



VALUING NATURE PROGRAMME

VNP14



**UK Research and Innovation —
High-level Sector Round Tables**

Round Table 1

**Valuing and Measuring Natural Assets
for Infrastructure**

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Round Table 1

Valuing and Measuring Natural Assets for Infrastructure

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Contents

Executive summary	3
1. Introduction	6
1.1 Objective and expected outcomes of the Round Table	6
1.2 Participants	7
2. Overview of current activity	8
3. Knowledge gaps/R&I needs	19
4. Next steps	23
Annex 1 — List of participants	24

This paper presents the objectives and captures key points made during the Round Table.

The Round Table followed Chatham House rules for the discussion of research and innovation (R&I) needs, thus comments and opinions in Section 3 are not attributed to specific participants.

Annex 1 provides a list of participants.

The following RT1 papers are separately available:

- **RT1 01: Background Paper.** This paper outlines the objectives, the expected output and longer-term outcomes of the Round Table. It also provides brief context for the Round Table, including an overview of interactions between the environment and infrastructure, drivers for measuring and valuing relevant activity in the sector, and some examples of current activity.
- **RT1 02: Overview of relevant UKRI funding instruments/ programmes for research and innovation.** This paper outlines why the Research Councils engage with business, why NERC is investing in this Round Table, and existing mechanisms to support academic and business collaboration.
- **RT1 03: Relevant Research and Knowledge Exchange.** Provides an overview and specific relevant examples of (predominantly NERC-funded) research and research output relating to measuring and valuing natural capital and with potential relevance for the infrastructure sector.

Executive summary

The objective of the Round Table was to identify the research and innovation (R&I) needs and priorities of businesses in the infrastructure sector related to measuring and valuing natural assets, so that current and future research has enhanced utility for the sector.

The Round Table considered: current activity to measure and value nature in the sector, drivers for this activity, and barriers and challenges to expansion of activity; the extent to which knowledge needs may be supported by existing output from R&I (e.g. data, tools, methods, models) and how uptake of this output may be accelerated; and what further R&I investment may be needed to support the sector in measuring and valuing nature. Finally, it considered what role the Natural Environment Research Council (NERC), other funders within UK Research & Innovation (UKRI) or beyond, may have in supporting that.

The Round Table revealed considerable activity for measuring and valuing natural assets (the term incorporates the concepts of natural capital, ecosystem services and biodiversity) across the infrastructure sector, including energy networks and power generation, road and rail infrastructure, water and waste infrastructure, construction companies, consultancies and insurers. This activity includes:

- development of standards (e.g. BSI Group standard on natural capital);
- various approaches to measuring and valuing natural assets, (e.g. mapping, metrics for biodiversity accounting, development of natural capital accounts, monetary valuation);
- assessment of risk relating to natural assets;

- working on net gain (of biodiversity) in development (e.g. developing tools, guidance, offsetting approaches);
- development of ecosystem service markets for water catchment management;
- integration of natural capital in corporate decision-making (e.g. road-testing the Natural Capital Protocol), integration of green infrastructure (e.g. tree planting, SUDS).

There was also a general consensus that the direction of travel was towards greater attention from business to the measurement and valuation of natural assets and the integration of natural asset consideration in business decision-making. There is growing support across the sector for the concept of no net loss (of biodiversity, natural assets) as applied to development of infrastructure, and indeed for the concept of net gain. There is also a growing interest in addressing both natural and social capital together.

Key drivers for this activity are:

- regulation, e.g. National Planning Policy Framework (NPPF) expectation for no net loss of biodiversity in development, 25 Year Environment Plan, EU 2020 Biodiversity Strategy, EU Water Framework Directive and UK water regulations, as well as less direct drivers from regulation and policy on resource and energy efficiency;

- in-house policies, strategies and plans, e.g. for sustainable development, biodiversity net gain, asset management;
- trends in corporate accounting, reporting and disclosure, e.g. government interest in Natural Capital Accounting, Task Force on Climate-related Financial Disclosure;
- global environmental agreements, e.g. Sustainable Development Goals; and operational and reputational considerations.

Barriers/challenges include:

- the fast-moving evolution of the natural assets arena (difficult for companies to keep up);
- regulatory uncertainty (e.g. will net gain become mandatory under NPPF?);¹
- regulatory constraints, as well as knowledge and cultural constraints in the infrastructure sector, that favour grey solutions over green;
- absence of standardised approaches, methods, metrics, definitions and a plethora of existing methods and tools giving differing results;
- lack of approaches which bring together natural capital, ecosystem services and biodiversity;
- lack of approaches which integrate natural and social capital;
- the complexity of natural systems, what ecosystem services they provide and identifying the beneficiaries of these;
- limitations in the available data;
- limited understanding of thresholds and tipping points in ecosystems;
- methodological and practical challenges in compensating for impacts on, and/or trading, natural assets;

- making a business case;
- getting buy-in across the business;
- building in-house capacity; and
- integrating cradle-to-grave considerations in natural capital approaches.

