Report

Work package 1: Methodological Review

Work package 2: Which Ecosystem Services?

Work package 3: Communications

Work package 4: Sources of Data

Work package 5: Links to Natural England's Land Use Strategy and Vision 2060

Work package 6: Project Plan

Recommendations

Key recommendations are shown in bold with a grey highlight. Each recommendation is referenced with a code to identify the Work Package and recommendation number, for example the second recommendation of Work Package 1 is referenced **[R1.2]**.

Executive Summary

Shaping Objectives: The Importance of Place

1. **We recommend that to clarify CQuEL's objectives it be viewed as providing a 'place-based' evidence about the character and function of landscapes and the provision and quality of selected ecosystem services delivered by England's natural environment [R1.1].**
2. In CQuEL 'place' provides a means of integrating different perspectives and concerns, and a framework in which the cultural and ecological aspects of landscape and ecosystem services can be brought together in a coherent and unified way. The notion of place is also a good starting point for fostering public engagement in questions about the value of landscape and ecosystem services, and for understanding the visions that different groups have for the future.
3. An understanding of the linkages between places is probably more important for the analysis of ecosystem services in CQuEL than it was for the analysis of landscape character in Countryside Quality Counts (CQC). This is because of the more complex relationships between places where services are generated and places where they are consumed. **It is recommended that key steps in the CQuEL methodology must include: (a) some kind of screening/prioritisation of services according to local circumstances; and (b) some kind of review of the importance of services potentially flowing 'into' and 'out of' the area (places) concerned [R1.2].** The spatial relationships between places are especially important in the coastal and marine context. This prioritisation of services is likely to be captured in the final Integrated Objectives for each NCA that will be developed as part of the programme for updating the NCA descriptions. The integrated objectives are programmed to be completed by March 2011. These integrated objectives will capture priorities for both landscape character and ecosystem services, seeking synergy between the two.

Linking Landscape Quality Objectives and Ecosystem Services

4. There is a close relationship between the work undertaken through CQuEL and the development and monitoring of landscape quality objectives that are needed to support implementation of the European Landscape Convention (ELC). **However, we recommend that although the formulation of landscape quality objectives and objectives for the output of ecosystem services are complementary, the mechanisms by which they are developed should be kept distinct [R1.3].** While a long term goal for Natural England in relation to the natural environment must be to match 'required functional needs with desired landscapes', this will only be achieved by explicitly considering the consistency between the two sets of objectives and understanding the implications of any conflicts or synergies between them. It is this approach that is being captured in the formulation of the final Integrated Objectives for each NCA and that will be tested through CQuEL.
5. The formulation of landscape objectives for each National Character Area (NCA) that are consistent with the requirements of the ELC is an important goal for Natural England. However, for the

Preparing a detailed project plan for CQuEL purposes of CQuEL, it is essential that these landscape objectives are defined in sufficient detail or with specific precision, so that they can be used to assess change in relation to the seven thematic elements used in CQC. **If this condition is not met then the refinement of the landscape objectives will be an additional task that would need to be undertaken within CQuEL in order to fulfil Defra's requirement that the indicator of change in landscape character should be maintained [R1.4].**

6. **If character area descriptions are to be updated, then the extent to which this process takes in issues related to their functional properties and relationships also needs to be considered. [R1.5].** It is understood that the functional role of individual NCAs will be considered as part of the update of the NCAs and the development of service objectives. This understanding of services and functions will be vital to CQuEL and will require an iterative approach. The first stage could involve a more generic assignment of service characteristics to NCAs, which could then be refined during a second stage to determine how the general objectives for services translate into NCA actions or other transformations that can be monitored.

Assessing the Significance of Change

7. For the significance of change in landscape character and function to be assessed, an understanding of the magnitude and direction of desirable or required change needs to be developed, either as part of CQuEL or through associated work:
 - a. In the context of the ELC landscape quality objectives; if they are generic, aspirational and qualitative, then work undertaken within CQuEL will need to include some process of refinement or translation for them to be used as the basis of assessing the significance of landscape change.
 - b. In the context of functional objectives for ecosystem services, the development of the criteria for assessing change is more problematic, and further work is required to determine whether this is best done from the bottom up (knowing the characteristics of the individual NCAs) or from the top down (knowing broad national and regional patterns and trends).

We recommend that both issues are the focus of attention in the later stages of this scoping study, particularly within Work Package 3, since their resolution is fundamental to designing a robust methodology for CQuEL.

8. The use of NCAs to develop landscape quality objectives and a set of character area descriptions that are sensitive to the ecosystem services associated with each area provides a compelling argument for using these spatial units as the framework for CQuEL. Use of the NCAs would also ensure consistency with what went before. The acceptability of using the NCAs as the primary spatial framework for CQuEL, nevertheless, needs to be examined critically. The question was therefore put to the Expert Panel. While no single view prevailed, the overarching theme in the comments received was that, whatever spatial analysis and reporting units are used, the evidence base must be capable of exposing or capturing issues across **scales**. NCAs were seen as helpful in providing context for analysis and interpretation and a way of communicating information to people, but they may not be the only spatial framework that is needed if Natural England is to achieve the goals it has set in relation to landscape and ecosystem services. **While NCAs are a key part of the analytical**

framework to be used for CQuEL we therefore recommend that the approach is sufficiently flexible to permit analysis and reporting for a variety of other types of spatial unit, such as major catchments, administrative regions or more generic types of landscape such as the 'uplands' or 'coastal landscapes' [R1.6].

9. Internet-based consultation with expert-stakeholders played a key role in CQC. It was used both to define the criteria against which landscape change at the NCA level was to be assessed, and to test the acceptability of the judgements made after they had been applied, given the data available. **Given the brief for CQuEL it is apparent that the same considerations will also apply, although these consultations may need to take in a wider range of experts and the public [R1.7].** Consultation processes will be needed to:
- a. Translate ELC landscape quality objectives into quantifiable targets against which landscape change can be assessed.
 - b. Test the descriptions of the role of individual NCAs or NCA groups in relation to broad patterns of ecosystem service outputs and recent trends and to extend (included in the updated NCA descriptions to include issues relating to ecosystem services.).
 - c. Agree the priorities for the functional objectives for ecosystem services delivery at the level of individual NCAs or groupings of them. (that will form part of the Integrated Objectives).
 - d. Assess the acceptability of the judgements made about the magnitude and direction of change in both landscape character and the output of ecosystem services once the preliminary analysis has been completed.
10. The identification of thresholds or limits potentially provides one way in which the significance of change in landscape character and service output might be judged. As previous work has identified, the specification of such thresholds or limits is difficult. Although the issue will continue to be an important one in terms of framing strategies for sustainable development more generally, the extent to which it is a priority for CQuEL is an open question. We therefore asked members of the Expert Panel to comment. Although views were mixed, the general view should be that an attempt to identify thresholds or limits should be made where it is appropriate and feasible. It was also recognised that the specification of limits of acceptable or desirable change must be based on stakeholder input and may vary from place to place. **We therefore recommend that in developing approaches to measuring ecosystem services, a range of criteria should be used for assessing performance. However, where it is possible to go beyond simply identifying the direction of change, the feasibility of identifying some limit or threshold through stakeholder consultation should be considered [R1.8].**
11. **In terms of identifying suitable methodological frameworks for CQuEL it is recommended that it would seem appropriate to treat the analysis of landscape and ecosystem services as independent but linked processes [R1.9].** It is recommended however, that the interaction between character and function should be the explicit focus of the subsequent reporting. While some clear methodological directions for CQuEL can be identified on the basis of the review presented here, further work is required to test the practicalities of these approaches and the costs and risks associated with them. This is particularly important given the evolving methodological work being carried out in the context of the on-going National Ecosystem Assessment (NEA) and more specific work being undertaken by Natural England to assess ecosystem service delivery, especially in the

Preparing a detailed project plan for CQuEL uplands. Further work is required to understand just how the range of services identified by the NEA will be made operational, but it seems evident that the selection of ‘things to measure’ within CQuEL might usefully be done in ways that nest within the broad NEA methodology.

