Application of an NCA approach on transport infrastructure projects

UNSD, October 2019

Ian Dickie (eftec)

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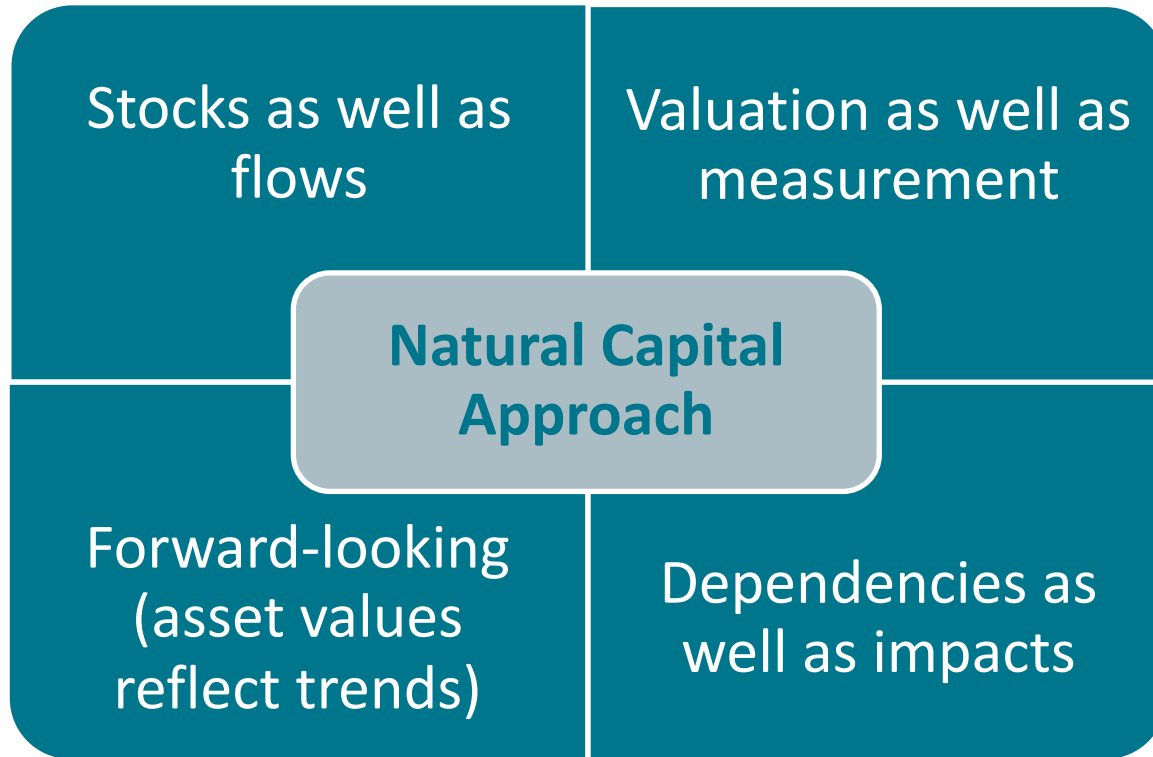
- Data sources: Air Pollutant Removal

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CNCA Method

- Developed for UK Natural Capital Committee (eftec, RSPB, PWC)

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/516971/ncc-research-cnca-guidelines.pdf

- Applied for 35+ Organisations in UK & Ireland:
  - Private Sector: Ports, Aggregates, Water
  - Public bodies: Forest Agencies, Scottish Natural Heritage
  - Local Government: Greater Manchester, London Boroughs
  - Sites: e.g. public parks

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The Natural Capital Approach

Stocks as well as flows	Valuation as well as measurement
Natural Capital Approach	
Forward-looking (asset values reflect trends)	Dependencies as well as impacts

Features of natural capital approach	Other approaches
Focuses on **stocks** of natural capital assets (quality and quantity) as well as **flows** of benefits	Ecosystem Services approaches, and indeed most economic analysis, focus on flows of benefits – as such they are inputs to a natural capital approach
Incorporates both **biotic and abiotic** natural resources	Ecosystem Services approaches consider biotic resources only
Assesses how both stocks and flows are likely to change in the **future**	Environment Social and Governance analysis and financial accounting mainly consider past performance
Considers both **dependencies** of an economic activity on natural capital and its **impacts** on natural capital	Most environmental regulation is about controlling the impacts of activities (such as reducing emissions); the implications of the impacts are considered separately
Uses **valuation*** of impacts and dependencies	Different approaches use different measures, mostly of impacts
Makes the links between all of the above, to support **systems-based thinking**	Research & decision making tend to be developed separately for different sectors or issues (like agriculture, water, biodiversity) even when they depend on the same natural capital assets

*Valuation is the process of estimating the relative importance, worth, or usefulness of natural capital to people (or to a business), in a particular context. Valuation may involve qualitative, quantitative, or monetary approaches, or a combination of these.

NATURAL CAPITAL COALITION

The Natural Capital Coalition is an international collaboration of the organizations who are working together to improve decision making by taking a natural capital approach. This summary paper was put together by one of the Coalition Organizations, eftec.

