

# Ecosystem Services of Roadside Verges

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“Ecosystems” are the webs of life found in habitats (fields, woodlands, rivers, beaches) and the non-living components of those habitats, such as soil, water, air and sunlight.

### UK-NEA Broad Habitats (ecosystems)



Freshwater, wetlands and floodplains



Urban



Marine



Coastal margins



Mountains, moors and heathlands



Semi-natural grasslands



Enclosed farmland



Woodland

# Ecosystem Goods & Services

## Supporting services

- soil formation
- nutrient cycling
- water cycling
- primary production

## Regulating services

- climate
- hazard control (flood/erosion)
- pests & disease
- pollination
- pollution (noise/toxic)
- air/soil/water quality



## Provisioning services

- food
- fibre
- fuel
- bio-materials
- water

## Cultural services

- aesthetic
- cultural heritage/sense of place
- education
- health
- recreation
- spiritual/religious
- tourism

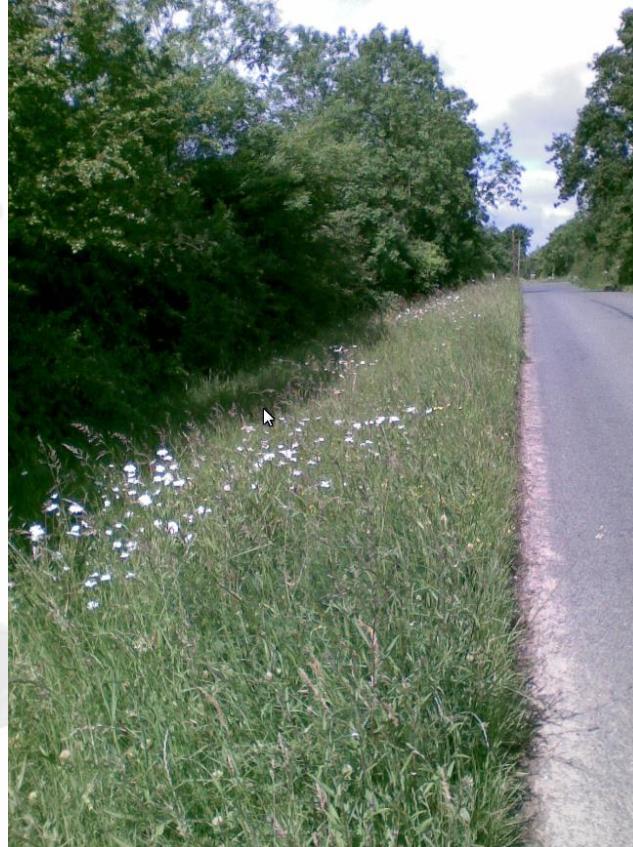
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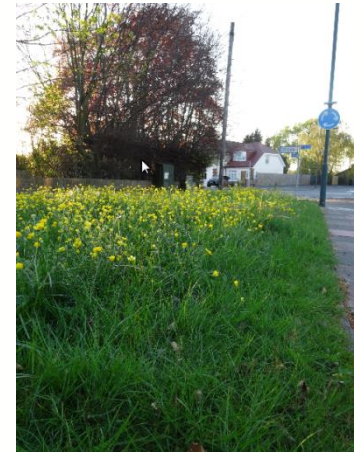
**Ecosystem  
Services**

Ecosystems

Air, land, water and  
all living things

# Biodiversity

Refugia and corridors



Powys



NRW

# Provisioning Services



Food



# Provisioning Services

Fodder



# Provisioning Services

Fibre and fuel



Montgomeryshire Wildlife Trust



# Regulating Services

## Pollination



# Regulating Services

## Soil carbon

“Grasslands store considerable amounts of carbon in their topsoils and contribute more than 32% of the total C stored in British topsoils, second only to peat bogs”.



**Table 7** Carbon stock average estimates by broad habitat

Habitats	Carbon stock in soils (t Cha <sup>-1</sup> )
Dwarf shrub Heath	88
Acid grassland	87
Fen, mash and swamp	76
Bog	74
Coniferous woodland	70
Broad leaf, mixed & yew woodland	63
Neutral grassland	60
Improved grasslands	59
Arable and horticulture	43
Coastal margins (UK)	48

NERC-CEH Countryside Survey

# Regulating Services

- Water quality



# Regulating Services

## Hazard control (flooding/soil erosion)



# Regulating Services



“Swales”





