RT1 03

UK Research and Innovation – High-level Sector Round Tables

ROUND TABLE 1

Valuing and Measuring Natural Assets for Infrastructure

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Prince Philip House, 3 Carlton House Terrace, London, SW1Y 5DG

RELEVANT RESEARCH AND KNOWLEDGE EXCHANGE

This paper 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. It includes:

1. A brief overview of recent and ongoing research activity
2. A brief overview of relevant research output in terms of tools and methods
3. An example of a relevant tool
4. NERC Knowledge Exchange contacts
5. Knowledge exchange platforms

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1. OVERVIEW OF RECENT AND ONGOING RESEARCH ACTIVITY

A recent scour of research databases using the terms 'valuing nature', 'green infrastructure', 'natural capital' and 'ecosystem services' identified over 650 relevant projects with a combined value of £350M. This is predominantly made up of research grants (75%). It is likely that many of these projects may be producing output with potential utility to the infrastructure sector, though an analysis of this is beyond the scope of this brief paper. Moreover, the use of other search terms, for example 'environmental impact', 'offsetting', etc., might yield manay more research projects of potential relevance.

Of the 650 projects identified with the above search terms, 24 contain the word 'infrastructure' in the title (see Annex 1). These projects are particularly likely to deliver output of relevance to the infrastructure sector.

The extent to which projects work collaboratively with stakeholders – including business - varies, with some focussing on addressing specific gaps in scientific understanding whilst others take existing research and work with end users to maximise benefit to relevant sectors.

In general, knowledge exchange is becoming an increasingly important aspect of successful funding bids and working closely with potential users to deliver beneficial societal impacts is a funding requirement.

2. RELEVANT RESEARCH OUTPUT – TOOLS AND METHODS

Many different tools and methods for measuring and valuing natural capital and/or ecosystem services exist. The Joint Nature Conservation Council and NERC funded a piece of work to help users to identify the most appropriate assessment tool. The resulting 'Tool Assessor' is hosted by the Ecosystems Knowledge Network (***Table 1***).

Table 1 Overview of tools included in the Tool Assessor.

			Environmental setting			Ecosystem service categories represented			Experience of use			Software		
Tool	Multi scale	No. of models	Terrestrial	Freshwater	Marine	Provisioning	Regulating	Cultural	UK	Outside the UK	Open access	Excel	GIS	Web based
ARIES	✓	11	✓	✓	✓	✓	✓	✓		✓	✓		✓	
Benefits of SUDS (BeST)		19	✓	✓		✓	✓	✓	✓		✓	✓		
CoSting Nature	✓	7	✓	✓		✓	✓	✓	?	✓	✓		✓	✓
EcoServ-GIS		10	✓	✓			✓	✓	✓		✓		✓	
GI Valuation Toolkit		14	✓				✓	✓	✓		✓	✓		
i-Tree Eco	✓	7	✓				✓	✓	✓	✓	✓	✓		
InVEST	✓	18	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
LUCI	✓	9	✓	✓			✓		✓	✓			✓	
Natural Cap. Planning Tool		10	✓	✓		✓	✓	✓	✓			✓		
ORVal	✓	1	✓					✓	✓		✓		✓	✓
Participatory GIS tool		5	✓	✓	✓			✓	✓		✓			✓
SENCE	✓	/	✓	✓	✓	✓	✓	✓	✓	✓			✓	
TESSA		10	✓	✓		✓	✓	✓	✓	✓	✓			✓
Viridian		5	✓	✓			✓		✓				✓	

This Tool Assessor looks at 14 of the most commonly used tools and methods and, for each, provides a comprehensive fact sheet detailing the input data required to run the tool, the form of output produced, the geographic scale over which it can be applied, the land uses that it considers, and the cost, software and skill requirements to operate it This is an extremely useful and highly recommended resource for any person or

organisation wanting to find out more about the tools available for natural capital assessment.

3. EXAMPLE OF A RELEVANT TOOL

The excel-based the Natural Capital Planning Tool (NCPT) was initially developed through funding from the Royal Institute of Chartered Surveyors Research Trust, and subsequently tested, refined and delivered as an operational tool with funding provided by NERC.

The NCPT was developed to give local authorities, planners and developers a fit-for-purpose, easy-to-use tool enabling them to identify and deliver opportunities for environmental net gain, and also to assess the impacts a proposed development design may have on natural capital and ecosystem services over 25 years post-development. The tool considers a range of ecosystem services including space for recreation, the mitigation of flooding events and air quality regulation as well as their associated health and wellbeing benefits.

The tool has been applied to Central Bedfordshire, which is facing considerable development pressure with anticipated population growth of 30% by 2036. In order to accommodate this, it is expected that around 40,000 homes will be built over the next 20 years (together with related infrastructure including roads, energy distribution, water and waste water). At the same time, Central Bedfordshire Council recognises that its environment is "*key to its identity and widely valued by our residents, visitors and businesses.*" In this context, the NCPT was used to assess 8 potential sites brought forward for development in terms of both their location and design, against a policy goal of achieving 'environmental net-gain.

Development Impact Score
Average Per-Hectare

Ecosystem Service	Max Possible	Adjusted Scores	Min Possible
1. Harvested Products	+0.2	-2.33	-3.0
2. Biodiversity	+4.6	+0.27	-0.4
3. Aesthetic Values	+6.6	+0.98	-3.4
4. Recreation	+10.0	+4.68	+0.0
5. Water Quality Regulation	+2.3	+0.02	-2.3
6. Flood Risk Regulation	+3.0	+0.51	-0.0
7. Air Quality Regulation	+0.8	+0.11	-0.4
8. Local Climate Regulation	+5.4	+0.79	-2.7
9. Global Climate Regulation	+4.0	-0.32	-1.0
10. Soil Contamination		+0.00	
Development Impact Score		+4.71	

Figure 1 Example output from the Natural Capital Planning Tool for one of the sites assessed.

