

Summary of reviews of Natural Assets Registers and Natural Capital Accounting

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Introduction

This briefing paper summarises the outcomes of two reviews undertaken as part of Research Deliverable 1.4.1 of the Strategic Research Programme. The aims of these reviews were to inform the development of a Natural Assets Register and Natural Capital Accounts for Scotland. In both cases these sought to identify existing initiatives and the lessons learnt to inform our future activities.

Natural Assets Register

The review of assets registers mainly focussed on Scottish and wider UK practical initiatives with a view to understanding how comprehensively and in what ways this information is currently made available. A total of 19 initiatives of various types were reviewed, these can be broadly categorised as either assessing the functionality of natural assets or providing environmental information. These lessons are summarised below.

General findings/lessons

A rapid increase in initiatives over the past 12-24 months

The majority of the actively supported initiatives have been started in the last few years, reflecting where policy and social needs to assess natural capital assets have met with innovations in the technological capability required to meet those needs.

There are two main types of initiatives relevant to the SRP Natural Asset Register, depending on its final purpose and functionality

Our review found that relevant initiatives could be most efficiently grouped into initiatives that primarily assess natural capital and its services and valuations, and a second group focussed on the provision of environmental information.

All of these initiatives are dependent on using established standards and approaches

A range of standards are in place, from those governing the electronic publication of data to ecosystem service classification. All of the assessed initiatives utilise standards, but to varying degrees.

Digital (web) technologies are enabling the development of these initiatives, especially free and open source software

The development of these initiatives is being accelerated. Their implementation has been simplified and made less resource intensive by the development of these established standards and also by free to use templates and software.

There is a need to link assessments of natural capital assets with data on those assets

There is currently little overlap between projects assessing assets and those which make environmental data accessible. No project which provided a comprehensive assessment of a broad range of terrestrial natural assets and which made that assessment accessible was identified in our review.

Initiatives primarily providing assessment functionality

The initiatives we identified under this category are summarised in Table 1. We have drawn the following key lessons from these initiatives.

There is a need to include information on the quality of natural capital assets

There has been more emphasis on the quantity of natural capital than in assessing the quality of those assets. However, ecosystem service provision can only be accurately assessed when the quality and quantity of natural capital is known.

There are a number of limitations related to providing functional assessment of natural capital assets

In addition to the requirement for qualitative assessment of assets there is a need to ensure that information is captured which takes account of how natural assets change over time. There is a need for time series data that measures the physical flow of assets or services.

Key Limitations: Lack of approaches to reproducibly value these assets and services

The valuation of natural capital and services is rapidly developing however there remain significant challenges to monetisation and non-monetary valuations of services.

Key Limitations: Existing initiatives have been criticised for including indicators that do not reflect the status of natural capital assets

A systematic evaluation of the Scottish Natural Capital Asset Index found a low percentage of indicators were fit for purpose and that few reflected changes in flows or the resilience of the resource.

Table 1 Summary of initiative assessing functionality

	Natural capital assets	Provision of ecosystem services	Valuation of natural capital/ services	Does it provide spatial data?	Spatial extent	What is it?
SNH Natural Capital Asset Index (NCAI)	Y	Y	N	N	Scotland	Index
Defra & Scottish Government ecosystem accounts pilots	Y	Y	Y	N	Regional	Report
UK Natural Capital Asset Check (UK NEA FO)	Y	Y	Y	N	UK	Report
UK national level and corporate level natural capital accounts	Y	Y	Y	N	Site, UK	Report
RICS sponsored Natural Capital Planning Tool (NCPT)	Y	Y	N	N	Site	Report, Tool
Natural Capital Protocol	Y	N	Y	N	Site, business	Tool/ framework

Initiatives primarily providing environmental data

The initiatives we identified under this category are summarised in Table 2. We have drawn the following key lessons from these initiatives.

There has been a recent increase in the number of new data and information initiatives of relevance to the SRP Natural Asset Register

There is currently a lot of activity in producing new spatial data sharing websites and in updating existing sites. This is particularly the case in Scotland. These sites cover a diverse range of data types, purposes and intended audiences.

