

## Locating and measuring nature's benefits

### Using mapping tools for the management of natural resources and ecosystem services



**Living With Environmental Change  
Policy and Practice Notes**

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**The Living With Environmental Change Partnership** brings together 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies. The private sector is represented by a Business Advisory Board.

**Landscapes and seascapes, urban and rural settings are increasingly being managed for their natural resources and the services they can deliver to individuals and to society. But how can decision-makers know what resources exist, where they are located, and what services they might deliver?**

## **What prevents us from using these resources and services sensibly and sustainably?**

**Land has always been in short supply and we need to grow more food and house more people in the future. But our use of the landscape has not always been as efficient and sustainable as it could be because:**

- We are only just beginning to understand which services are supported by which resources and how all of these link together.
- We don't yet understand how close we may be to damaging permanently our supply of these resources and endangering the services they provide.
- There have been few off-the-shelf, easy-to-use information tools that can guide decision-makers in identifying where the resources are, what condition they are in, and the values of the different services they can produce.

## **Who needs information about the location of natural resources and services?**

**Anyone who is involved in making decisions about the future of landscapes or seascapes needs this kind of information. They will include:**

- The UK and devolved governments as well as their agencies such as Natural England, Scottish Natural Heritage, the Countryside Commission for Wales, the Environment Agency, the Marine Management Organisation, etc.
- Urban and rural planning authorities.
- Estate managers, other private landowners and their professional advisers.
- Managers of protected areas such as National Parks, Nature Improvement Areas, Areas of Outstanding Natural Beauty, Local Nature Partnerships, the RSPB, the National Trust and the Wildlife Trusts.

## **What is happening now with mapping natural resources and the services they provide?**

**The government white paper has committed the UK to an ecosystem approach, which means taking all the natural services into account when managing land.**

**In order to do this:**

- Decision-makers need to know where the natural resources are that deliver these vital services and what condition they are in.
- Organisations, in the UK and abroad, including government departments, academic institutions and the voluntary sector are developing a variety of different tools that can help in mapping these resources. They are also developing ways of allocating monetary and non-monetary values for these natural resources.

## **Why is interest in mapping natural resources growing at the moment?**

**Research on this is being funded, particularly within the Living With Environmental Change partnership, because:**

- The UK government has acknowledged the need to provide national accounts of the country's natural resources and the services they can deliver.
- At regional and local scales, national and local government, private landowners and third sector organisations all need to manage land and resources in such a way that services can continue to be sustainably delivered today and in an uncertain future.
- This is particularly important as we will have to manage our resources while, at the same time, dealing with environmental change.
- In the past, failure to recognise the long-term importance of the services that land provides has meant they have not been properly valued in decision-making, which has resulted in lost assets for everyone in society.

## What mapping tools are currently available?

**There are a variety of mapping tools that are freely available on line:**

- All the tools use Geographic Information System (GIS) maps of major habitats or land-uses as a basis for mapping the natural resources in the landscape and the ecosystem services these resources provide.
- Some use quite complex in-built functions linking this base to amounts of service, and allocate a monetary value to these. This is usually based on a “benefits transfer” ie a valuation that has been worked out for another, similar geographical location.
- Others are more basic, and simply show the relative importance of areas of land for providing different kinds of services.
- Several large-scale tools have been developed and are available at different scales. Examples include Polyscape (which helps evaluate trade-offs and synergies in the water, biodiversity, farm productivity and carbon services provided by natural assets such as trees and ponds), LUCI (the Land Use and Capability Indicator, an extension of Polyscape to larger scales and further services) and the EATME tool package (developed as part of the National Ecosystem Assessment and which provides a road map for professionals to work through the key stages of a project or policy process).
- There are also more locally based tools that have been developed by a range of organisations and projects throughout the UK. These have been brought together by Natural England and may be accessed via a single portal, the Ecosystem Service Mapping Gateway, shown below. Many of these are simple to use and may fulfil more local needs.

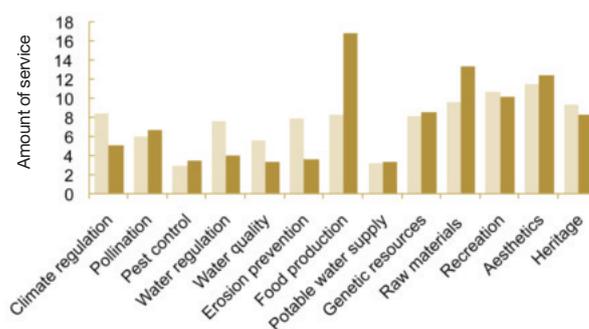
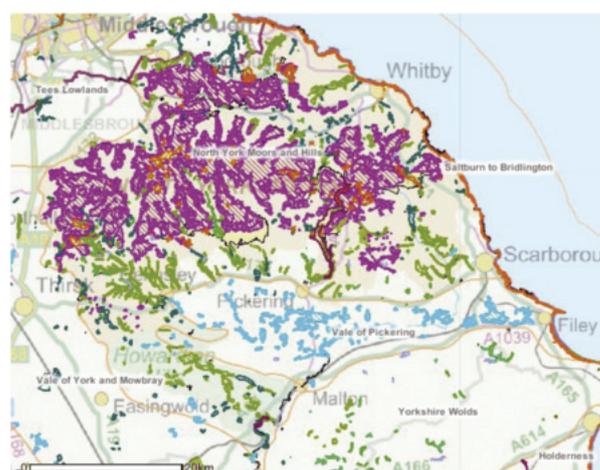


The Ecosystem Service Mapping Gateway shown here, was developed by the NERC/BBSRC Biodiversity and Ecosystem Services (BESS) Directorate and brings together information on the growing number of projects mapping ecosystem service delivery at the landscape level. It is an interactive, searchable, map-based gateway that helps users to locate a project that is appropriate for their needs.