The Added Value of CQuEL

12. Any consideration of the case for CQuEL must consider the relationship that it has to the NEA, and what contribution it might make, given this other major national initiative. In order to examine this question we invited views from the Expert Panel who confirmed that far from duplicating the work of the NEA, CQuEL would add significant value to the future evidence base. Not only would CQuEL establish a strong link between ecosystem services and landscape character, it would also extend the analysis down to a much finer geographical scale – one that people might better understand. The foundation that CQuEL provides for longer term monitoring was also considered significant. **We therefore recommend that the methodology developed for CQuEL does not merely seek to be consistent with the NEA, but complements, refines and extends the understandings that the NEA is seeking to provide [R1.10].**

Scoping the Analysis of Ecosystem Services

13. The question of what the relationship is between CQuEL and the NEA is an important one, not least in terms of identifying which ecosystem services should be included in the analysis. The issue is central to the design of CQuEL and has been explored in detail in Work Package 2. However, as part of this more general scoping exercise some key issues were identified and discussed by the Expert Panel. As a result some preliminary recommendations can be made:

- a. **That in recognition of the problem of placing ‘biodiversity’ within an ecosystem services framework, we recommend that care is taken to specify precisely what aspects of biodiversity are being considered [R1.11].** The agreed service typology used for CQuEL should distinguish between contributions that different components of biodiversity make to all aspects of service delivery, especially their contribution to the provisioning, regulating and cultural services.
- b. That the balance between the supply and demand for ecosystem services is a fundamental part of any assessment relevant to management or policy. Therefore, **we recommend that CQuEL should consider both the potential of an area to deliver a service as well as the actual demand for it [R1.12].** However, experience from other work suggests that it is often easier to identify the changing capacity of an area to generate services than to measure consumption, and so a complete analysis of both components may not be possible in all circumstances. Nevertheless, the focus of CQuEL should be on an understanding of the outputs of ‘final products’ that directly impact on people’s well-being; measures of supporting services or ecological functions may be taken as a surrogate if service output is difficult to measure directly.
- c. That while the focus of CQuEL is on the contributions that ecosystems and biodiversity make to human well-being, the issue of ‘geodiversity’ and associated abiotic outputs of ecosystems

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are considered but that these are not a central component of the analysis. **We recommend that the scope of CQuEL be restricted to ecosystem outputs that are renewable and which depend on a combination of biotic and abiotic factors [R1.13].** Thus aspects such as the potential of a landscape or seascape for wind energy would be excluded from the analysis.

- d. That in recognition of the fact that it is important to understand patterns of supply and demand for ecosystem services, the links between different places or areas, and the geographical flows of services across space, **the geographical scope of CQuEL should include rural and urban areas and those aspects of the marine and coastal environment directly or indirectly affected by terrestrial activity [R1.14].** The scope should include:

- i. rural *and* urban areas: thus urban green space (and the service it provides) and peri-urban areas and their relationship with the main centres of population should be considered; and
- ii. those aspects of the marine and coastal environment that are directly or indirectly affected by terrestrial activity – namely physical coastal processes, biophysical processes influenced by inter-tidal habitats, and water quality issues relating to pollution derived from terrestrial sources.

Timeframes

14. An important set of constraints on the development of the CQuEL methodology are those imposed by the reporting timetable. The methodology needs to be robust, but if results cannot be delivered within a relatively short time, then it is unlikely that the work would be supported. **Fortunately, given the advanced state of current work and initiatives, CQuEL can make a significant, on-going contribution to current debates by publishing staged reports [R1.15]:**

- an 'historic' assessment of trends in ecosystem services using existing NEA and CQC data in 2010, possibly linked to the production of the 'England Synthesis' for the NEA, being led by Natural England;
- an assessment of future landscape and ecosystem service trends for NCAs as part of the 'Vision 2060' exercise in mid-2011;
- the update of the CQC landscape indicator in the first quarter of 2012; and
- an updated review of landscape and ecosystem service trends by NCA in mid-2012.

Background

The CQuEL Initiative has been proposed by Natural England as a means of assessing the Character and Quality of England's Landscapes. The aim of the initiative is to develop an assessment approach that extends the work begun by Countryside Quality Counts (CQC) to provide a better understanding of the ways different landscapes deliver ecosystem services.

The present study commissioned by Natural England has been designed to develop a detailed project plan for CQuEL. In particular, we have been asked to examine the merits and cost implications of different analytical and reporting approaches. As a first step towards developing our recommendations, this document sets out a detailed understanding of the analytical and reporting requirements for CQuEL. These are then used as a framework for identifying different methodological options. Many of our preliminary recommendations have been tested through discussions with our Expert Panel.

Assumptions

From our understanding of the project brief and the more detailed discussions at the Project Inception Meeting, this initial exploration of methodological issues is based on the following assumptions, namely that:

- Any modified CQuEL methodology should retain the ability to report change in landscape character in ways consistent with the earlier phases of CQC. In particular CQuEL should retain the capability of fulfilling Defra's wish that Natural England continues to report on an indicator of Countryside Quality, as required by the Rural White Paper 2000.
- Past approaches must be updated to take account of the revision of the National Character Area (NCA) framework¹, the development of Landscape Quality Objectives and new data sources and developments such as those arising in connection with the UK National Ecosystem Assessment (NEA).
- CQuEL should provide 'place-based' evidence about the provision and quality of selected ecosystem services delivered by England's natural environment, in ways that are consistent with Natural England's remit and responsibilities. In particular CQuEL should:
 - Support Natural England's strategic **monitoring** activities needed to assess the successes of its policy interventions, including its responsibilities under the European Landscape Convention (ELC) in the UK².
 - Be consistent with and support the work of Natural England in relation to developing future **scenarios and visions** for England's natural environment in the medium (2020) and long term (2060).

¹ Formerly known as Joint Character Areas

² Council of Europe (2000) European Landscape Convention, Strasbourg (which came into force in the UK in March 2007)

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- The proposed CQuEL methodology should support Natural England's need for public engagement, and should promote a better understanding of people's aspirations and perceptions of landscape in the development of strategies and policies for the management of landscape change.
- That the timing of the outputs from CQuEL are critical in terms of securing long-term support for the work. It is anticipated that initial results should be made available in 2010, interim findings in 2011 and final reporting in 2012.

Analytical and Reporting Issues

There are a number of analytical and reporting issues that arise in relation to the assumptions that are outlined above. We explore them here and identify their implications for the design of CQuEL. The issues can be grouped as follows:

- the role of landscape as an integrating framework;
- the selection of ecosystem services;
- the relationship of CQuEL to the National Ecosystem Assessment (NEA) and its added value;
- the relationship of CQuEL to the ELC requirement that Landscape Quality Objectives be defined and be incorporated into assessment processes;
- the relationship between the updating of NCA descriptions and the role of NCAs in CQuEL;
- how the significance of change in landscape character and ecosystem service delivery can be assessed, and in particular, how these assessments relate to notions of environmental or landscape thresholds at different spatial scales;
- the role of consultation processes in CQuEL;
- how the CQC reporting matrix can be adapted to take account of an assessment of the quality of the ecosystem services provided by CQuEL; and
- how the output of results can be sequenced over the period 2010-2012.

The role of landscape

A key issue to consider in relation to adapting the CQC approach for CQuEL, is whether a 'landscape approach' is an appropriate one for the assessment and monitoring of ecosystem services. Problems arise at two levels. First the different ways landscape itself is conceptualised, and the ambiguities this may bring into the analysis and reporting. Second, if landscape is used as an analytical framework, then what spatial scales are appropriate?