There are a range of approaches to presenting web based complex information on natural capital assets

This range of approaches is a response to a number of factors, including the diversity of information being presented, but also editorial decision making. Sites which offer flexible user interaction but also fixed pre-defined outputs appear to offer more successful solutions.

Web services are increasingly used to provide information on natural capital assets

Web Mapping Services (WMS) are a key component in the reviewed sites. However, the use of WMS presents significant cartographical challenges unless there is significant collaboration among providers.

Remote and/or local data access

EU regulations give guidance on the best approach to data access. However, there are technical requirements that can mandate specific data holdings. A range of solutions has been observed and these have been governed by the functions provided by the sites. There are trade-offs between level of site functionality and the resource required to support it.

Developing the scope, focus and requirements of the SRP Natural Asset Register

References to the Natural Asset Register in in the Main Research Providers Strategic Research Programme proposals

There are references to the Natural Asset Register across all three SRP Themes, with particular emphasis in Theme 1. The diversity of the research deliverables referencing the Natural Asset Register requires that significant flexibility be incorporated into its design.

Where does the SRP Natural Asset Register fit in relation to the initiatives reviewed?

There is currently significant capacity in the supply of environmental data in Scotland. However, the SRP Natural Asset Register will avoid duplication in being unique in adhering to CICES and in focussing on natural assets, ecosystem services and valuations. It will also provide access to SRP spatial outputs which are currently largely missing from other initiatives.

The next steps in developing the SRP Natural Asset Register

Our review will be followed by discussions with appropriate individuals and bodies to develop the scope and specification of the Natural Asset Register. These will build on our initial consultation carried out during this review. There is an aspiration that the Natural Asset Register's scope will be co-constructed with RESAS, MRP colleagues and other stakeholders.

Table 2 Summary of initiatives providing environmental information

	Natural capital assets	What is covered Provision of ecosystem services	Valuation of natural capital/ services	Provision of data Does it provide spatial data?	Spatial extent	What is it?
Scotland's Environment Website-first phase	Y	Few	N	Y	Scotland	Website
Scotland's Environment Website – Shared Digital Hub/ Environment Information Portal	?*	?	?	?	Scotland	Website
Scotland's Environment Website – Centralised Environmental Data Catalogue	?	?	?	?	Scotland	Website
Scotland's Environment Website – Ecosystem Health Indicators	?	?	?	?	?	Website
Scotland's Environment Website – Ecosystem service Data Management Tool	?	?	?	?	?	Website
Perth and Kinross Council – Instant Atlas	Y	Y	N	N	Regional	Website
Scottish Government Land Use Strategy Data Directory	Y	?	?	?	Scotland	Website
National Biodiversity Network Gateway	Y	N	N	Y	Site, Regional, UK	Website
Atlas of Living Scotland	Y	N	N	Y	Site, Regional, Scotland	Website
Spatial Hub (Scotland)	?	?	N	Y	Scotland	Website
NERC Biodiversity and Ecosystem Services Directorate Mapping Gateway	Y	Y	N	N	Site	Website
UK Environmental Change Network	Y	N	N	N	Site	Website
CEH Environmental Information Platform	Y	Y	N	Y	Site, Regional, UK	Website
European Environment Agency: European Data Portal	Y	?	?	Y	EU	Website
European Nature Information System (EUNIS)	Y	N	N	Y	EU	Website
EUROSTAT	Y	N	N	Y/N**	EU	Website
Geospatial Resources at the US Environmental Protection Agency	Y	Y	?	Y	USA	Website

* A question mark indicates that the content of recently announced initiatives is uncertain at this time.

** Datasets with a European extent are often limited to one single value for the whole of the UK (let alone Scotland).

Natural Capital Accounts

Natural capital is the stock of natural assets that underpins the flow of ecosystem services that benefit human society and the economy. Natural capital accounting (NCA) is a process of quantifying those natural capital stocks and service flows to determine the nature and scale of those benefits to determine how they vary over time and whether our management and use of natural capital is sustainable. By aligning NCA with conventional economic accounts we can also begin to explore the interrelationship between the environment and the economy.