SUPPORTED BY **WE VALUE NATURE**

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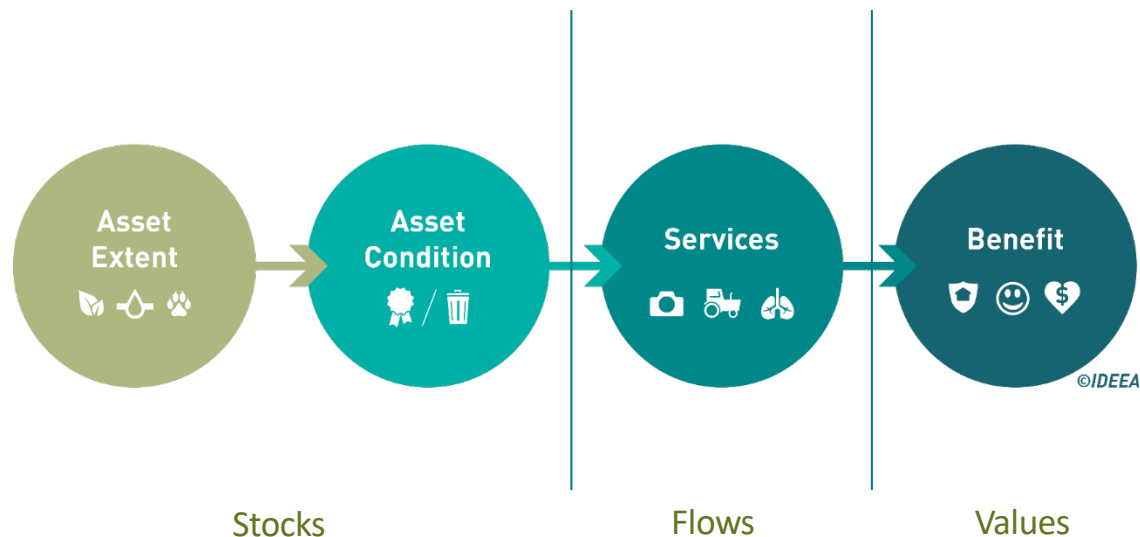economics for the environment

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Natural Capital Accounting – the Process

Answer to these key questions to….	…generate these natural capital accounting outputs
1. What natural capital assets do we own, manage or depend on?	**Natural capital asset register**
2. What flows of benefits do these assets produce for us and for the wider society?	**A physical flows statement**
3. What is the value of the benefits and to whom do they accrue?	**A benefit valuation statement**
4. What does it cost to maintain the natural capital assets and the flows of benefits?	**A schedule of maintenance costs**
5. What's the net impact of the business on natural capital?	**A natural capital balance sheet**

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CNCA vs SEEA-EEA

Core ecosystem accounting model

Asset Extent → Asset Condition → Services → Benefit

Stocks   Flows   Values

©IDEEA

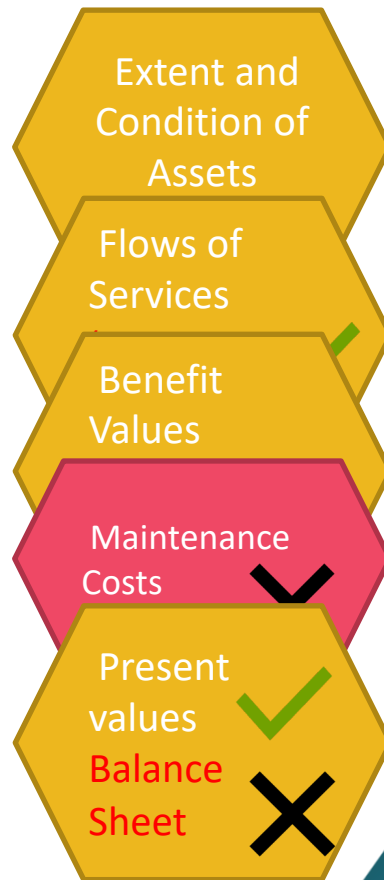- *Source: Natural Capital Coalition and Partners*