Research and innovation needs include:

- **Development of new knowledge**, including on: appropriate boundaries for natural capital accounting (NCA); how to establish markets for natural assets that are good for both nature and society; the risks of monetising and trading natural assets; implications for natural assets of using primary raw materials vs. recycling and re-use; how to measure and value natural capital (including wide scale benefits) with a view to achieving an optimal mix of green and grey infrastructure; the effectiveness of the Environment Agency's natural capital calculator in relation to enforcement undertakings.
- **Development of frameworks, standards, guidance and tools** for measurement and valuation of natural assets, including: development of frameworks, standards and guidance that work flexibly across sectors; enhancing availability of relevant data; development of a common currency for valuation of natural assets; development of a toolkit, bringing together and consolidating existing methods and tools, enhancing interoperability and filling gaps; developing new methods and tools for identified needs; mapping ecological opportunity at scale; and development of agreed common definitions/language/terms relating to the measurement and valuation of natural assets.

¹ Update (April 2019): The Chancellor in his Spring Statement indicated that net gain would indeed be made mandatory in the forthcoming Environment Bill.

- **Innovation and scaling actions** including: research on how to accelerate uptake of natural asset approaches; proof of concept and demonstration activities; establishment of a pre-competitive space for innovation; scaling consideration of natural assets in relation to the UK National Infrastructure and Construction Pipeline, water catchment management, major developments (e.g. Oxford-Cambridge Corridor).
- **Making the case for natural assets within business**, including: development of a common currency for valuation of natural assets; examining how biodiversity can be recognised by business as a ‘material’ issue; and linking natural asset valuation with climate change mitigation and adaptation.
- **Research on financing business projects/ innovations related to natural assets**, including: bankability of projects/innovations that create/restore natural assets; how best to deploy finance for natural assets to optimise ecological returns.
- **Training and capacity-building**, including investment in new research and innovation skill sets (not just knowledge exchange) to meet the needs of business in relation to measuring and valuing natural assets.
- **Dissemination and communication**, including a knowledge hub and research on what might shift public opinion in favour of measuring, valuing and trading natural assets.

Some of these needs are more suited to research and innovation funding through the Research Councils, and others more suited to innovation funding through Innovate UK. While business will be a key player in taking forward this work with academia, the engagement of other stakeholders will be important, including regulators, planners, the third sector and the general public.

The Valuing Nature Programme ran two further sector Round Tables for NERC, one addressing the land management sector (November 2018) and one addressing the insurance/financial services sector (January 2019). We anticipate that there will be a good deal of common ground in terms of research and innovation needs across these three sectors.

The findings from all three Round Tables will be analysed with a view to identifying this common ground (as well as differences), and where there may be greatest opportunity for academia to contribute to business (and policy) in the realm of measuring and valuing nature. This analysis will be shared in due course with participants of all three Round Tables to obtain feedback and will subsequently be published in an options and analysis paper in 2019.

A longer-term view is towards the co-creation, with business and policy-makers, of a future research and innovation agenda related to measuring and valuing natural assets. This would involve further activity, such as a possible cross sector workshop bringing together the sectors involved in Round Tables 1, 2 and 3.

1. Introduction

1.1 Objective and expected outcomes of the Round Table

The objective of the Round Table was to identify the research and innovation (R&I) needs and priorities of businesses in the infrastructure sector, related to measuring and valuing natural assets, so that current and future research has enhanced utility for the sector.

Expected outcomes include: (a) better integration of nature in project and investment decisions, and in the management and development of infrastructure assets; (b) knowledge needs and priorities identified by the sector influence R&I funding.

The Round Table considered:

- **current activity to measure and value nature in the sector** (e.g. how to apply corporate natural capital accounting, and how to define and deliver ‘net gain’ for infrastructure projects), the direction of travel in this respect, and the related knowledge needs;
- **the extent to which these knowledge needs may be supported by existing output from R&I** (e.g. data, tools, methods, models) and **how uptake of this output may be accelerated** (e.g. through collaborative working between the research and business communities, filling knowledge gaps); and
- **what further R&I investment may be needed** to support the sector in measuring and valuing nature, and **what role the Natural Environment Research Council (NERC), or other funders, may have** in supporting that.

This was the first in a series of Round Tables commissioned by the NERC Innovation Team² and delivered by the Valuing Nature Programme³. Subsequent Round Tables focus on land management/agriculture (Nov 2018) and insurance/financial services (Jan 2019).

NERC, as part of UK Research & Innovation (UKRI) are interested in stimulating **benefit to the UK economy from publicly funded UK environmental research**, by enabling businesses to access the latest research. The Round Tables therefore focus on businesses with significant operations in the UK (not necessarily UK-owned), but may also consider how these businesses are integrating natural capital in their business decision-making internationally.