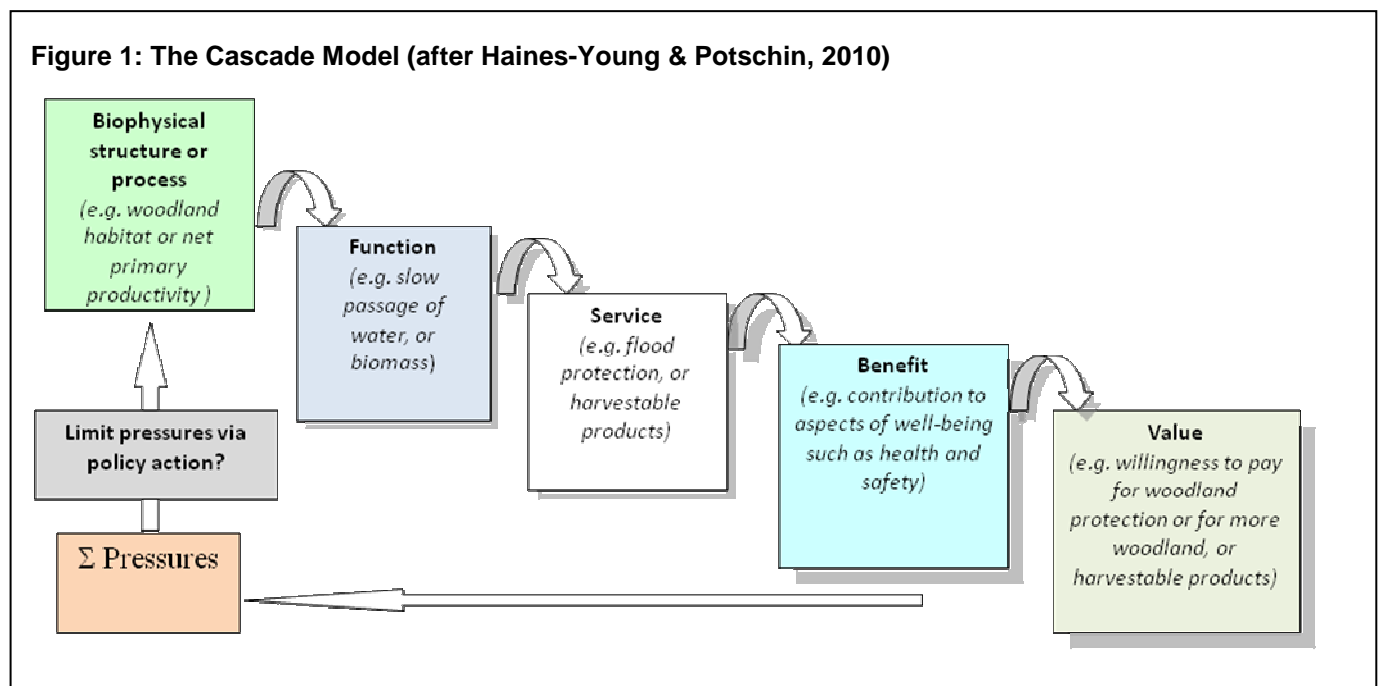
As a term, 'landscape' has been used in a number of different ways. Although it is not possible to review them here, it does seem appropriate to consider the way it is defined in the ELC and consider the issues that surround this conceptualisation as a basis for future work.

According to the ELC 'landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'. In terms of its implementation in the

English context, it is seen as a ‘meeting ground between past, present and future as well as between natural and cultural influences. It has both a physical and an emotional presence and sets a context for people’s lives’³. Such a definition is wide ranging, and clearly represents the notion of landscape as an integrating framework. Moreover, by stressing the importance of *all* landscapes the ELC sees it as a framework that is *generally* applicable.

Although the CQC approach is consistent with the ELC concept of landscape, the basis for CQuEL and the framing of landscape in these terms has some potential limitations when we begin to consider it as the starting point for the assessment of ecosystem services. Most notably, it seems to emphasise the cultural importance of landscape as a unit, and downplay its functional properties; that is the way the coupled social-ecological system ‘works’ and delivers benefits to people at different scales. It also tends to stress the importance of understanding the distinctive characteristics of particular places and not so much the connection and linkages between different places (different landscapes). Neither of these problems invalidates the ELC framework as the basis for CQuEL, however, recognition of these issues does suggest that some clarification of terms is necessary.

Although it could be argued that the idea of ‘character’ can be taken to include the functional properties of landscape, as well as their cultural and physical characteristics, in terms of using the notion of landscape in the context of ecosystem services, it might be clearer if the ELC definition is broadened to include reference to the character *and* function. Thus landscape might be defined as ‘...an area, perceived by people, whose character *and* function are the result of the action and interaction of natural and/or human factors’.



Reference to the functional characteristics of landscape in the expanded definition has the advantage that it stresses the importance of landscape to those whose work is more closely linked to the natural sciences. Stressing the interaction of natural and human factors is also consistent with ideas emerging in the new ecosystem services approach – which argues that for something to be regarded as an ecosystem service it must be able to identify a beneficiary (Boyd and Banzhaf, 2007; Fisher and Turner,

³ http://www.landscapecharacter.org.uk/files/u1/ELC-Framework-2009_0.pdf

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2008). The cascade model shown in Figure 1 has often been used to describe the links between natural capital and types of contribution that it makes to the well being of people (Haines-Young & Potschin, 2010). The critical point this diagram seeks to convey is that a given ecosystem capability (function) only becomes a service if a beneficiary or beneficiaries attach some value to the outputs of an ecosystem.

In terms of operationalising the cascade model, a critical issue is what constitutes the ‘ecosystem unit’ that generates the service. Luck et al. (2003, 2009) have proposed the idea of ‘service providing units’ (SPUs), defined as ‘the collection of individuals from a given species and their characteristics necessary to deliver an ecosystem service at the desired level’. Others (Kremen, 2005) have argued for a more general concept of ‘Ecosystem Service Providers’ (ESP), consisting of all the component populations, communities, functional groups, interaction networks, or habitat types that provide ecosystem services in an area.

Approach	Characteristic	Advantages	Disadvantages
Habitat (Biodiversity Pattern) based	Mapping of services made on the basis of spatial patterns in underlying components of biodiversity, e.g. habitat types, biomes.	<ul style="list-style-type: none"> • Clear links with existing conservation frameworks and approaches. • Multi-functional character of ‘ecosystems’ evident. • Can often make use of existing biodiversity or habitat monitoring data. 	<ul style="list-style-type: none"> • Unclear how different habitats should be weighted to make some overall assessment of services. • Unclear how habitat combinations influence service output.
Systems (Process) based	Mapping services based on the spatial characteristics of biophysical elements on which the service is functionally dependent, e.g. catchment.	<ul style="list-style-type: none"> • Allows overall assessment of service state and trend to be made. • Generalisation is easier. 	<ul style="list-style-type: none"> • Unclear how issues of multi-functionality can be addressed. • Systems modelling is complex and present understandings may be limited – especially in the context of predicting spatial pattern.
Place-based	Mapping services as bundles across units that have strong social relevance or resonance.	<ul style="list-style-type: none"> • Allows better understanding of local contexts, and therefore priorities and values. • Allows issues of trade-offs to be identified and potentially resolved. • Allows implications of alternative management of policy options to be tested easily through participatory methods. 	<ul style="list-style-type: none"> • Difficult to generalise results. • Difficult to model services at local scales because of uncertainties and lack of base-line data.

Some of the arguments in favour of adopting a broad scale approach to the analysis of ecosystem services were considered in work undertaken for Defra, which examined how assessments could be made of the major ecosystem services associated with England’s major terrestrial ecosystems (Haines-Young and Potschin, 2008). Three complementary, but contrasting approaches were identified (Table 1), namely the:

- habitats perspective;
- systems perspective; and
- place-based perspective.

The 'habitats perspective' starts from the position that it is often easy to identify links between particular habitats and specific services, and hence gain an insight to how service output might change as the ecological status or condition of habitats vary. Much of our ecological monitoring data is also available at a habitat level, and so, potentially, the approach might be easy to apply (Countryside Survey; SSSI Condition Monitoring). The perspective also has the advantage of looking at the ability of habitats to deliver simultaneously a number of services (i.e. their multi-functional characteristics). The problem with applying this approach, however, is that the relative contribution that individual habitats make to overall service output is unclear, and, in any case, some services depend more on combinations of habitats and, indeed wider land management, than individual instances. Thus an overall assessment at the service level is often difficult to make through the habitats perspective.

As an alternative, a systems perspective starts by focusing on the problem of understanding the outputs of a particular service, and then attempts to identify the system (or functional unit) that might deliver it (e.g. catchments, aquifers, coastal cells). This approach has the advantage of identifying the sensitivity of service output to the various controlling parameters, but the problem this perspective seems to pose is that the analysis of cross-service links is more difficult. While the systems' representations could be expanded to take in multiple services, systems modelling can be rapidly complex if one attempts to link many components. The analysis of multi-functionality and trade-offs between services is therefore more challenging using this perspective.