# “Rainscape” programme

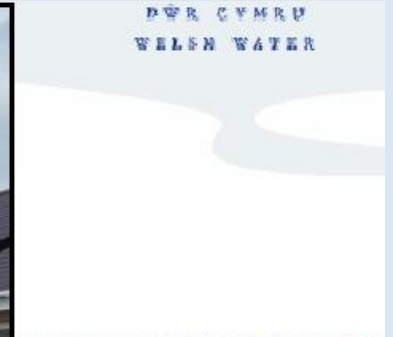


Key elements	P
Working with communities	1,12
Flood protection	3
Climate change adaptation	9



# Regulating Servicesg

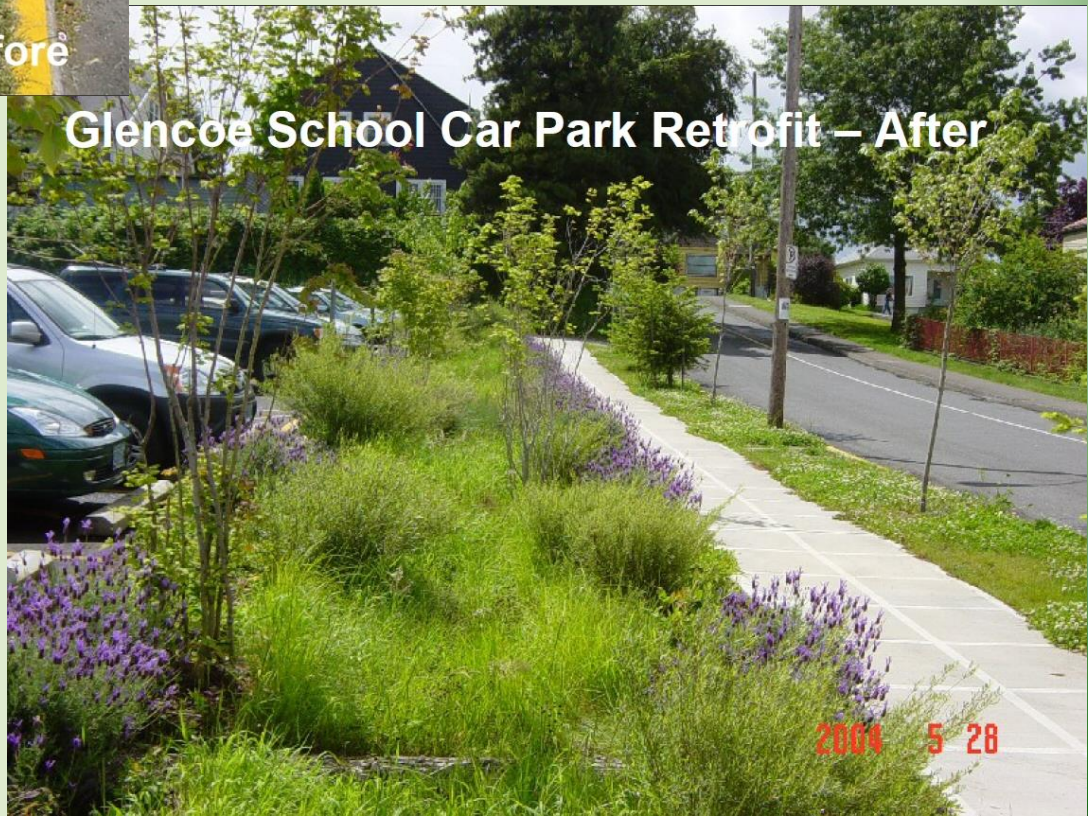
Water and air pollution control





Glencoe School Car Park Retrofit - Before

Multiple ecosystem  
service benefits



Glencoe School Car Park Retrofit – After

DC/WW

2004 5 28



# Cultural Services



Cotswold Life

- aesthetic
- cultural heritage/  
sense of place
- spiritual upliftment



Yorkshire Post



Alex and Bob's  
Blue Sky Scotland

# Cultural Services - recreation and tourism – not!



# The Ecosystem Approach



“The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way”

*(UN Convention on Biological Diversity)*

“This means considering and regulating the environment and its health as a whole rather than dealing with individual aspects separately. It means setting our priorities to better meet strategic outcomes rather than tackling individual symptoms in isolation”

*(Wales Environment Green Paper)*

Number: WG19631



Llywodraeth Cymru  
Welsh Government

[www.cymru.gov.uk](http://www.cymru.gov.uk)