CNCA vs SEEA

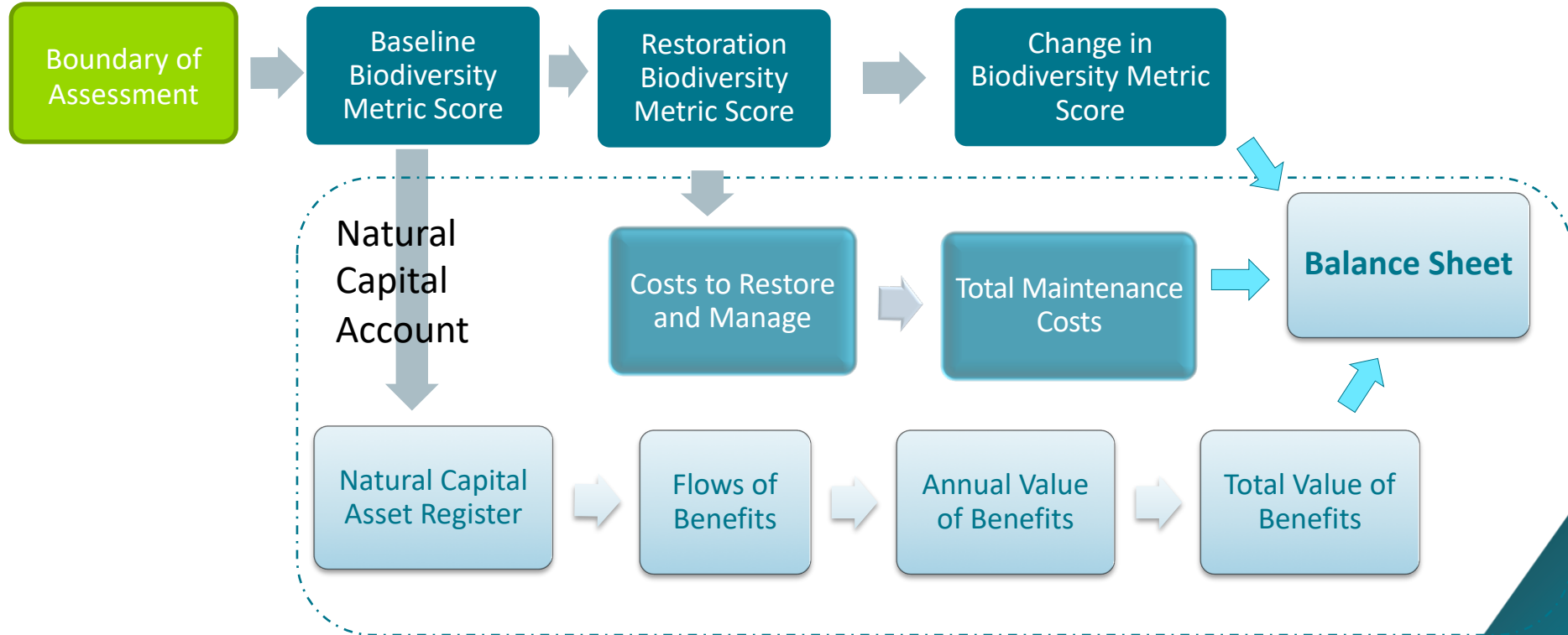| Answer to these key questions to….	…generate these natural capital accounting outputs
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Extent and Condition of Assets ✓

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CNCA vs SEEA

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Extent and Condition of Assets

Flows of Services

Benefit Values

Maintenance Costs

Present values

Balance Sheet

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CNCA vs Biodiversity Net Gain/NNL