The third approach identified, uses the notion of 'place' as the focus, and starts from the position that since the identification of beneficiaries is essential in defining what constitutes an ecosystem service, the characteristics of particular localities and the views of the people who live there can be used to frame the assessment problem. The notion of place is used to define the bundle of services that are important to particular groups of people in particular contexts, and to understand the values and priorities they attach to them. It is therefore a framework in which the trade-offs between services can be better understood and examined, and in which the implications of different management options evaluated. Like the other two approaches, the place-based perspective has difficulties, not least in relation to the lack of data at more local levels and the problem of identifying alternative futures in the absence of general models. Nevertheless, it does seem to offer a way of linking in issues about the supply and demand for services, and the multi-functional characteristics of 'ecosystems' (different areas) more simply than the other approaches described above. People can, perhaps, also relate to ideas about 'place' more easily than to abstract concepts like 'ecosystems', 'habitats' or even 'landscape'.

It is a moot point whether the notion of 'place' is equivalent to the idea of 'landscape'. It could be argued that they are largely synonymous terms, given the definition of landscape suggested in the ELC, because they both refer to 'an area perceived by people' which is distinctive in some way – as captured in the term 'Sense of Place' which is often seen as synonymous with landscape. The advantage of viewing them as somewhat distinctive is that it allows 'services' and 'landscapes' to be pulled out, if necessary, as separate issues within the context of particular localities – which may be an advantage given the diverse reporting objectives suggested for CQuEL. This position is not inconsistent with the view that 'landscape' might be a determinant of a particular ecosystem service ('sense of place – cultural service), or that the analysis of landscape-scale processes is essential in the assessment of services more generally (e.g. flood protection; pollination).

The conclusion that emerges from this discussion is that for clarity the description of CQuEL suggested in the brief for this project should be modified to say: *CQuEL provides 'place-based' evidence about the character and function of landscapes and the provision and quality of*

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selected ecosystem services delivered by England's natural environment⁴. In this framing of the work, the idea of 'place' is used to integrate different perspectives and concerns. It can also provide the focus for public engagement in the kinds of discussion needed to assess both current states and future visions and directions⁵.

Table 2: Exploring the nature of places

1. *What are the ecosystem services associated with this place that matter to people's well-being?*
2. *How are these services generated? Do they arise locally or are they generated outside the place or area being considered?*
3. *How important is each of these services, to which individuals or groups, and for what reasons? Do people outside the area also depend on these services?*
4. *How can the importance of these services be prioritised or valued?*
5. *Do we expect to have enough of each of these services either here or elsewhere in the future?*
6. *What, if anything, could replace or substitute for each of the benefits obtained from these services, either here or elsewhere?*
7. *What kinds of management or policy actions are needed to protect or enhance these services and in particular how might actions directed towards one service impact or enhance another?*

In the earlier work undertaken for Defra (Haines-Young and Potschin, 2007) it was suggested that one way of taking the place-based perspective forwards was to adapt the framework proposed in the *Quality of Life Capital* Project, rephrasing the questions that formed the basis of the investigation of the things that made particular localities distinctive to make explicit reference to ecosystem services (Table 2). If public engagement is seen as an essential element in the process of identifying and valuing ecosystem services then these questions seem to provide a good starting point around which dialogue can begin. Moreover, they form a general set of considerations that can be used to review other documentary evidence about the characteristics of particular places, with a view to understanding what is important there.

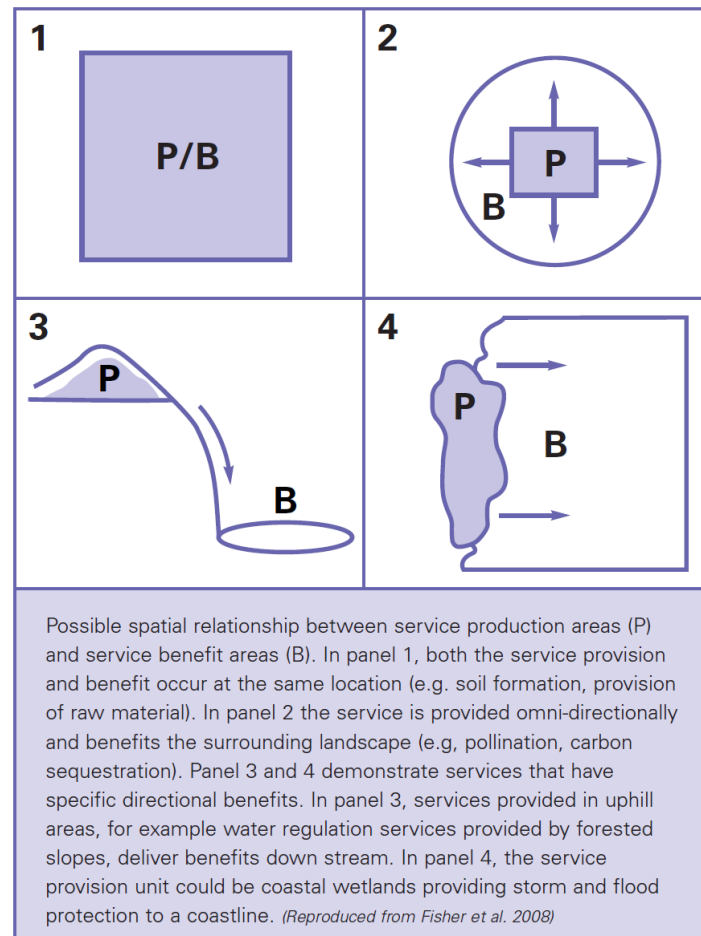
In the context of understanding the nature of places, questions 2 and 3 are particularly important, because they specifically deal with the issue identified earlier, namely that the focus on localities might tend to overlook the way different places are linked. There is no single geographical scale at which to analyse either places or landscape. Thus to analyse the context in which particular places or landscapes are set, it is necessary to ask whether the services that are important in any given area are generated within that area or outside. Equally it is important to ask if they provide services that are important elsewhere. The beneficiaries of a service may be located far from the point where a service is generated (Figure 2). The regulation of water quality and quantity for beneficiaries in the lower catchment, for example, may be entirely dependent on activities in upstream areas.

⁴ Suggested addition is underlined.

⁵ In fact the idea of 'place' and the qualities of a locality that make it a 'place' are very similar to those associated with the ideas of 'countryside' and 'countryside character' used in the earlier CQC work; the merit of the term place is that it does not restrict the focus to rural environments.

Rephrasing CQuEL’s key objective around the notion of place thus seems to ‘free up’ the way we can apply the term landscape in future work, by emphasising that the initiative is interested in both the socio-ecological character and function of the natural environment. While this strategy overcomes the first difficulty we identified in using ‘landscape’ as the integrating focus for CQuEL – it does not overcome the second issue that was highlighted at the outset, namely that concern with particular localities tends to obscure the importance of understanding the connection and linkages *between* different places. This second issue is best discussed in the context of what criteria might be used to select the ecosystem services that need to be considered by CQuEL.

Figure 2: Differing spatial relationships between the generation of ecosystem services and those who benefit from them.



The selection of ecosystem services

The selection of ecosystem services to be examined through CQuEL must be shaped by Natural England’s remit. The set of services selected must also make sense in terms of building up a robust and complete understanding of the state of England’s Natural Environment. Since environmental issues rarely coincide with either disciplinary boundaries or institutional responsibilities, the two sets may not necessarily be the same. Two issues therefore arise at this initial stage in terms of identifying which services should be included in CQuEL:

- the extent to which the selection of services should conform or be driven by decisions made as part of the NEA; and
- notwithstanding the approach adopted by the NEA, it is important to choose the most coherent package of services given the place-based perspective and Natural England’s remit and wider concerns.