² Infrastructure, risk management, food systems, natural resources, environmental data... – <http://www.nerc.ac.uk/innovation/activities>

³ <http://valuing-nature.net>

1.2 Participants

The Round Table brought together representatives (see *List of Participants, Annex 1*) from across the infrastructure sector, including:

- transport infrastructure (roads, railways)
- utilities infrastructure (energy distribution networks, power generation, water)
- environmental management (flood, water and waste management, and large-scale green infrastructure)
- integrators of environmental science involved in projects subject to national infrastructure planning⁴ (e.g. engineering consultancies, large-scale developers, construction companies).

⁴ for scope of projects, see <https://infrastructure.planninginspectorate.gov.uk>

2. Overview of current activity

Participants recognised the area of measuring and valuing natural assets was a fast developing one, and noted it is difficult to be fully aware of current work. Each organisation was therefore asked to first address the following questions to set the context for subsequent discussion:

- *What is your business currently doing in relation to measuring and valuing natural assets?
What are you aware others are doing?*
- *What is your business's future ambition in this regard?*
- *What are the drivers for this?*
- *What are the enablers and barriers?*

NATIONAL GRID

Current activity/direction of travel

Currently working at a fairly high level to build capacity across the business on natural capital and ecosystem services. Applying the Defra Biodiversity Metric with a view to delivering biodiversity net gain in infrastructure developments. The focus is on the company's non-operational estate, notably corridors beneath power lines.

Drivers

- National Planning Policy Framework (NPPF).
- 25 Year Environment Plan (25YEP).
- Agreeing on metrics and values for natural assets (other than carbon), which can be widely recognised and agreed among stakeholders.

Barriers/limitations/challenges

- Lack of granularity in the data.
- Ecosystem services data is generic, not specific/pertinent to infrastructure.
- Challenges in differentiating public and private benefits, and in differentiating local, national and global benefits.
- Generating cross-organisational buy-in, developing internal capacities and resources.

Reports/tools used

- Defra Biodiversity Metric.

LONDON UNDERGROUND

Current activity/direction of travel

Delivering Mayor's Transport Strategy for London 2018, including policy on the natural environment. Working on a qualitative analysis of natural assets involving GIS-based biodiversity mapping. Also looking at how/where to retrofit green infrastructure, where possible from a civil engineering perspective including through influencing neighbours and stakeholders. Making good progress on reducing carbon emissions, and new green infrastructure, e.g. tree planting, SUDS. Looking to embed a circular economy approach in TfL operations.

Drivers

- Transport Strategy for London.

UKWIR

Current activity/direction of travel

Valuing and measuring natural assets has been on the water industry's radar for a long time. Water infrastructure is intrinsically linked to the environment. Built infrastructure is not always the most cost-effective solution but gives more certainty of results, soft/green solutions may be more cost-effective but results are less certain. Valuation of wider environmental and social benefits is very important in order to take stakeholders along with you – notably regulators. In terms of direction of travel, it would be helpful to develop a flexible, overarching framework for measuring and valuing natural assets – for example incorporating values for water, transport infrastructure, agriculture, etc. – that all sectors can use and share but is flexible to the needs of differing sectors, and can reveal overall multi-sector costs and benefits for UK plc.

Drivers

- EU Water Framework Directive.
- Five Yearly Asset Management Plans.
- Lack of standard approach for measuring and valuing costs and benefits.

Barriers/challenges

- The industry is very interested but is heavily regulated which can be a barrier to innovation; regulators are less willing to accept the uncertainty associated with soft/ green solutions.
- Water has traditionally been an asset-centric industry, other sectors less so, so needs differ (however, in the water industry, significant steps have been made to progress adoption and installation of green infrastructure).

- Developments on measuring and valuing natural assets are fast moving and it is difficult to demonstrate impact.

Reports/tools used

- UKWIR Report 2016.⁵
- UKWIR tool developed for water industry to enable them to assess and value the natural capital and social benefits of assets and activities.

ATKINS

Current activity/direction of travel

Engineering consultancy work on HS2, other rail, motorways and highways — clients realising environment net gain is important and want to know how to achieve this and what tools are available. The Defra Biodiversity Metric is not perfect. There are lots of tools available but it's deciding which ones are the best to pick for clients' needs. Atkins are involved with CIRIA on development of guidelines for application of net gain principles. Recently worked on valuation of London Wildlife Trust reserve in relation to an application for Lottery funding.

Drivers

- NPPF (NB: NPPF is currently under review, net gain currently not mandatory but may become so)⁶.

Reports/tools used

- CIRIA Biodiversity Net Gain Principles, forthcoming CIRIA guidance on net gain in construction.