Biodiversity and NC Accounting Process

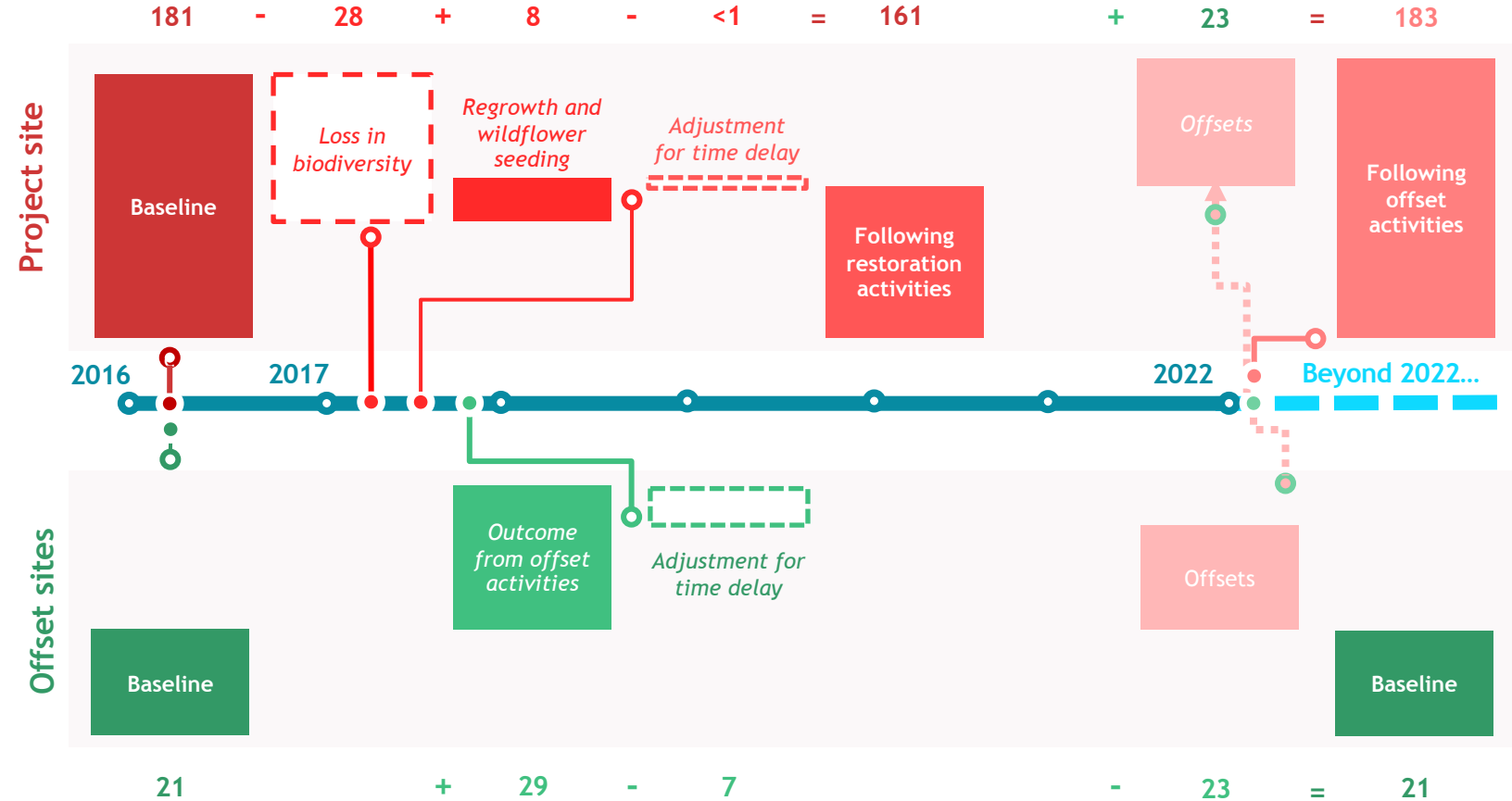# Example corporate balance sheet

At December 2018	Renewables		Total Value (PV £m)	Defra biodiversity metric score
	Private Value (PV £m)	External Value (PV £m)		
Assets				
Baseline Value	1,804	7,838	9,642	84,800
Cumulative Gains/(Losses)	-	-	-	
Additions/(Disposals)	-	-	-	
Revaluations and Adjustments	-	-	-	
Gross Asset Value	1,804	7,838	9,642	84,800
Liabilities				
Legal Maintenance Obligations	(25)	(4,826)	(4,852)	
Other Maintenance Provisions	(44)	-	(44)	
Total Net Maintenance Provisions	(69)	(4,826)	(4,896)	-
Total Net Natural Capital Assets	**1,735**	**3,012**	**4,747**	**84,800**

Present values calculated over 60 years using HMT recommended declining discount rates.

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CASE STUDY: TRANSPORT PROJECT UPGRADE: TIMELINE
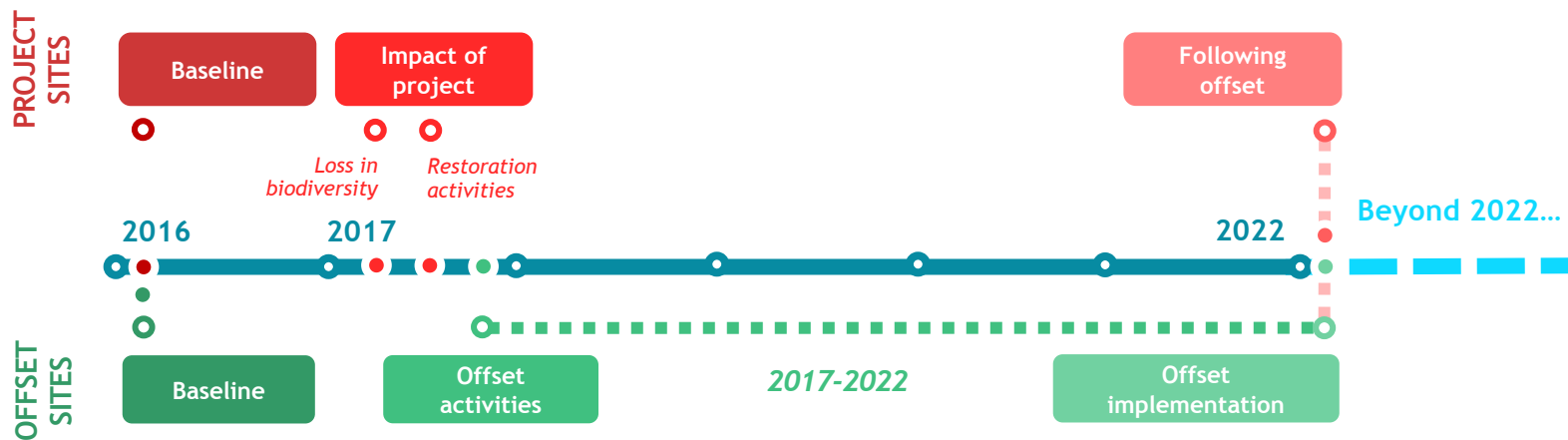
BIODIVERSITY OFFSET ACCOUNTS

Project site

181   -   28   +   8   -   <1   =   161   +   23   =   183

Baseline

Loss in biodiversity

Regrowth and wildflower seeding

Adjustment for time delay

Following restoration activities

Offsets

Following offset activities

2016   2017   2022   Beyond 2022...