Principles of natural capital accounts

Defra and ONS (2014)¹ outline the principles of natural capital accounting based on the System of Economic-Environmental Accounting (SEEA) (UN, 2014)²:

-) NCAs aim to gather information on the contribution of ecosystem goods and services generated by ecosystems/land units to the wider economy.
-) NCAs should follow the Common International Classification of Ecosystem Services (CICES) system.
-) Inclusion of biodiversity creates issues: the SEEA sees biodiversity as a characteristic of ecosystem assets and an indicator of habitat condition.
-) Defra suggest following the NEA Broad Habitats classification.
-) Ideally all natural assets and ecosystem services should be included, but a prioritisation may be needed, e.g. where ecosystem services are: i) sensitive to changes in ecosystems or at risk of irreversible losses; ii) influenced through decision making and/or relevant to people's wellbeing; and/or iii) measurable using acceptable and adequate methods.
-) To compile NCAs and make them comparable with the System of National Accounts (SNA), there is a need to consider natural assets and ecosystem services at national scale, which introduces spatial diversity. The SEEA proposes a units model, based on three spatial units:
 - o Basic spatial units (BSUs) – the smallest possible unit identified after partitioning a given area of interest
 - o Land cover/ecosystem functional units (LCEU) – reflect a set of BSUs with similar ecological characteristics which commonly correspond to ecosystems.
 - o Ecosystem accounting units (EAUs) – an aggregation of BSUs including different land cover types, commonly correspond to countries, regions but also management units (e.g. catchments or national parks).

An alternative approach to using habitat based accounts that might be more relevant for highlighting economy/environmental interactions would be to develop NCA for particular industry sectors. Whilst forest and woodland accounts match both habitat and industry sector, agriculture crosses multiple habitats both at sector level and potentially when scaled down to single farm level.

¹ <http://www.ons.gov.uk/ons/guide-method/user-guidance/natural-capital/related-publications/principles-of-ecosystems-accounting.pdf>

² http://unstats.un.org/unsd/envaccounting/eea_white_cover.pdf

Economic valuation for natural capital accounts

A key issue in developing economic values for NCA is the fact that different valuation approaches measure different elements of value. Conventional economic accounts use the concept of exchange values, which in practice for most sectors mean market prices (for some sectors such as publicly provided health care cost of provision is used). There are a variety of methods for estimate the non-market values of ecosystem goods and services and these determine different types of value:

-) Revealed preference (hedonic prices/travel cost): can use market prices or estimated demand curves which include full economic welfare (consumers' surplus).
-) Cost based (defensive expenditure/replacement cost): can use market prices or supply costs, so do not measure full economic welfare.
-) Stated preference: estimate demand curves (based on willingness to pay) so include full economic welfare. These can also capture non-use values.

Values for ecosystem services may also be influenced by a number of contextual factors:

-) Distance: values for some ecosystem services (and disservices) will be related to distance from provision particularly where there is direct use.
-) Substitute/complements: values for ecosystem services will reflect the availability and proximity of similar natural capital assets or assets that jointly provide ecosystem services.
-) Similarity of environmental context: different habitats may provide similar ecosystem services, but values for those services will vary due to the difference in habitats rather than the similarity in benefits received.
-) Similarity of socio-economics context: common socio-economic factors (income, population density, age structure etc.) may be consistent across different populations yet values for ecosystem services still differ due to less tangible factors such as 'sense of place' or 'spatial identity'.

These issues are of particular relevance when considering the use of benefit transfer, as existing values will need to be adjusted to fit different environmental and socio-economic contexts.

Existing valuation evidence

Our review of existing UK relevant values (drawing on the Defra Environmental Look-up tables)³ revealed that there are significant evidence gaps. Cultural services are well represented, but regulating services are a significant gap. Coverage is also variable in terms of habitat types with some better represented than others. This suggests the need for more primary valuation across ecosystem services and habitat types. Given their flexibility we propose to use stated preference approaches for primary valuation studies.

Initial case studies

Our approach to developing NCA for Scotland will follow a case study approach based on habitats or economic sector where appropriate. We propose to begin with case studies with good existing biophysical and economic data. Our initial case studies will be agriculture and forestry as these are well covered in terms data. We have undertaken two primary valuation studies covering water quality and biodiversity impacts of agriculture and forest recreation.

³ <http://sciencesearch.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=19514>