Barriers/challenges

- Lack of standard approaches; different tools give different answers.
- Need a suite of tools that can be applied depending on what is appropriate for client aims and what input data is available.

⁵ UKWIR (2016) Benefits and limitations of integrating Natural Capital Accounting (NCA) and Ecosystem Services Assessment (ESA) into water company activities. Reference 16/CL/04/14

⁶ Update (April 2019): The Chancellor in his Spring Statement indicated that net gain would indeed be made mandatory in the forthcoming Environment Bill.

WILLIS TOWERS WATSON (WTW)

Current activity/direction of travel

WTW assesses risk for insurers and businesses, including risk to major infrastructure, in relation to major natural hazards. The business is very international. Risk is expressed in terms of average annual loss (AAL). Insurance is about the many sharing the misfortunes of the few — a stronger risk narrative helps reduce the cost of insurance and capital. In strengthening the risk narrative, the insurance industry is increasingly interested in understanding how natural assets affect risk. Coastal wetlands, coral reefs, mangroves reduce risk related to storm surge, so damage to these features causes AAL to rise. Presence/absence of certain species can affect health of natural assets, e.g. parrot fish (Scaridae) help maintain healthy coral reef which protects against storm surge damage. There is more to be done to connect assets — including natural assets — to climate risk, and to consider the role of infrastructure, including green infrastructure, in reducing climate risk. There is a need to develop a robust and quantitative narrative of risk incorporating consideration of natural assets. Related to this is the emergence of resilience bonds to finance green and grey infrastructure that enhances resilience in the face of climate change.

Drivers

- Task Force on Climate-related Financial Disclosures (TCFD) is developing voluntary risk disclosures for companies to inform stakeholders and investors of the impact of climate change. However, consideration of the role of natural assets is, so far, less well developed.

ARUP

Current activity/direction of travel

ARUP has been working in this space for 8 to 10 years, for example on Humber Estuary coastal realignment. Currently road-testing the Natural Capital Protocol for Yorkshire Water, but finding the approach too reductionist — works better for supply chains, less good for asset management. Company-wide adoption of the UN Sustainable Development Goals (SDGs) is shaping future project delivery and business development — aspiration to inform and guide clients in achieving SDG targets. At the moment there is perhaps a failure to fully appreciate the role of natural capital in delivering many SDGs and accompanying targets. SDGs 14 and 15 (Life on Land, Life below Water), which essentially relate to biodiversity, will require engagement and understanding of the associated operational challenges.

Drivers

- SDGs (especially 14 and 15) underpinned by Aichi Targets.

Barriers/challenges

- Dealing with complexity of natural systems, with tools that are too reductionist, i.e. issues relating to scale, transboundary impacts/benefits, e.g. the contribution of managed coastal realignment and resultant creation of local fish nurseries to international stocks.
- Absence of good data is a limiting factor for ecosystem assessments. Natural capital values often appear skewed/small compared to other defined categories and traditional values, e.g. land/property values, because it is difficult to quantify qualitative/intangible assets.

- There is a need to plan for the natural environment in the same way we plan for infrastructure; tools to integrate both natural and social capital considerations are needed for this. Ideally this should be undertaken via a Total Value Approach — integration of elements of value relating to natural and societal factors, which are considered to be more difficult to capture and monetise, yet critical to making informed decisions.
- Need for better understanding of thresholds and tipping points, marginal change in ecosystem services.
- More research and innovation on financing natural capital.

Reports/tools used

- Natural Capital Protocol.

WSP

Current activity/direction of travel

WSP have a rapidly growing environmental services team. There is ongoing BSI Group work to develop a British Standard on natural capital — a standard will be helpful but needs to allow flexibility to work for different sectors.

Barriers/challenges

- Bringing together natural capital, ecosystem services and biodiversity considerations is a challenge; there is ongoing work by the Natural Capital Coalition and Cambridge Conservation Initiative to integrate biodiversity in to the Natural Capital Protocol.
- There is also a need to develop a multi-capital approach integrating natural and social capital.
- There is currently considerable duplication of tools and efforts between academia and practice.

KIER UTILITIES

Barriers/challenges

- There are differences between infrastructure sectors — e.g. the water sector is very keen on addressing natural assets, the power sector less so.
- Industry has good economic and social calculators but not good biodiversity calculators — there is a need for something straightforward and easy to use.

HS2

Current activity/direction of travel

HS2 has a 'seeking no net loss' principle. HS2 is working on a 'green corridor initiative' (beyond the HS2 development 'red line' boundary) and will provide considerable funds for landowners to enhance biodiversity (woodland fund, community and environment fund). HS2 is feeding into various initiatives in relation to biodiversity net gain — HS2 is aware of work underway on a BSI standard on natural capital/net gain, CIRIA guidance on net gain, updating of the Defra biodiversity metric. The NPPF is currently under consultation, including whether net gain should be made mandatory (it is currently up to planning authorities to interpret the NPPF intention to deliver net gain).⁷

Drivers

- NPPF no net loss requirement.
- 2020 Biodiversity Strategy.
- 25YEP (though not very detailed).