Offset sites

Outcome from offset activities

Adjustment for time delay

Baseline

Offsets

Baseline

21   +   29   -   7   -   23   =   21

Case study: Applying the NNL/CNCA framework

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Project Balance Sheet

III. Offset outcome

Baseline year: 2016. Reporting year: 2017. Time period over which assets and liabilities are estimated: +50 years.

	Non-Renewables		Renewables				Total Value	
	Private	External	Private		External			
	£'m	£'m	£'m	Biodiversity Units	£'m	Biodiversity units	£'m	Biodiversity units
Assets								
1 Baseline value (2016)			-	180.5	6.2	-	6.2	180.5
2 Cumulative gains/(losses)			-	(19.7)	(1.1)	0	(1.1)	(19.7)
3 Additions/(disposals or consumption)			-	22.7	1.4	-	1.4	22.7
4 Revaluations and adjustments			-	(0.2)	-	-	0.0	(0.2)
Gross asset value	0	0	0	183.3	6.6	0.0	6.6	183.3
Liabilities			Private		External			
			£'m		£'m			
5 Legal provisions			1.3		-		1.3	-
5a Offset delivery			-		-		0.0	-
6 Other maintenance provisions			0.06		0.0		0.06	-
Total maintenance provisions			1.3		0.0		1.3	-
Total Net Natural Capital							5.2	183.3

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eftec et al work on 'Landscape Appraisal' for DfT (2019)

- Recommends use of ecosystem services (ES) to improve on current appraisal methods

- Key services to appraise:
  - Monetary: Recreation, carbon sequestration, air pollutant removal
  - Quantitative: water regulation
  - Qualitative: visual amenity of landscape

- Materiality of ES values in UK:
  - Project NPV: Low
  - Project design: Moderate
  - Project Mitigation: High

- *Source: https://www.gov.uk/government/publications/transport-modelling-and-appraisal*

Report

TEMPLE

January 2019

eftec TRL

Valuation of Landscape Impacts of Transport Interventions & Mitigations Using an Ecosystem Services Approach

National Ecosystem Accounting & Organisation/ Project Accounting - *data source example: air pollution*

UK Air Pollutant Removal by vegetation ecosystem account: logic chain
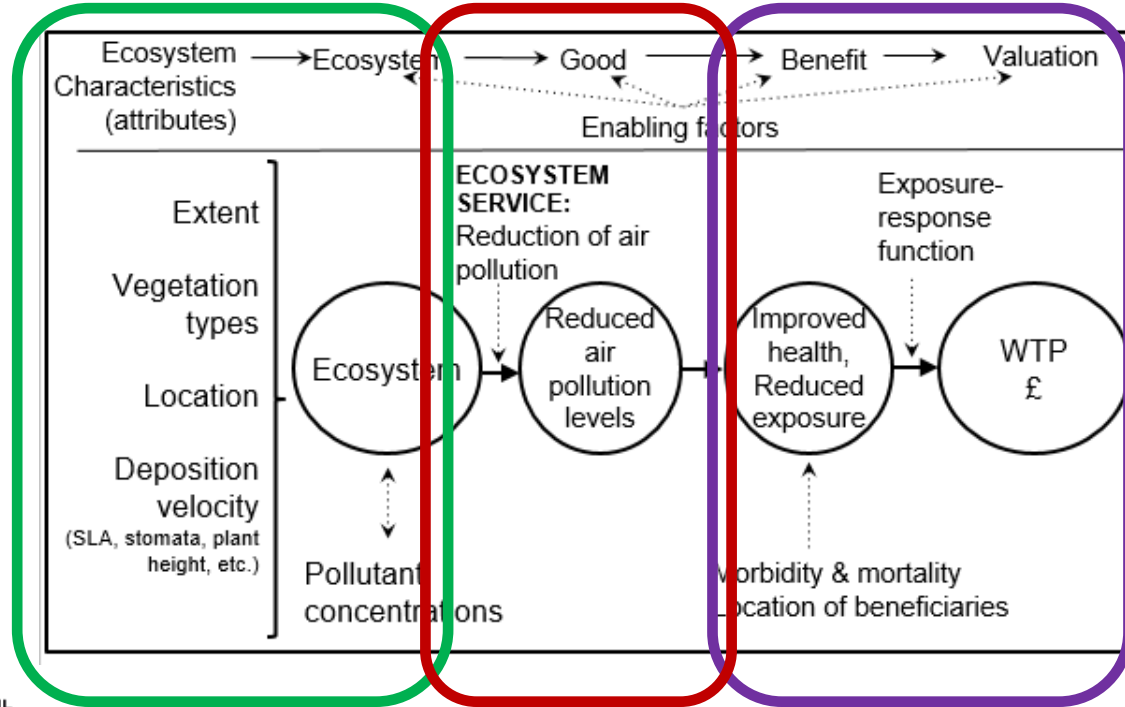
• *Source: Centre for Ecology and Hydrology*
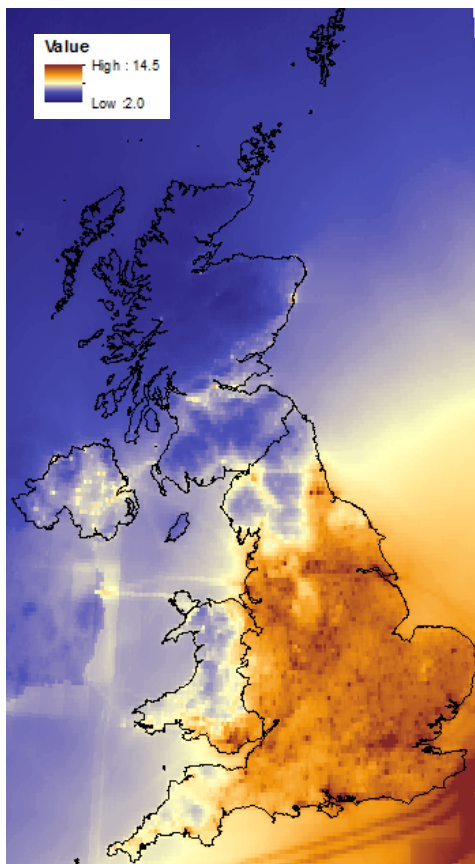
2015, ugPM2.5 base