## How will such information be used?

**Organisations will be using the information to:**

- Establish the nature, location and value of natural resources.
- Enable a more holistic approach to decision-making about different environmental futures. In particular, this kind of information helps to make it clear what services are being traded off against others, and should avoid accidentally closing down options for services that might be desirable in the future.
- Visualise management issues which aids stakeholders’ involvement in decision-making.
- Explore with stakeholders how different landscapes can provide quite different suites of services and thus require to be managed at the appropriate level: a one-size-fits-all policy will not work. See example below.



Adjacent landscapes (North Yorkshire Moors and the Vale of Pickering) fall within a single administrative district, the Yorkshire and Humber Region. They are characterised by different major habitats (purple is peat bog, green is woodland, blue is floodplain grazing) and hence ecosystem services. A one-size-fits-all development policy would not be appropriate. The graph shows the difference in amount of ecosystem services in the North York Moors (light brown) and the Vale of Pickering (dark brown) (Modified from University of York and URSUS 2010).

## How can practitioners and other stakeholders choose the right tools and apply them effectively?

### In order to make the best use of these resources:

- Decide in advance why you need this information and how it is likely to be used once obtained. For instance, do you need to estimate the value of the resources and the services or will you simply use the information to facilitate stakeholder participation, debate and engagement?

- Remember that no one tool is likely to suit everyone. Use the Ecosystem Service Mapping Gateway or the EATME Tree to get a feel for the range of approaches out there. There may be someone located in your area using these tools, so why not share their experience?
- Note that the mapping tools will not make decisions for you: they are there merely to provide you with more complete information on which to base a decision.
- Some approaches are quite technical and need prior skills in GIS, whilst others are simpler and spreadsheet-based; when choosing which tool to use, take into account not only your own skill sets and preferences, but also those of the stakeholders with whom you are working.

## Further information

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### Mapping tools:

The Ecosystem Service Mapping Gateway is hosted by the NERC/BBSRC programme Biodiversity and Ecosystem Services Sustainability (BESS). [www.nerc-bess.net/ne-ess](http://www.nerc-bess.net/ne-ess)

Polyscape explores the impact land use and land management has on a selection of environmental and economic functions, and the trade-offs and synergies between these functions. An overview of Polyscape can be found at [www.polyscape.org](http://www.polyscape.org) with further detail provided in Jackson, B. et al: Polyscape: A GIS mapping framework providing efficient and spatially explicit landscape-scale valuation of multiple ecosystem services Landscape and Urban Planning 112:74-88 (2013) [www.sciencedirect.com/science/article/pii/S0169204612003532](http://www.sciencedirect.com/science/article/pii/S0169204612003532).

LUCI, the Land Utilisation Capability Indicator is a software implementation and extension of Polyscape to handle larger scales and to include more ecosystem services. Information on LUCI is available at [www.lucitools.org](http://www.lucitools.org)

TABLES The National Ecosystem Assessment Follow-on Phase Tools workpackage, Applications Benefits and Linkages for Ecosystems <http://uknea.unep-wcmc.org>

The EATME Tree [www.eatme-tree.org.uk](http://www.eatme-tree.org.uk) also developed by the National Ecosystem Assessment follow on project.

InVEST - Integrated Valuation of Environmental Services and Trade-Offs developed by the Natural Capital Project [www.naturalcapitalproject.org](http://www.naturalcapitalproject.org)

LWEC is a multi-agency partnership that is concerned with responses to environmental change [www.lwec.org.uk](http://www.lwec.org.uk). Research on ecosystem services within the LWEC partnership has been conducted by a number of programmes including:

- Relu, an interdisciplinary research programme supporting projects under the theme of adapting rural living to environmental change. [www.relu.ac.uk](http://www.relu.ac.uk)
- Valuing Nature Network, an interdisciplinary network for valuing ecosystem services, biodiversity and natural resource use. [www.valuing-nature.net](http://www.valuing-nature.net)
- Biodiversity, Ecosystem Services and Sustainability programme, a research programme investigating the role of biodiversity in ecosystem processes. [www.nerc.ac.uk/research/programmes/bess](http://www.nerc.ac.uk/research/programmes/bess)
- Ecosystem Services and Poverty Alleviation programme which is generating new knowledge to demonstrate how ecosystem services can reduce poverty and enhance well-being for the world's poor. [www.espa.ac.uk](http://www.espa.ac.uk)
- The NEA (National Ecosystem Assessment) follow-on phase which is further developing and communicating the evidence base of the UK NEA and making it relevant to decision and policy makers at different spatial scales across the UK. <http://uknea.unep-wcmc.org>

**Other useful resources:** Applying an ecosystem services approach in Yorkshire and Humber, a Report to Yorkshire Futures by University of York and URSUS Consulting September 2010

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