The results from the NCPT application indicate that, in principle, all assessed sites offer opportunities for enhancement of natural capital. As shown in Figure 1, recreation, which includes the physical and mental benefits associated with activities such as walking, sport and leisure in a natural environment, is the largest potential benefit. Assessment of planning design was more mixed and highlighted the importance of working closely with the planners and developers to make the most of net gain opportunities where possible.

Central Bedfordshire Council concluded that this approach provided an objective and simple means of assessing proposals put forward, working collaboratively with site promotors to negotiate enhancements to masterplans, and providing a measure of whether proposals are capable of achieving net gain in natural capital.

4. NERC KNOWLEDGE EXCHANGE CONTACTS

NERC currently funds several knowledge exchange activities focussing on natural capital and ecosystem services and with relevance to the infrastructure sector. These activities are targeted towards better collaboration between the academic and practitioner communities and are looking for opportunities to work closely with industry in order to understand how best use can be made of relevant science. Primary contacts for this are the NERC funded Knowledge Exchange Fellows.

- **Charlie Stratford**, Natural Capital and Healthy Local Economies: cstr@ceh.ac.uk
- **Alister Scott**. Mainstreaming green infrastructure: alister.scott@northumbria.ac.uk

5. OTHER KNOWLEDGE RESOURCES

A number of platforms bring together relevant knowledge on measuring and valuing natural assets for business. These include:

- **Ecosystems Knowledge Network –** UK Network sharing knowledge on practice of putting environment at heart of decision making
- **Valuing Nature Programme –** UK interdisciplinary research programme with business engagement focus
- **Natural Capital Hub** – Managed by the Natural Capital Coalition, a global multi-stakeholder collaboration aiming to harmonize business approaches
- **Cambridge Institute for Sustainability Leadership – Natural Capital Impact Group –** Aims to empower leaders from the worlds of business, government and finance in environmental sustainability
- **EU Business @ Biodiversity Platform –** Includes workstreams on natural capital accounting, innovation and finance

ANNEX 1

PROJECTS OF POTENTIAL RELEVANCE TO THE INFRASTRUCTURE SECTOR

This list was generated by searching the research database for the terms such as Natural Capital and Ecosystem Service, and then filtering out those whose title contains the word 'infrastructure'.

Funder	Reference	Title
NERC	NE/N017404/1	A Decision Framework for Integrated Green Grey Infrastructure (IGGIframe)
NERC	NE/R013853/1	A materials roadmap for marine infrastructure: a path towards enhanced ecological performance in a changing world
NERC	NE/N016971/1	A national benchmark for green infrastructure
NERC	NE/N017714/1	A National Scale Model of Green Infrastructure for Water Resources
NERC	NE/N017447/1	An Ecosystem Services Approach to Green Infrastructure Partnership Planning
NERC	NE/N019180/1	Arup Global Research Challenge: Delivering green infrastructure in cities through a new business model
NERC	NE/N018745/1	Arup Global Research Challenge: Novel technologies to understand relationships between green infrastructure and environmental quality in cities
NERC	NE/M008274/1	Co-creating railway flood resilience: applying the science of blue-green-grey infrastructure
NERC	NE/S00582X/1	Developing a 'GI4RAQ' platform to predict quantitatively the potential of strategic green infrastructure to improve roadside air quality at planning
NERC	NE/P01254X/1	EKN Tool Assessor: Facilitating the application of innovative tools in the assessment of ecosystem services, green infrastructure and natural capital
NERC	NE/R002681/1	Exchanging knowledge on the multiple values of urban green infrastructure in sub-Saharan Africa
NERC	NE/N017498/1	Green Growth: Increasing Resilience in Cities Through the Delivery of Green Infrastructure-based Solutions
NERC	NE/N013530/1	'Green infrastructure and the Health and wellbeing Influences on an Ageing population (GHIA)
Innovate UK	104014	Green Infrastructure Assets in Urban Heat Island (GIAUrban)
NERC	NE/M008169/1	Improved techno-economic evaluation of Blue Green Solutions for managing flood risk to infrastructure
NERC	NE/N017587/1	Injecting a Natural Capital Planning Tool into Green-Blue Infrastructure Management
NERC	NE/R009236/1	Integrated Green Grey Infrastructure Framework Accelerator

Funder	Reference	Title
NERC	NE/R00398X/1	Mainstreaming green infrastructure in planning policy and decision making: Translating NERC science into a co-produced spatial planning toolkit
NERC	NE/N005325/1	Open KE Fellowship - MEDIATE: Overcoming barriers to MaximisE Data potential for better blue-green-grey InfrAsTructurE
EPSRC	EP/N029488/1	The systemic city: Infrastructure interdependency and complex value business models
NERC	NE/N017730/1	Tools for planning and evaluating urban green infrastructure - Bicester and beyond
NERC	NE/N017773/1	Tree Selection for Green Infrastructure
EPSRC	EP/N030095/1	Urban green infrastructure: optimising local food and fuel production for regional sustainability and resilience
NERC	NE/N017927/1	Valuing Green Infrastructure Through Tree Assessment TooLs (VITAL)

More information about these projects can be found on the UKRI gateway to publicly funded research and innovation.