2015, ugPM2.5 no veg
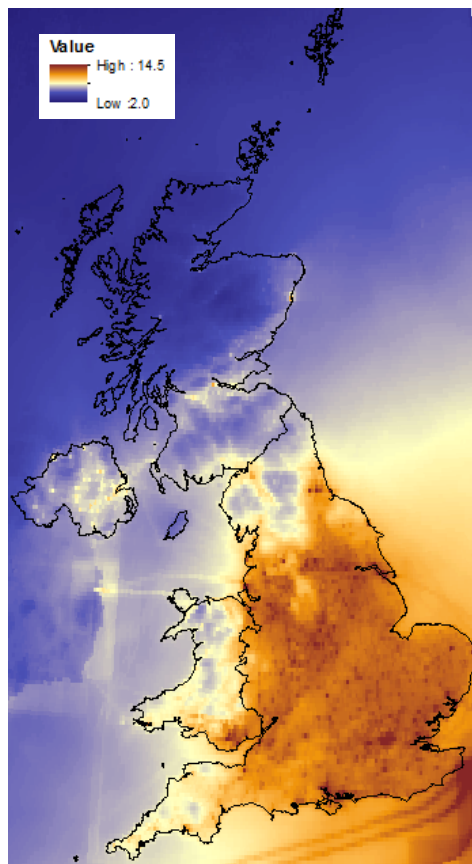
2015, ugPM2.5 difference
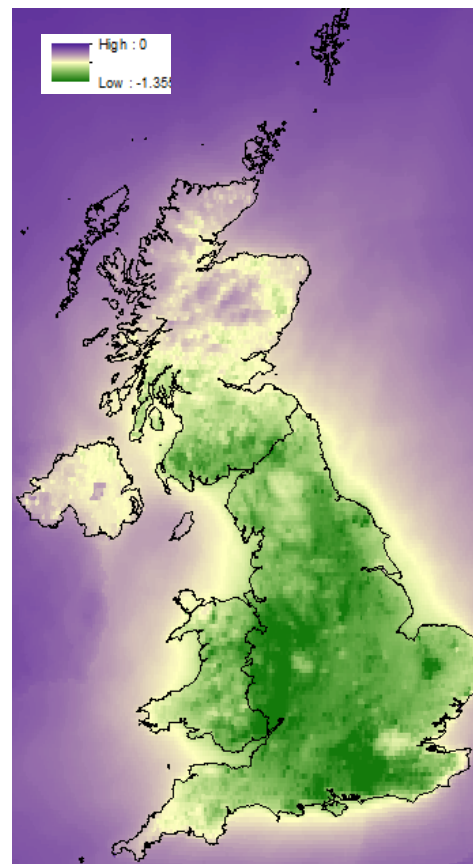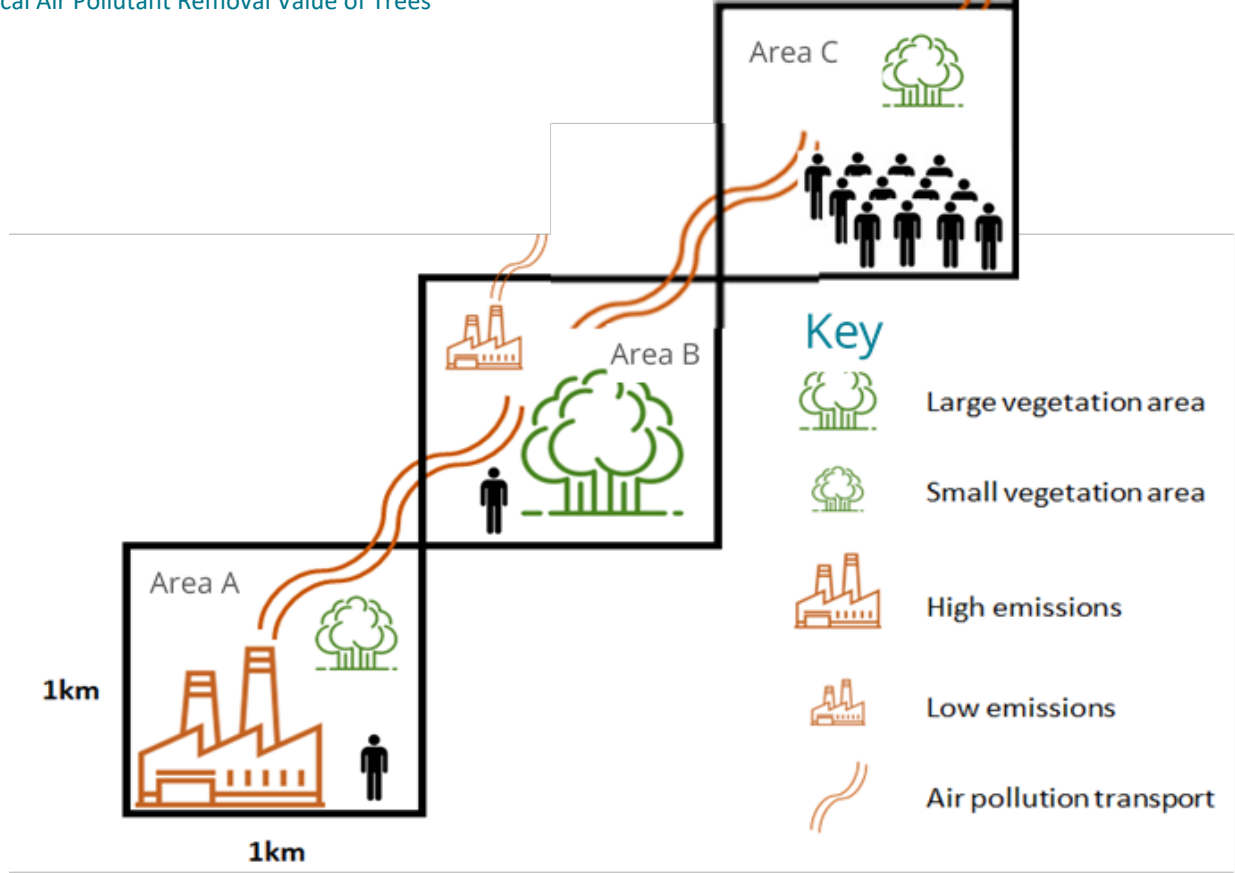
Pollutant Removal Modelling