Barriers/challenges

- Uncertainty pending outcome of NPPF consultation — will net gain become mandatory?
- There is a need for standard metrics, and more guidance on equivalence of natural assets across different habitat types — 'biodiversity units'.

⁷ Update (April 2019): The Chancellor in his Spring Statement indicated that net gain would indeed be made mandatory in the forthcoming Environment Bill.

NETWORK RAIL (NR)

Current activity/direction of travel

This is a dynamic area for NR, which is the fifth largest landowner in the UK. Railway networks naturally provide wildlife corridors. Current activity includes:

- Biodiversity information Management: making use of external data and data generated internally to inform planners and route managers.
- Biodiversity accounting: internal standard (June 2018) mandates biodiversity accounting using an internal tool and the Defra metric on all projects (over a certain size).
- 6 pilot projects on biodiversity net gain — to deliver learning for wider application across the company (though currently no company-wide net gain commitment).

NR's current contract period (CP5) ends March 2019 — NR has a biodiversity net gain commitment (for high value projects) under CP6. Also aspire to apply the Natural Capital Protocol and value ecosystem services.

Drivers

- 25YEP.
- NPPF (but NPPF is less stringent than the requirements for large-scale infrastructure such as HS2, and small projects do not fall under NPPF).
- Natural Environment and Rural Communities (NERC) Act 2006 poorly written in terms of requirement to take account of biodiversity.

Barriers/challenges

- Difficult to balance managing trackside vegetation for biodiversity versus safety of the rail network (e.g. tree branches causing obstructions, 'leaves on the line').
- Challenges to join up biodiversity, natural capital and ecosystem service considerations.
- Inconsistency in tools.
- Difficulty in finding local sites for biodiversity offsets (and assessing equivalence if not local).
- Cultural challenge — the rail sector is a very engineering-based, asset-driven sector so considerations of green issues is quite alien.

HIGHWAYS ENGLAND (HE)

Current activity/direction of travel

Sustainable development is written in to HE's licence. HE's sustainable development strategy recognises the various capitals — financial, social, human, environmental. Delivery plan includes a metric to reduce biodiversity loss. Currently working towards developing approach with a view to Road Period 2 (starts 2020). An internal memo sets out the approach to measuring biodiversity units; like the Defra metric, these take into account distinctiveness and condition of ecosystems. HE aspires to make biodiversity units tradable to facilitate compensation/offsetting, and looking to integrate consideration of ecosystem services and the intrinsic value of biodiversity in this. Also interested to develop an approach to assess natural capital values in financial terms to inform project appraisals. HE has dedicated innovation funding available to progress these issues.

Drivers

- Highways England Sustainable Development Strategy.

Barriers/challenges

- No common language of 'value' of the environment.

UNITED UTILITIES (UU)

Current activity/direction of travel

The water industry has been working on these issues for the past 10+ years. UU is both a utility company — taking water out and putting effluent back in — and a large landowner (10th biggest in the UK, major landholdings in NW England). The Water Framework Directive (WFD) sets water quality requirements — treatment does not necessarily deliver these, so UU works on catchment management to improve water quality. Land management and water quality models are being merged to provide new perspectives on how to deliver quality standards.

UU has developed comparative natural capital accounts, using the Natural Capital Committee's method (with help from a secondee from Natural England), to explore what value UU brings to NW England and how to get the most out of the land asset. The accounts reveal that the major value of the asset to the public derives from recreational use, whilst the major value to the company is water supply.

Looking at setting up markets for ecosystem services to deliver catchment management, considering how to capture value from stacking benefits, e.g. water supply, carbon storage, flood protection, biodiversity. This involves identifying and working with the various beneficiaries and speaking new languages.

Drivers

- EU Water Framework Directive and UK water regulations – the industry is highly regulated, making innovation in this space difficult.

Barriers/challenges

- Major challenge is to make a convincing case for investment in natural capital by identifying how to deliver benefits to the company (greater return on the assets), share costs and benefits among beneficiaries, and deliver benefits to local communities.
- Need a common language that works across stakeholders.

EDF ENERGY

Current activity/direction of travel

EDF's main focus, in operating nuclear power plants, is on hazard and risk. The concern is to protect plants from extreme (one in 10,000+ year) events. The industry is very heavily regulated with safety the priority. The industry also has lots of ageing assets so decommissioning is a major issue. As regards new build, looking at slightly more adaptive measures. In the past, the focus was on hard engineered (grey) solutions – is there now a role for combining green and grey solutions and how can EDF and the regulator (the Office for Nuclear Regulation) be confident this can perform as well as grey solutions alone? E-RISE is a NERC-funded project with the University of Southampton focussing on the risks related to sea level rise, including marine ingress and mapping of problematic species occurring near plants (e.g. jellyfish swarms). The focus is currently more on getting a handle on which species occur than on attaching values.