Welsh Government

White Paper

## Towards the Sustainable Management of Wales' Natural Resources

Consultation on proposals for an Environment Bill

Date of issue: 23 October 2013

Action required: Responses by 15 January 2014



Alun Davies AM, Blaenau Gwent (Lab.)  
Welsh Government Minister for Natural  
Resources and Food

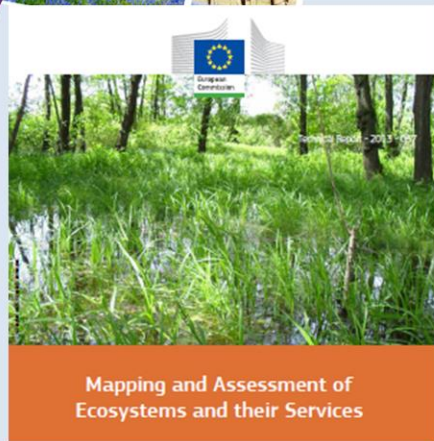
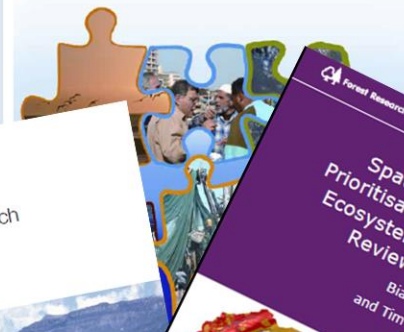
*“The principles of the ecosystem approach are at the heart of the Bill, ensuring that the value of our ecosystems can be properly considered”*



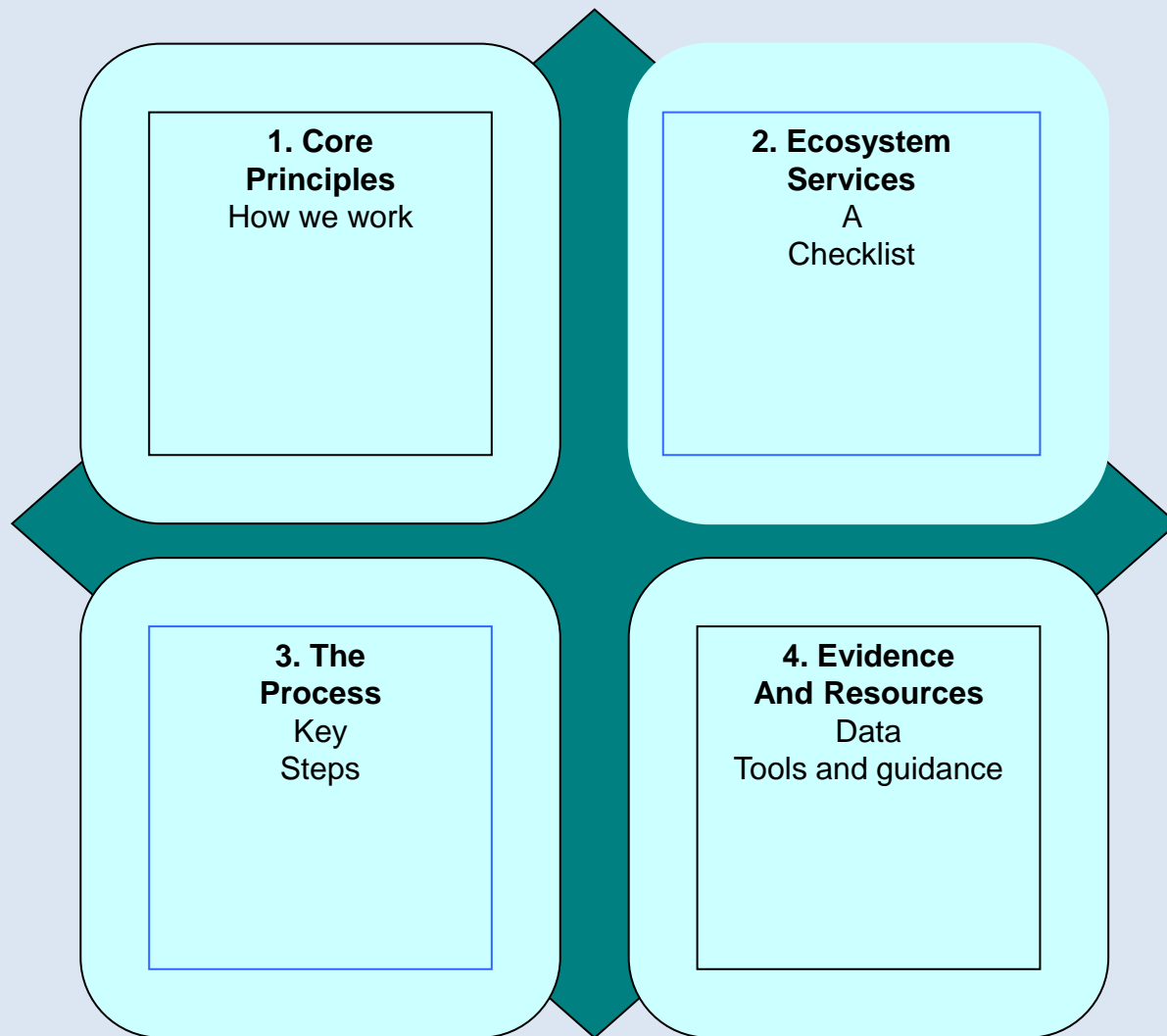
**2013 September** - "While building on the successes of the past it is necessary to realise the opportunities of a more integrated Ecosystem Approach. Natural Resources Wales is starting to set a new direction which is framed by the Ecosystem Approach and the need to restore ecosystem resilience." *Ceri Davies, Executive Director, Knowledge, Strategy and Planning, NRW.*