- New approach – calculates change in concentrations dynamically

- Only covers PM2.5 removal by trees, so underestimates total impact/value

- Scale of analysis: Chemical interactions at 5x5 km; Vegetation types, 25 m

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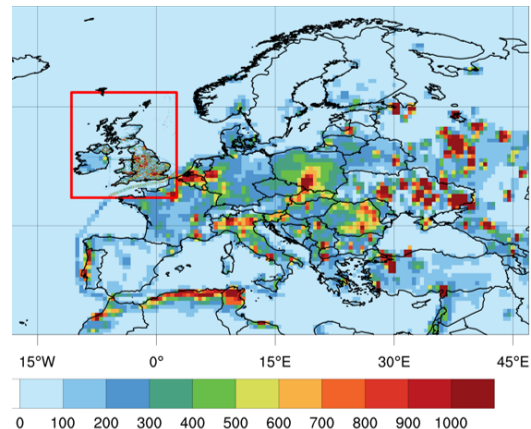
Free online tool

Pollution Removal by Vegetation

How to use the tool: *Click in a Local Authority of your interest on the map and information will be diplayed. If you wish to know information about planting or removing woodland in your Local Authority, please insert a number (possitive if you wish to plant and negative if you wish to remove) in the box on the left. If you wish to see a map of PM2.5 removed or values of the woodland by Local Authority please click in the radio buttons below 'Choose your Map'.*

Trees remove air pollution, and this has health benefits to society that can be valued. Values vary due to levels of pollution, population density, and other factors.

This tool allows users to explore the change in value resulting from new woodland planting, or removal of existing woodland, and its ability to remove PM2.5 pollution.
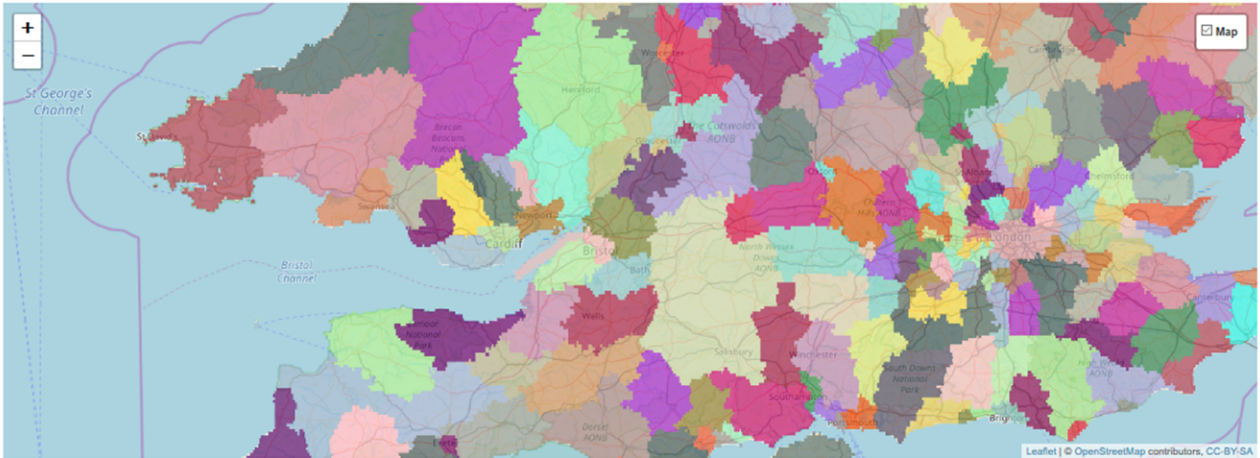
The tool is based on new modelling by the Centre for Ecology & Hydrology (CEH) and Economics for the environment consultancy (eftec). A more detailed explanation of the tool and assumptions behind the work in the button below.