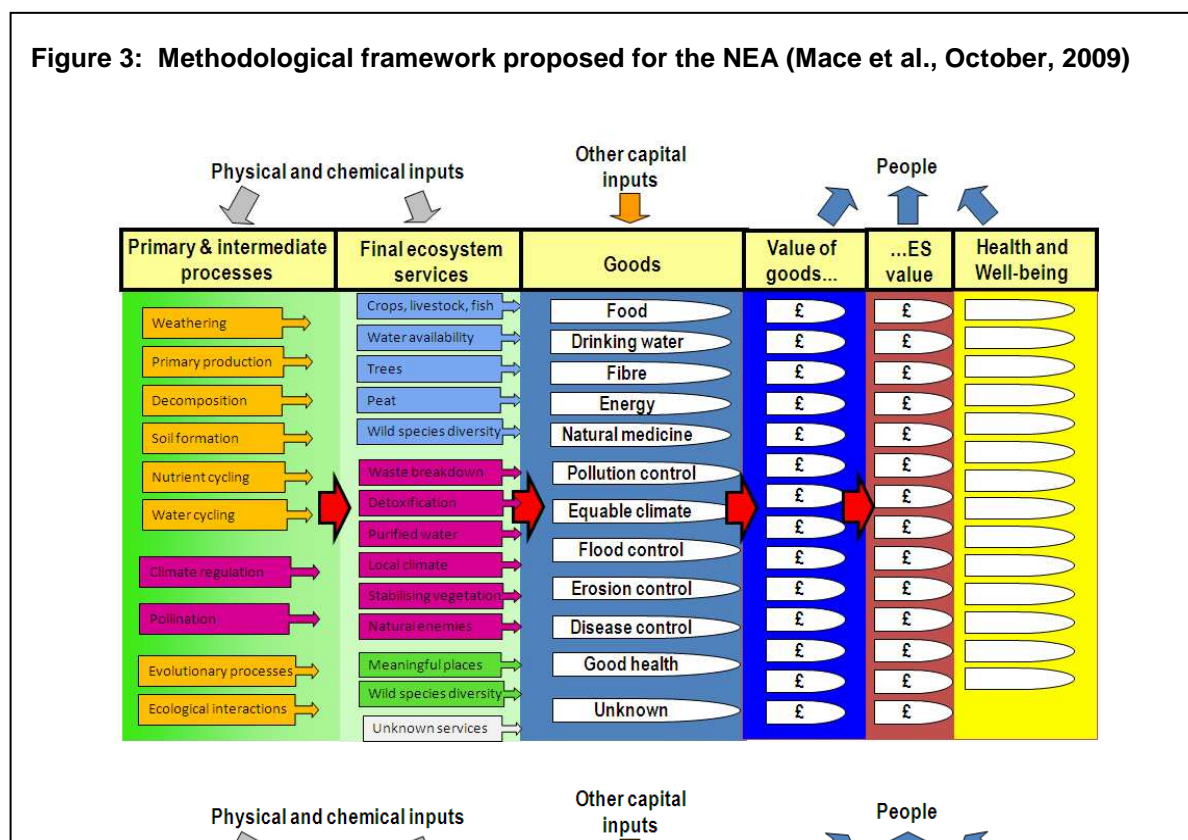
It is important to be sensitive to the approach being adopted by the NEA because this initiative is Defra funded and Natural England is also a key contributing partner – indeed responsible for the ‘England Synthesis’. If CQuEL and the NEA were to adopt fundamentally different views of what constitutes a service, how these services might be measured and what the state and trends of these services are then

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this may pose considerable communication difficulties for Natural England. More pragmatically, the NEA will generate new interpretive information (albeit based on existing data sources) and it seems wise to be able to draw upon this body of knowledge, given the resource and time constraints that exist for CQuEL.

Figure 3 provides an insight into the analytical approach proposed for the NEA. The methodology is heavily driven by the aim to make an assessment of the value of ecosystem services either in economic terms or qualitatively to overall well-being. To make these estimates as robust as possible, the methodology has been constructed to identify a set of 'final goods and benefits' that can be valued, thereby avoiding the problem of 'double counting'. This arises if the intermediate or supporting services are also valued and added to the values for the final products. Thus, according to Figure 3, while the NEA will give an account of the so-called 'primary and intermediate products', much of the assessment will focus on measuring the output of the 'final ecosystem services' and the goods and benefits that flow from them. The valuation work will focus only on these goods and benefits and will recognise that: (a) any of the final services can give rise to multiple benefits; (b) that since the goods and benefits are generally composites of inputs from natural capital *and* human capital, then some attempt to apportion relative values should be made (hence the two columns, the value of the goods and services and the value of the ecosystem service within this); and that (c) values are best expressed in terms of 'marginal changes' resulting from changes in the availability of these final services.

In Figure 3, the relationship between the economic valuation and the estimate of the importance of the goods and benefits for well-being should be noted. There is no implication in the proposed methodology that well-being flows from economic values alone. Indeed it is assumed that for some sets of goods and benefits *no* economic valuation can be made and that their importance can only be assessed qualitatively in non-economic terms. It should also be noted that the listing of the final ecosystem services and the goods and benefits shown in the diagram are only *indicative*. Indeed the construction of the target list of services, goods and benefits has been the subject of much discussion.



For the NEA, the agreed set of 10 'final' services and the goods and benefits that are associated with them is shown in Table 3. They are split between provisioning, regulating and cultural services, although it is recognised that some (water quantity and wild species) may fall into two of these broad groupings. The two cultural services are 'new', in the sense that they do not appear in many other ecosystem service typologies; they are 'meaningful places' (which includes both 'green' and 'blue' space), and 'socially valued landscapes and waterscapes'. In associating goods and benefits with all the final ecosystem services listed in Table 3, it should be noted that there is no one-to-one relationship of particular goods and benefits to particular services. Rather the assumption is that the goods and benefits (the things that are valued) can be generated by a number of final services, and that part of the work of the NEA would be to disentangle these contributions.

Table 3: Revised list of final ecosystem services and corresponding goods proposed for the NEA (October, 2009)

Final ecosystem service	Goods and benefits
(P) Crops, plants, livestock, fish, etc. (wild and domesticated)	Food, fibre, avoidance of climate stress, energy, genetic resources, industrial inputs, fertiliser, recreation and tourism
(P) Trees, standing vegetation & peat	Timber, avoidance of climate stress, energy, noise regulation, recreation and tourism
(R) Climate regulation	Avoidance of climate stress
(P, R) Water quantity	Potable water, industrial use of water, flood protection, energy, recreation and tourism
(R) Hazard regulation – vegetation & other habitats	Coastal protection, erosion protection, flood protection, avoidance of climate stress
(R) Waste breakdown & detoxification	Pollution control, waste removal, waste degradation
(P,R) Wild species diversity including microbes	Natural medicine, disease and pest control, genetic resources, wild food, bioprospecting, recreation and tourism, citizenship (with liaison with biodiversity)
(R) Purification	Clean air, clean water, clean soils
(C) Meaningful places inc. green & blue space	'CB list' see note below (No note)
(C) Socially valued landscapes and waterscapes	'CB list' see note below

Note: In terms of the cultural goods and benefits, physical health, mental health, ecological knowledge will be assessed throughout; spiritual/religious, cultural heritage and mediated natures, aesthetic/inspirational, security and freedom, neighbourhood development, enfranchisement social and environmental citizenship will be assessed as part of the two cultural services identified (C) in the table above. For other final services, P=Providing; R=Regulating.

The implications for CQuEL in terms of the services, goods and benefits selected for the NEA are that:

- The list of final services is 'feature' biased, in that there is an attempt to relate these services to 'things on the ground' that can be mapped or measured (e.g. livestock density, tree cover, water

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availability etc.). These features therefore have some read-across to the elements used by CQC to examine changes in landscape character; and

- That the two cultural services have strong resonance with the ELC and notions of landscape character and the importance of place, and have been framed with the recent work undertaken by 'Research Box' on cultural services in mind.

Clearly further work is needed to understand how the range of services identified by the NEA will be made operational. However, it is evident that some of this work could be used, and the selection of 'things to measure' within CQuEL might usefully be done in ways that nest within the broad NEA methodology.