Putting into practice the ecosystem approach to fisheries

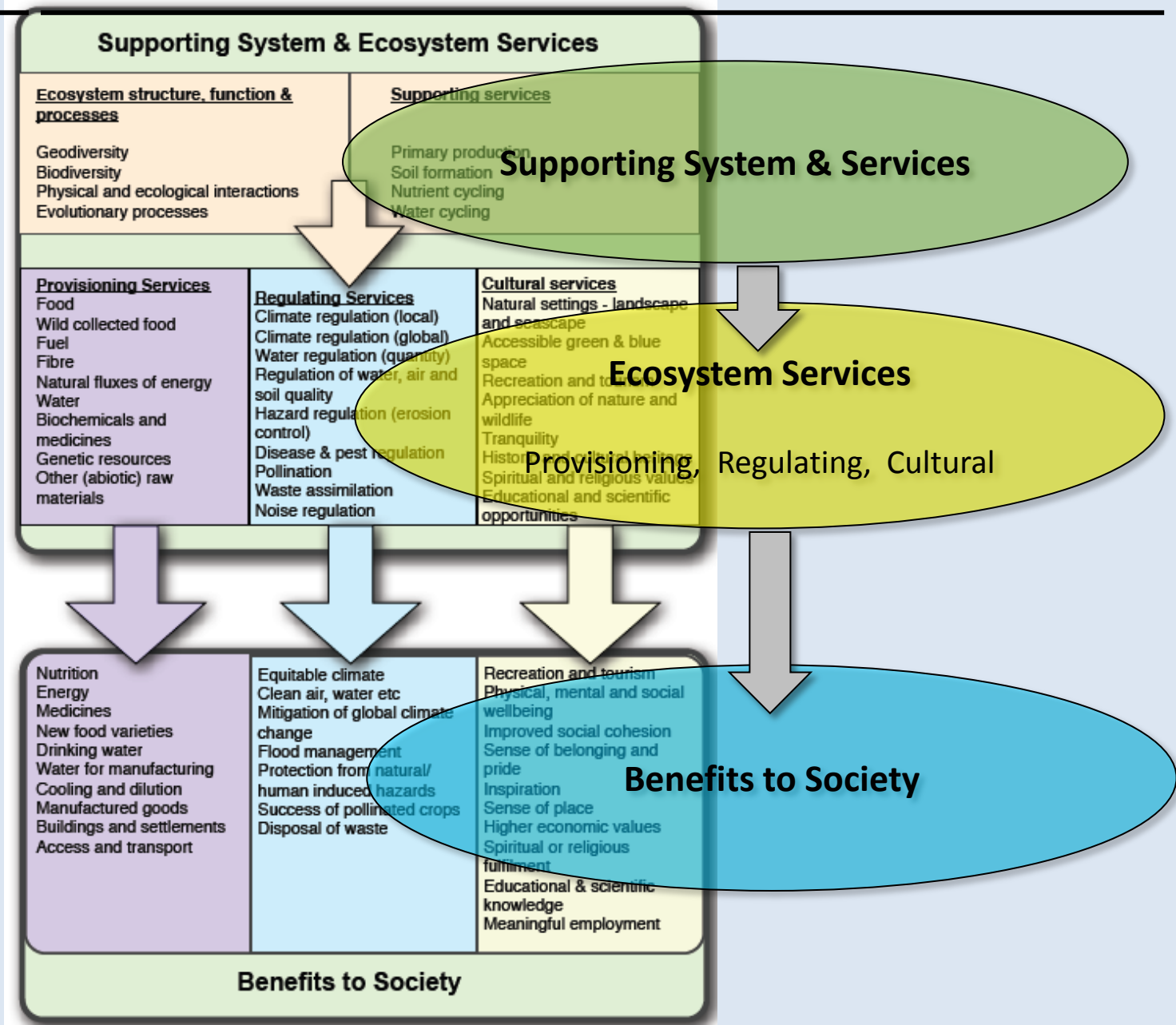