⬇ More info about the tool

Area of woodland planted or removed (negative number) in hectares:

1

Choose your Map:
- ◉ Local Authorities
- ○ PM2.5 Removed
- ○ Value

- Local authority scale
- Physical data on pollutant removal
- Asset values by LA for total area of woodland and per hectare

Demonstration (1)

Demonstration (2)

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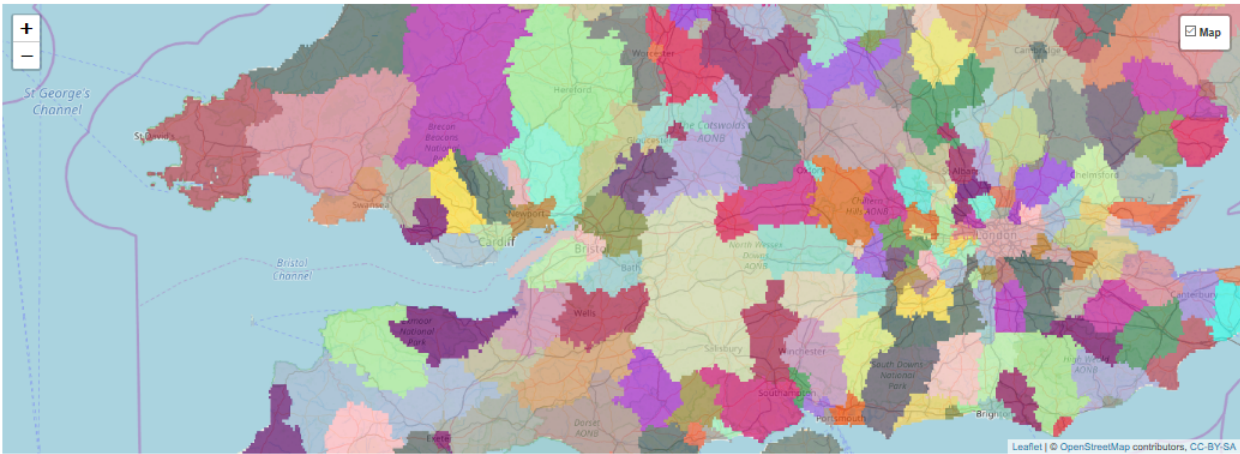
📥 More info about the tool

Area of woodland planted or removed (negative number) in hectares:

-5

Existing Woodland (ha)	686
Woodland removed (ha)	5
Change in asset value (£, PV 100, 2019 prices)	-1365705

Local Authority	Bristol, City of
Area of woodland (ha)	686
Total area of Local Authority (ha)	23533
Population	448600

Leaflet | © OpenStreetMap contributors, CC-BY-SA

Choose your Map:
- ⦿ Local Authorities
- ○ PM2.5 Removed
- ○ Value

Local Authority	PM2.5 removed by woodland (kg/year)	PM2.5 removal rate per ha woodland (kg/ha year)	Asset value of PM2.5 removal (£ million, 2019 prices)	Asset value of PM2.5 removal per ha (£/ha, 2019 prices)
Bristol, City of	4700	6.9	187.4	273141

Conclusions

- Work for UK's ecosystem accounts brings new knowledge of ecosystem service flows & values

- Marginal further work to make robust data available at disaggregated scale

- 3 steps to the calculations are same for different purposes:
  - Pollution removal
  - Health calculations
  - Economic calculations

- Tools can make ecosystem-accounting data more accessible for decision making

- Consistency between UK / Govt project/ Business data

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Economic Valuation of Impacts

- **The economic value of health benefits** is based on Defra guidelines

- Figures are presented in terms of **£ per hectare of woodland**

- Results for **existing** and **newly planted trees**

- **Asset values** describe the total PM2.5 removal benefits trees are expected to provide over 100 years

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Thank you

✉ Ian Dickie / ian@eftec.co.uk

✉ www.eftec.co.uk

📞 +44 (0) 20 7580 5383

🐦 @eftecUK

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