BARRATT

Current activity/direction of travel

Barratt is a construction company active in infrastructure. The company has a biodiversity and ecology policy and seeks net gain in the context of planning and permitting. The focus is on quality and quantity of biodiversity as opposed to financial valuation, but consideration is also given to societal values. Involved in current initiatives on net gain including CIRIA guidance, NPPF consultations on making net gain mandatory, Natural England update of the Defra offsetting metric, BSI committee on net gain. Work on valuing natural capital will follow on from net gain work – there is a need to bring together these net gain and valuation strands. Barratt also addresses carbon emissions and has a commitment around sustainable timber use.

Drivers

- NPPF expectation of no net loss and net gain where possible.
- Operational considerations (reduced planning delays if biodiversity is carefully considered).
- Reputational considerations.

Barriers/challenges

- Need for evidence of how biodiversity benefits the business.

Reports/tools used

- BSI committee on net gain (in production).

CIWM

Current activity/direction of travel

The waste sector currently sees measurement and valuation of natural assets as a means to accelerate planning approval at specific sites. There is to some extent a trade-off between using measurement and valuation in order to get an application through the planning system, and taking a more holistic approach for genuine shared benefit.

Barriers/challenges

Overall, the sector is not sure how to address this issue. Existing natural capital tools do not adequately take into account the natural capital benefits of using recycled materials (compared with using raw materials) or those arising from lower pollution. How can natural capital measurement and valuation capture the benefits of site restoration, e.g. through anaerobic digestion of waste to feed back in to soil?

ENVIRONMENTAL SERVICES ASSOCIATION UK

Current activity/direction of travel

Waste sector not currently using the concept of natural capital — focus is on carbon accounting and landfill restoration. Waste and recycling are more about flows than assets — how can we account for the benefits in terms of reduced pressures on raw materials and nature?

Drivers

- Waste sector recognises increasing signals from government on natural capital. Finance is also increasingly looking at sustainability targets.

Barriers/challenges

- There is a need for a shared framework on measuring and valuing natural assets.

3. Knowledge gaps/R&I needs

The Round Table addressed the questions:

- *What knowledge/tools/data do you already have, what are the gaps, how might these be filled?*
- *What should R&I investment focus on, to be of most use to the sector?*
- *How might R&I investment most usefully be structured for businesses to engage?*

Discussion centred on the following issues. In the following, the term ‘natural assets’ incorporates the notions of natural capital stocks, the ecosystem services that flow from these stocks, and biodiversity (which, as an element of natural capital, underpins ecosystem function and the flow of ecosystem services).

New knowledge

- **Research on appropriate boundaries for natural capital accounting (NCA)**, perhaps somewhat analogous to carbon emissions Scope 1, Scope 2 and Scope 3 accounting and reporting. This might include questions such as: (a) to what extent should valuation include upstream and downstream impacts and dependencies? (b) how do you value local vs. global benefits? (c) what should be excluded from the valuation and simply retained as uncertainty (e.g., in assessing risk, there are always some risks which cannot be modelled and are treated as uncertainty).
- **Research on how to establish markets for natural assets that are good for both nature and society** – including consideration of equivalence of natural assets across geographical locations and habitat types (some reservations were expressed about trading in natural assets, it raises many questions ethically, socially, technically).
- **Research on the risks of monetising and trading natural assets** – e.g. how to balance monetary value versus intrinsic value, can we capture intrinsic value, what are the ethical issues involved in this, and what checks and balances would need to be in place to avoid perverse/unintended consequences.

- **Research on the implications for natural assets of using primary raw materials vs. recycling and re-use** – is this advanced Life Cycle Assessment or something more and what data is needed for this? E.g. how does plastic recycling benefit marine biodiversity?
- **Research on how to measure and value natural capital (including wide scale benefits) with a view to achieving an optimal mix of green and grey infrastructure** – how can the values of natural capital be factored in to decisions on green vs. grey?⁸
- **Research on use of the Environment Agency’s natural capital calculator⁹ in relation to enforcement undertakings** – to what extent is this delivering uplift in natural assets?
- **Development of a common currency for valuation of natural assets.** There is utility in a monetary value (£) for those elements that can be monetized, but it would be helpful to capture also non-monetary values such that these are not treated as zero – in particular to communicate with boards and help ensure that natural assets are given due weight in decision-making. This helped a lot with carbon (though natural assets are of course more complex) – it may be helpful to review lessons learned from valuing carbon.¹² However, it was also suggested that the focus might be less on valuation and more on what is the right thing to do – natural asset values in many instances may be too low to have any impact on decisions.
- **Development of a toolkit**, bringing together the many existing methods and tools for measurement and valuation on natural assets, comparing approaches across sectors (which tools/methods work better in which situations and with what data?), consolidating (where appropriate) methods and tools, enhancing interoperability and filling gaps.¹³
- **Development of new methods and tools** for measurement and valuation of natural assets by business, including: (a) methods/tools that are not overly reductionist (e.g. in treatment of biodiversity and ecosystem services), but at the same time not overly complex; (b) methods and tools that combine valuation of both natural and social assets/capital; (c) methods and tools that integrate consideration of marginal change, thresholds and tipping points in ecosystems.