The question of which ecosystem services should be the focus of CQuEL is addressed in Work Package 2 (draft list of ecosystem services appears in Appendix 4), and will be the topic of a subsequent briefing paper. As a precursor to this debate, we examined some general issues further and tested some preliminary conclusions through discussions with the Expert Panel. In designing a classification of services to be considered by CQuEL we suggest:

- That in recognition of the problem of placing 'biodiversity' within an ecosystem services framework, care is taken to specify precisely what aspects of biodiversity are being considered. The agreed service typology used for CQuEL should distinguish between contributions that different components of biodiversity make to all aspects of service delivery, especially their contribution to the provisioning, regulating and cultural services.
- The balance between supply and demand for ecosystem services is a fundamental part of any assessment that is relevant to management or policy. **We therefore recommend that CQuEL should consider both the potential of an area to deliver a service as well as the actual demand for it.** However, experience from other work suggests that it is often easier to identify the changing capacity of an area to generate services than to measure consumption, and so a complete analysis of both components may not be possible in all circumstances. Nevertheless, the focus of CQuEL should be on an understanding of the outputs of 'final products' that directly impact on people's well-being; measures of supporting services or ecological functions may be taken as a surrogate if service output is difficult to measure directly.
- That while the focus of CQuEL is on the contributions that ecosystems and biodiversity make to human well-being, the issue of 'geodiversity' and associated abiotic outputs of ecosystems are considered but that these are not a central component of the analysis. We recommend that the scope of CQuEL be restricted to ecosystem outputs that are renewable and which depend on a combination of biotic and abiotic factors. Thus aspects such as the potential of a landscape or seascape for wind energy would be excluded from the analysis.
- That in recognition of the fact that it is important to understand patterns of supply and demand for ecosystem services, the links between different places or areas, and the geographical flows of services across space, the scope of CQuEL includes:
 - rural and urban areas: thus urban green space (and the service it provides) and peri-urban areas and their relationship with the main centres of population should be considered; and

- those aspects of the marine and coastal environment that are directly or indirectly affected by terrestrial activity – namely physical coastal processes, biophysical processes influenced by inter-tidal habitats, and water quality issues relating to pollution derived from terrestrial sources.
- In terms of identifying how CQuEL might progress, and in particular how we might show that it has considerable added value, given the contribution that the NEA is making, it seems that a strong focus on developing a place-based perspective would seem important. Although the NEA makes reference to 'place' these ideas are quite poorly framed, referring either to breakdowns by the four countries that make up the UK or the broad habitat groupings. It is clear that given the constraints under which the NEA is operating, the resolution of meaningful places etc and socially valued landscapes will not, for example, go down to the level of the NCAs in England. **Thus a clear contribution that CQuEL could make would be to refine and extend analysis to the more local scales at which decisions are made.**

The added value of CQuEL

In order to examine more closely the relationship between CQuEL and the NEA, we invited views from the Expert Panel who confirmed that far from duplicating the work of the NEA, CQuEL would add significant value to the future evidence base. Not only would CQuEL establish a strong link between ecosystem services and landscape character, it would also extend the analysis down to a much finer geographical scale – one that people might better understand. The foundation that CQuEL provides for longer term monitoring was also considered significant. We therefore recommend that the methodology developed for CQuEL does not merely seek to be consistent with the NEA, but complements, refines and extends the understandings that the NEA is seeking to provide.

While we may begin a project like CQuEL with a general list of services, such as those proposed in the Millennium Ecosystem Assessment (MA) or the NEA, the adoption of a place-based perspective implies that this has to be customised or refined according to both local considerations. However, the analysis cannot stop there. An understanding of the linkages between places is probably more important for the analysis of ecosystem services in CQuEL than it was for the analysis of landscape character in CQC, because of the more complex relationships between places where services are generated and places where they are consumed. It is recommended that key steps in the CQuEL methodology must (a) be some kind of screening/prioritisation of services according to local circumstances, and (b) some kind of review of the importance of services potentially flowing 'into' and 'out of' the area (places) concerned. This screening / prioritisation of services is likely to be captured in the final Integrated Objectives for each NCA that will be developed as part of the programme for updating the NCA descriptions. The integrated objectives are programmed to be completed by March 2011. These integrated objectives will capture priorities for both landscape character and ecosystem services, seeking synergy between the two.

A better understanding of the interconnectedness of landscape and the relationship between places could be a key contribution that CQuEL could make to future decision making frameworks. The fact that CQuEL also provides a future monitoring framework that will be in place after the NEA has been completed is also an important element of the added value that the work would bring.

CQuEL and the definition and monitoring of Landscape Quality Objectives

A requirement under the ELC is that objectives for landscape quality should be defined and monitored. Thus once a particular landscape has been identified and described, a detailed statement of the characteristics which local people want recognised in their surroundings should be developed⁶. These objectives then set the framework for future policy and management. Setting aside the question of whether 'landscape' is a service or not, clearly objectives that relate to particular features or characteristics of an area can clearly have relevance to the delivery of a range of other ecosystem services (e.g. woodland management and services such as recreation or flood regulation). Thus the relationship between CQuEL and the activities surrounding the definition and monitoring of landscape quality objectives needs to be examined.

It has been argued⁷ that to reflect the spirit of the ELC and general good practice (for example, in the development of landscape strategies) the landscape objectives should be based on the positive landscape **attributes** that people or stakeholders feel are central to defining the landscape character of the area. This position acknowledges that key characteristics may include negative landscape characteristics and that these objectives can both define what needs to be conserved and what needs to be restored or changed. Moreover, in stressing that we need to define these objectives in terms of **attributes** as opposed to **features**, it is recognised that some of the aspects that people value may relate to perceptual qualities, such as tranquillity, and not just to specific physical features..

Setting aside the practical question of whether landscape quality objectives are defined as part of CQuEL or through some parallel exercise, it is clear that in conceptual terms landscape quality objectives and objectives for the delivery of ecosystem services are **not** one and the same thing. The most fundamental differences between them are in that:

- landscape quality objectives tend to be framed around local considerations whereas objectives for services may not; and
- objectives for landscape expressed in terms of attributes may not address the functional properties of landscape that are important for the delivery of services.

While a long term goal for NE in relation to the natural environment must be to match 'required functional needs with desired landscapes', the resolution of this problem is probably not straightforward. What people perceive as a desired landscape may change as their understanding of its functionality develops or is challenged as circumstances change (e.g. as a result of the need to mitigate or adapt to climate change). **Thus we recommend that while the formulation of landscape quality objectives and objectives for the output of ecosystem services are complementary, the mechanisms by which they are developed should be kept distinct.** We suggest that within CQuEL it will be important to understand the implications of any conflicts or synergies between the two. Both sets of objectives are fundamental to answering the question of whether changes in landscape character and function *matter*. Understanding the differences between the objectives for landscape and services is part of the process of identifying 'what matters' to particular individuals or groups and why).

⁶ http://www.landscapecharacter.org.uk/files/u1/ELC_Briefing_Note.pdf

⁷ Note on the relationship between landscape quality objectives (ELC) and spatial objectives /targets, Lyndis Cole, 27/5/09

It is this approach which is being adopted in the setting of objectives for the NCAs as part of the programme for updating the NCA descriptions. The setting of these objectives will involve three stages, namely the identification of landscape and functional objectives for each NCA and their subsequent integration so as to provide an understanding of how in combination they can both enhance service delivery and support or create valued features and characteristics in the landscape. An examination of these assumptions takes the discussion beyond the question of how CQuEL relates to setting landscape objectives that conform to the requirements of the ELC – which may be answered simply along the lines that if landscape objectives are not defined before CQuEL takes place, some process of defining landscape objectives for the purposes of the analysis will have to be undertaken within CQuEL. The key requirement from the perspective of developing the methodology for CQuEL is that the landscape objectives are defined in sufficient detail or with specific precision, that they can be used to assess change in relation to the seven thematic elements used in CQC. **If this condition is not met then the refinement of the landscape objectives will be an additional task that would need to be undertaken within CQuEL in order to fulfil Defra’s requirement that the indicator of change in landscape character should be maintained.** The setting of objectives for ecosystem services will be examined in the next section.

Updating of National Character Area Descriptions and the role of NCAs in CQuEL

The descriptions of the NCAs played a fundamental role in CQC and are likely to continue to do so in CQuEL. Although the scope of CQuEL is broader than CQC, like the earlier initiative it has to make some judgement about the *significance* of change. In CQC the character area descriptions provided this contextual information against which this judgement was made. The descriptions of character provided the criteria against which the *magnitude* and *direction* of change could be assessed.