Development of frameworks, standards and tools

- **Development of frameworks, standards and guidance**, which work flexibly across sectors, for the measurement and valuation of natural assets.¹⁰
- **Enhancing availability of relevant data** – addressing issues such as the required granularity of the data, specificity of the data to the sites of business operations, supply chains, access to data.¹¹

⁸ To some extent this may be addressed by ongoing H2020-funded work on nature-based solutions.

⁹ Though note this has a limited remit and is sector specific.

¹⁰ Care is needed here not to re-invent the wheel but to assess carefully what more may be needed.

¹¹ The level of required granularity is likely to be sector specific.

¹² Including failures.

¹³ Again care needed here not to re-invent the wheel – there would be a need to consider to what extent such functions are addressed by existing and forthcoming initiatives, e.g. Natural Capital Coalition’s [Natural Capital Toolkit](#), Ecosystem Knowledge Network’s [Tool Assessor](#), EU H2020 Valuing Nature Network, [We Value Nature](#), [The Social and Human Capital Coalition](#)

- **Mapping ecological opportunity at scale** (UK or country scale) to identify where investment in natural assets can deliver ‘biggest bang for the buck’ in terms of ecological benefit – including research on equivalence of natural assets across habitat types and locations. A number of counties have already done such mapping.¹⁴ This can help businesses contribute to ecological restoration through offsetting development impacts beyond the conventional boundaries of a development (the ‘red line’) to achieve net gain and supports the increasingly important agenda around regenerative landscapes.
- **Development of agreed common definitions/language/terms** relating to the measurement and valuation of natural assets.
- **Establishment of a pre-competitive space for innovation in relation to natural assets** – are there lessons that can be learned on this, e.g. from EPSRC work with the automotive industry?
- **Research and scenario-building to identify key opportunities to enhance natural assets in relation to the UK National Infrastructure and Construction Pipeline.** This might include pilots/demonstrations for green infrastructure linked to a major development initiative (e.g. Oxford—Cambridge corridor), complementing the mandatory environmental assessments that developers will do with a view to optimising outcomes for natural assets.
- **Research and innovation action on how to take catchment management for natural assets to scale and to pilot this,** engaging multiple beneficiaries, who benefits, who pays and issues around systemic connectivity and inter-dependencies.¹⁵

Innovation, scaling

- **Research on how to accelerate uptake by business of natural asset considerations in decision-making,** how to move beyond the front runners, get to scale – what lessons can be learned from the carbon emissions experience, or other issues which have gone to scale (e.g. antimicrobial resistance, AMR), what role for leaders, professional associations, etc.
- **Proof of concept/demonstration of approaches and methods and peer-to-peer learning across sectors** in real-world market contexts – there is a role for academia working with business to translate research into practice, accelerate methodological improvements and enhance rigour and independence of findings.

Making the case for natural assets within business

- **Examining how biodiversity can be recognised by business as a ‘material’ issue.** Businesses respond to ‘material’ issues, i.e. issues that have a significant impact, e.g. on return on investment, risk, reputation, social value. This might be attained through regulation and/or investor sentiment – what role might each play (e.g. a mandatory requirement for net gain in development)? What knowledge is needed to achieve this?

¹⁴ The Nature Recovery maps produced by the wildlife trusts are relevant, see <https://www.wildlifetrusts.org/nature-recovery-network>. The CEH landcover map is also of relevance here: <https://www.ceh.ac.uk/services/land-cover-map-2015>.

¹⁵ This could build on extensive existing research and pilot studies across UK and EU, e.g. West Country Rivers Trust NE/DEFRA pilots.

- **Research into the relevance and value of natural assets for business resilience in the face of climate change.** What would the ‘do nothing’ option mean in terms of resilience? What habitats and species offer greatest functionality for resilience?¹⁶ How might investment in natural assets help meet corporate climate change objectives?¹⁷

Financing business innovation and projects related to natural assets

- **Research on the bankability of projects/innovations that create/restore natural assets,** e.g. how to make a sufficient return on investment, how to incorporate the value of natural assets for climate change adaptation and/or mitigation (in terms of avoided costs) in investment decisions?
- **Research on how best to deploy finance for natural assets.** What kinds of investments give greatest ecological returns? How can impact investment be shifted to focus more on natural assets?

Training and capacity building

- **Investment in new research and innovation skill sets** (not just knowledge exchange) to meet the needs of business in relation to measuring and valuing natural assets – e.g. skills in natural capital valuation in practice, and in operating and communicating at the nature-business-finance interface.

Dissemination and communication

- **Development of a knowledge hub** which brings together relevant knowledge and experience on measuring and valuing natural assets, including the business case for this, horizon scanning on this issue, linkages between business initiatives and academic R&I, opportunities to take forward business-academia collaboration.¹⁸ This would need to be done in a safe environment allowing frank and open exchange between business and academia.
- **Research on what might shift public opinion in favour of measuring and valuing (and trading?) natural assets** – the role of influencers and reputable users.¹⁹

¹⁶ see: Davies, H. et al. (2014) *Review of literature – how transport’s soft estate has enhanced green infrastructure, ecosystem services, and transport resilience in the EU.* Natural England Commissioned Report NECR169. ADAS.

¹⁷ Links to research and innovation on nature-based solutions.

¹⁸ Again, care needed here not to duplicate existing online resources.

¹⁹ A potentially divisive area of research, to be addressed with due care.

4. Next steps

A cross-sector analysis will be made of the findings from this and two other sector Round Tables. This analysis will underpin co-creation of a future research and innovation agenda related to measuring and valuing natural assets.

This Round Table has revealed the range of activity going on across the infrastructure sector of relevance to the measurement and valuation of natural assets, and identified a wide range of research and innovation needs in this regard.

The Valuing Nature Programme ran two further sector Round Tables for UKRI, one addressing the land management sector (November 2018) and one addressing the insurance/financial services sector (January 2019). We anticipate that there will be a good deal of common ground in terms of research and innovation needs across these three sectors.

The findings from all three Round Tables will be analysed with a view to identifying this common ground (as well as differences), and where there may be greatest opportunity for academia to contribute to business (and policy) in the realm of measuring and valuing nature. This analysis will be shared in due course with participants of all three Round Tables to obtain feedback and will subsequently be published in an options and analysis paper in 2019.

A longer-term view is towards the co-creation, with business and policy-makers, of a future research and innovation agenda related to measuring and valuing natural assets. This would involve further activity, such as a possible cross sector workshop bringing together the sectors involved in Round Tables 1, 2 and 3.

Annex 1 – List of participants

Surname	Name	Position	Organisation
Canning	Kate	Associate & UK-MEA Research Champion	Arup
Church	Colin	Chief Executive	CIWM
Dobson	Jonathan	Sustainability Strategy Manager	United Utilities
Duke	Guy	Business Champion, Valuing Nature Programme	GD NatCap Ltd
Edmonds	Jamie	Head of Environment	Kier Utilities
Fletton	Mandy	Senior Programme Manager	UKWIR
Forrest	Libby	Policy & Parliamentary Affairs Officer	ESAUk
Gascoigne	Jon	Senior Risk Adviser Capital, Science & Policy Practice	Will Towers Watson
Hails	Rosie	Director Biodiversity & Ecosystem Science and Head of Programme Coordination Team Valuing Nature Programme	CEH
Holm	Colin	Senior Advisor (SD & Climate Change)	Highways Agency
Hughes	Ruth	Senior Programme Manager, Innovation Team	NERC
Jones	Clive	Network Manager – Biodiversity and Infrastructure Carbon	Network Rail
Kakouratou	Melina	External Risks Engineer Infrastructure Protection	London Underground
Merriman	Jenny	Head of Natural Capital, Biodiversity & Net Gain	WSP
Nyul	Helen	Group Biodiversity Manager	Barratt
Patmore	James	Biodiversity Manager	HS2
Plester	Chris	Senior Sustainability Adviser	National Grid
Pratt	Sarah	Head of Corporate Sustainability	Barratt
Read	Adam	Director of External Affairs	Suez
Shaffer	Paul	Associate	CIRIA
Skelton	Mark	Executive Director	Temple Group
Stratford	Charlie	Knowledge Exchange Fellow	CEH
Wansbury	Claire	Associate Director of Ecology	Atkins
Weatherby	Anita	Programme Manager, Valuing Nature Programme	CEH
Winter	Hugo	Research Engineer – Extreme Weather and Statistics Specialist	EDF Energy
Young	Peter	Chair, Business Interest Group, Valuing Nature Programme	Independent

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The Valuing Nature Programme is a 5 year £7M research programme which aims to improve understanding of the value of nature both in economic and non-economic terms, and improve the use of these valuations in decision making. It funds interdisciplinary research and builds links between researchers and people who make decisions that affect nature in business, policy-making and in practice. See www.valuing-nature.net

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Further information visit:
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