In the design of the CQC methodology, the existence of the character area descriptions was one of the main arguments in favour of framing the analysis around these spatial units., The NCA material represented the **only** consistent set of information available at the national scale. In using them it was recognised that they were not initially designed to do the job required by CQC, but it was clear that the material could be adopted and extended for the purposes of the project. Thus the CQC methodology involved the creation of customised ‘profiles’ for each character area that were used as a template against which the significance of change was assessed, and included two stages of consultation to test the robustness of the profiles and the conclusions about changes that were made using them. To what extent do these types of argument carry over into the design of the CQuEL methodology?

- Given the requirement that the indicator of change in landscape character should be maintained as an output of future work, it is clear that the NCAs must play a role in the CQuEL analytical framework. However, the NCAs considered in isolation may not be the appropriate functional units for the analysis of all ecosystem services. The description of services and the service objectives may need to understand a wider context. This should be considered in the design of the process of updating the NCA descriptions and in their use for reporting and analysis of ecosystem services. Specifically:
- It would be helpful if the ‘NCA descriptions are revised in ways that support and underpin the setting of landscape quality objectives. They should also take account of the role of the NCAs in the output of ecosystem services in a national or regional context. It is clear, for example, that the boundaries of

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NCA cut across important functional units (e.g. catchment, ground water protection zones, designated areas) and that this contextual information needs to be brought into the descriptions of the NCAs if a full picture of their character *and* functional importance is to be developed.

- From the perspective of ecosystem services, functional objectives for an NCA may be determined partly or wholly by issues outside the area, if it is a significant exporter of services such as a regional demand for water.
- Where service output is dependent on the functional properties of neighbouring NCAs, an assessment of the significance of change in service output at NCA level will need to disentangle the impact of local factors from those arising outside the area. . These externalities may not only apply to understanding the links to other NCAs but may also need to take account of what is happening in other jurisdictions; for example, in the case of catchment related issues, we may need to consider what is happening to areas in Wales or Scotland.
- It may be difficult to determine how much change within an NCA is needed or possible given that service output may be dependent on external factors, because the wider process-response relationships that underpin ecosystem service output may be unknown.

If character area descriptions are to be updated, then the extent to which this process takes in issues related to their functional properties and relationships needs to be considered as this will be important information for CQuEL. Whether undertaken within the updating of the NCAs or within CQuEL there is a case for following an iterative approach.

The first stage could involve a more generic assignment of service characteristics to NCAs, reflecting their place in a wider context and potentially informed by the broad habitat groupings used as the framework for the NEA⁸. This could form part of the updated descriptions or considered as background material; within CQuEL. These initial functional descriptions could then be refined in a second stage process that focused in more detail on how the wider priorities and objectives for services translate into local actions or transformations that can be monitored. This second stage could be refined within CQuEL, as part of the work designed to develop the criteria against which change is assessed. This is likely to involve both local stakeholders and wider groups of experts (see below) who can provide insights about the importance of more general patterns and processes related to ecosystem services.

The use of NCAs to develop landscape quality objectives and a set of character area descriptions that are sensitive to the ecosystem services associated with each area clearly provides a compelling practical argument for using these spatial units as the framework for CQuEL. Use of the NCAs would also clearly provide consistency with what went before. The acceptability of using the NCAs as the primary spatial framework for CQuEL, nevertheless, needed to be examined critically. The question was therefore put to the Expert Panel. While no single view prevailed, the overarching theme in the comments received was that whatever spatial analysis and reporting units are used, the evidence base must be capable of exposing or capturing issues across multiple scales. NCAs were seen as helpful in providing context for analysis and interpretation and a way of communicating information to people in terms that they might understand. However they may not be the only spatial framework that is needed if Natural England is to achieve the goals that it has set itself in relation to landscape and ecosystem services. While NCAs are a key part of the analytical framework to be used for CQuEL the approach should be sufficiently flexible to

⁸ We assume that Land Cover map 2007 will be available to CQuEL

Preparing a detailed project plan for CQuEL permit analysis and reporting for a variety of other types of spatial unit, such as major catchments, administrative regions or more generic types of landscape such as the 'uplands' or 'coastal landscapes'.

Assessing the significance of change

A key step in the methodology developed for CQC was the identification of 'thresholds' beyond which 'significant change' was judged to have occurred. Although the term 'threshold' was used, there was no implication that these limits represented a point at which a significant non-linear or sudden 'regime shift' occurred (although this possibility was not excluded). Rather, the idea was introduced as a way of translating broader landscape objectives into a set of quantifiable criteria or targets⁹, against which the magnitude and direction of change could be assessed. Thus, for example, a threshold of more than 3% change in woodland cover during the assessment period was judged to be significant for a NCA, if an increase in woodland cover was considered appropriate given the character of the area and the way it had changed in the past.

The problem that CQC faced was that the set of thresholds used were fairly arbitrary. Although they were modified according to local circumstances it is clear that the way they were set could have been made more robust through the processes of stakeholder consultation. Within CQuEL, the process may be improved through:

- the translation of the set of ELC landscape objectives into quantifiable targets; and
- the specification of a set of targets for ecosystem services that make sense locally.

. The Landscape Quality Objectives developed as part of the NCA updating are likely to be aspirational and qualitative. Within CQuEL therefore there may need to be a process of refinement or translation to allow the objectives to be used as the basis for assessing the significance of changes in the landscape.

Assessing the significance of change in ecosystem services is more problematic for the reasons listed previously, not least that many services will be influenced by what is happening well beyond the boundary of individual NCAs. Some services may be assessed by looking at the characteristics of individual NCAs (bottom up) while others may also be informed by looking at wider national and regional objectives and translating these to the NCA level (top-down). One method for measuring the services, recognising these different approaches, could involve identifying the *marginal impacts* that the various landscape features and attributes might have on different types of service both within the NCA and beyond, and using this as the basis of reporting the significance of change rather than some absolute change in service output.

The identification of thresholds or limits potentially provides one way in which the significance of change in landscape character and service output might be judged. As previous work has identified, the specification of such thresholds or limits is difficult. Although the issue will continue to be an important one in terms of framing strategies for sustainable development more generally, the extent to which it is a priority for CQuEL is an open question. We therefore asked members of the Expert Panel to comment. Although views were mixed, the general view was that an attempt to identify thresholds or limits should be made where it was appropriate and feasible. It was also recognised that the specification of limits of

⁹ In CQC, the term 'target' was avoided so as not to imply that there was any commitment to achieving the level of change identified.

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acceptable or desirable change must be based on stakeholder input and may vary from place to place. **We therefore recommend that in developing approaches to measuring ecosystem services, a range of criteria should be used for assessing performance. However, where it is possible to go beyond simply identifying the direction of change the feasibility of identifying some limit or threshold through stakeholder consultation should be considered.**

The role of consultation in CQuEL

Internet-based consultation with expert-stakeholders played a key role in CQC. It was used both to define the criteria against which landscape change at the NCA level was to be assessed, and to test the acceptability of the judgements made after they had been applied, given the data available. The deliberative aspect this consultation process brought to the analysis was considered important because it helped ensure that the results were both robust and understood by those who might use them in their future work.

Given the brief for CQuEL it is apparent that the same considerations will apply. Moreover, given the wider brief for the work, and the issues that surround the assessment of ecosystem services, wide consultation is probably even more necessary than before, informing.

- The translation of the ELC landscape quality objectives into quantifiable targets against which landscape change can be assessed.
- The description of the role of individual NCAs or NCA groups in relation to broad patterns of ecosystem service outputs and recent trends and the extension of the NCA descriptions to include issues relating to ecosystem services.
- The formulation of functional objectives for ecosystem services at the level of individual NCAs or groupings of them.
- An assessment of the acceptability of the judgements made about the magnitude and direction of change in both landscape character and the output of ecosystem services once the preliminary analysis has been completed.

It is likely that these consultation processes will involve a much wider range of experts than CQC, and that the scale and timing of the exercises will have to be considered carefully. Given that the ELC requires the public to be involved in the formulation of landscape quality objectives, the question of whether these consultations are restricted to experts should also be considered.

Reporting on ecosystem services in CQuEL

A final methodological issue that must be considered concerns how the reporting matrix used in CQC could be adapted to take account of trends in ecosystem services.

On the basis of the discussion presented above it would seem appropriate to treat the analysis of landscape and ecosystem services as independent but linked processes (Figure 4), so that the interactions between them can be brought out in subsequent reporting. Thus ELC quality objectives can be used as a framework for looking at trends across the seven 'landscape themes' used in CQC by

Preparing a detailed project plan for CQuEL looking vertically through the central matrix shown in Figure 4. Alternatively patterns and trends in ecosystem services derived from wider national or regional sources can be represented in a more local context using the NCA framework, by looking horizontally through the central matrix shown in the same figure. On the basis of this kind of approach the interaction between these two elements could be considered so that some insights into the marginal effects of changes in landscape character on service output could be developed, potentially at a range of spatial scales.

The approach suggested in Figure 4 is tentative because, as the discussion presented in this document shows, many methodological questions remain open. Nevertheless such a structure does seem to be implied by the nature of the brief given for CQuEL, and the broad constraints that will shape it in relation to the need to link landscape quality objectives, maintain the indicator of change in landscape character and deliver insights into the functional properties of NCAs. The potential for making such an approach operational will be considered in the later phases of this work.

A number of approaches can be envisaged for reporting the results of CQuEL. One suggestion involves nesting the assessment of service trends in the cross tabulation of changes in character used in the previous CQC studies; Table 4 shows how this might work at the level of an individual NCA. Clearly for reporting purposes some aggregation and generation of results will be needed, and key questions that need to be resolved include how the results for services within each of the four service groups can be brought together if an approach like that shown is adopted. The framing of landscape character as a potential cultural service is particularly problematic – and approaches would need to ensure that ‘double counting’ can be avoided. A second issue with this kind of reporting matrix is how to resolve differences in the messages that might be coming from the two components – e.g. landscape character might be maintained but one important service might be ‘in decline’.

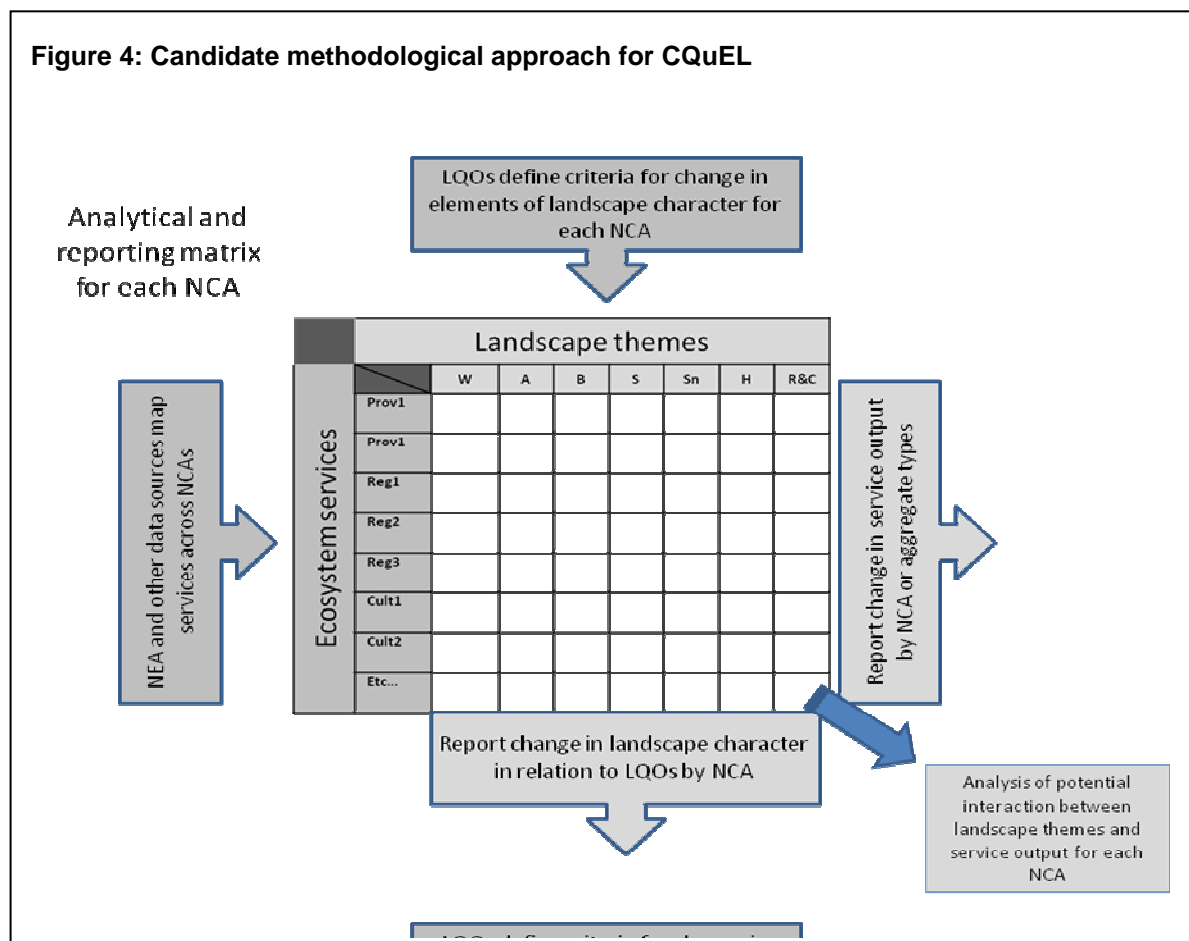


Table 4: Example of possible assessment and reporting matrix for CQuEL for an individual NCA (key: Red – service poor; Amber – service adequate; Green – service good)

	Consistent with Landscape and Functional Objectives	Inconsistent with Landscape and Functional Objectives
Stable	Maintained	Neglected
	Provisioning	Provisioning
	Regulating	Regulating
	Cultural	Cultural
	Supporting	Supporting
Changing	Enhancing	Diverging
	Provisioning	Provisioning
	Regulating	Regulating
	Cultural	Cultural
	Supporting	Supporting

Again the potential for making such a report approach operational will be considered in the later phases of this work. Before any final decisions can be made we need to determine which ecosystem services will be included in the analysis, whether it makes sense to group them according to the MA or NEA framework, and exactly what assessments like ‘good’, ‘adequate’ and ‘poor’ might mean. As noted above – the extent to which such an assessment of the service can be made at the individual NCA level is debatable. The extent to which it is appropriate to show a national or regional trend in service output for an individual NCA is also open to question. Possibly the most suitable approach might be to base the assessment on the implications of change in landscape character elements for the functions underlying the particular service; thus additional woodland might reduce water quantity (provisioning) but enhance recreational opportunity (cultural).

Timing the Outputs from CQuEL

An important set of constraints on the development of the CQuEL methodology are those imposed by the reporting timetable. The methodology needs to be robust, but if results cannot be delivered within a relatively short time then it is unlikely that the work will be supported.

The approach adopted for CQC was to focus on an eight year period and report change. Given the time lags built into the collection of some datasets (especially LUCS) the reporting period ran up to a date two or three years before the publication of the overall assessment. The analysis (which included both consultation and data processing) took about two years to complete, and the outputs were published as a single document at the end of the work. This kind of timetable is probably not appropriate in the context of CQuEL. Much of the consultative work on objectives for NCAs is already underway, and at present there also seems to be the demand for more rapid or at least staged approach to delivery of the results from CQuEL.

It is apparent that there is the potential to make a significant on-going contribution to current debates by publishing:

- an 'historic' assessment of trends in ecosystem services using existing NEA and CQC data in 2010, possibly linked to the production of the 'England Synthesis' for the NEA, being led by Natural England;
- an assessment of future landscape and ecosystem service trends for NCAs as part of the 'Vision 2060' exercise in mid-2011;
- the update of the CQC landscape indicator in the first quarter of 2012; and
- an updated review of landscape and ecosystem service trends by NCA in mid-2012.

The advantages of this staged model include the fact that outputs can be modified as circumstances and issues develop; it has greater flexibility than the 'one-shot' timing mode used for CQC.

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