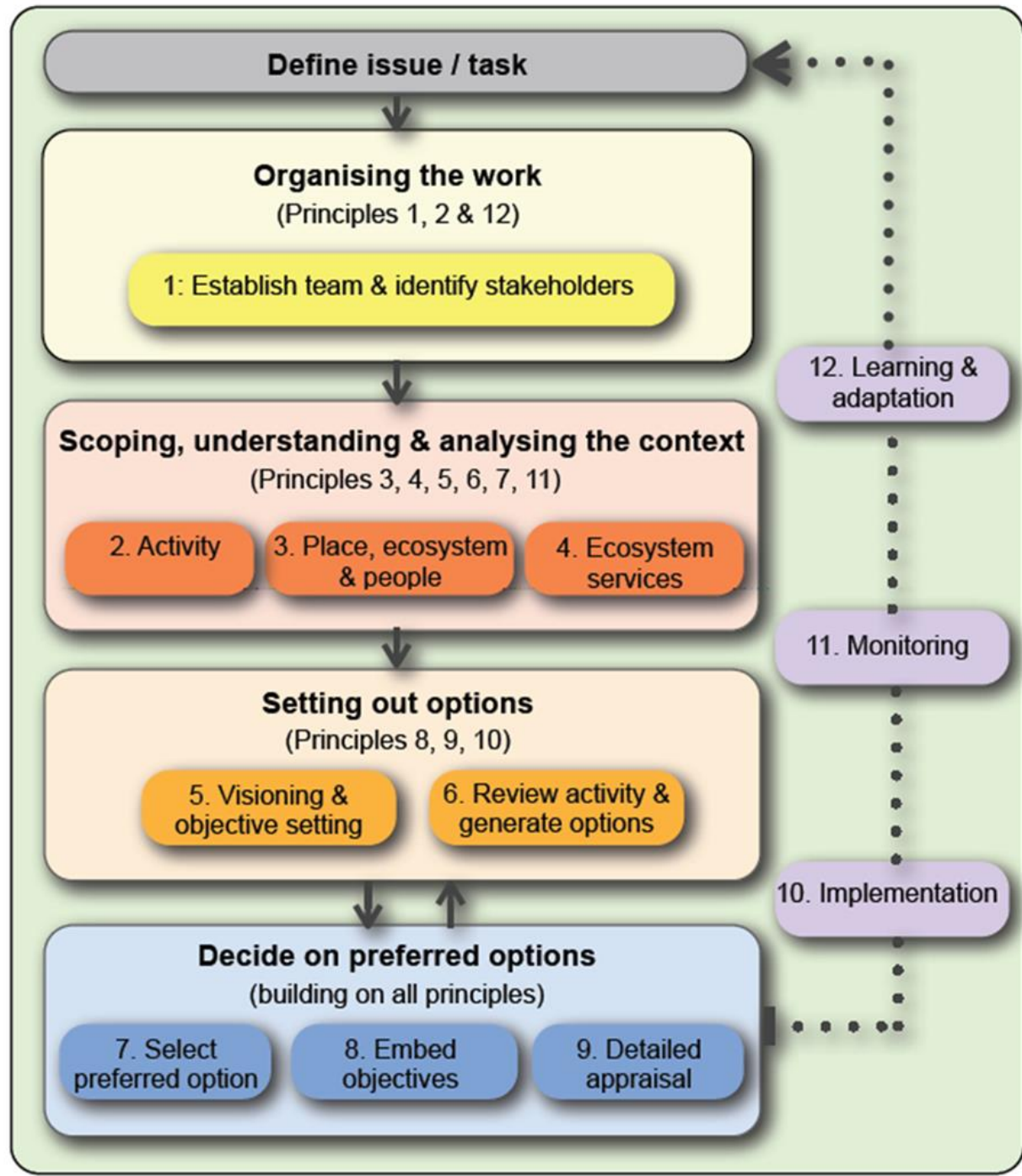
# Ecosystem Approach Framework





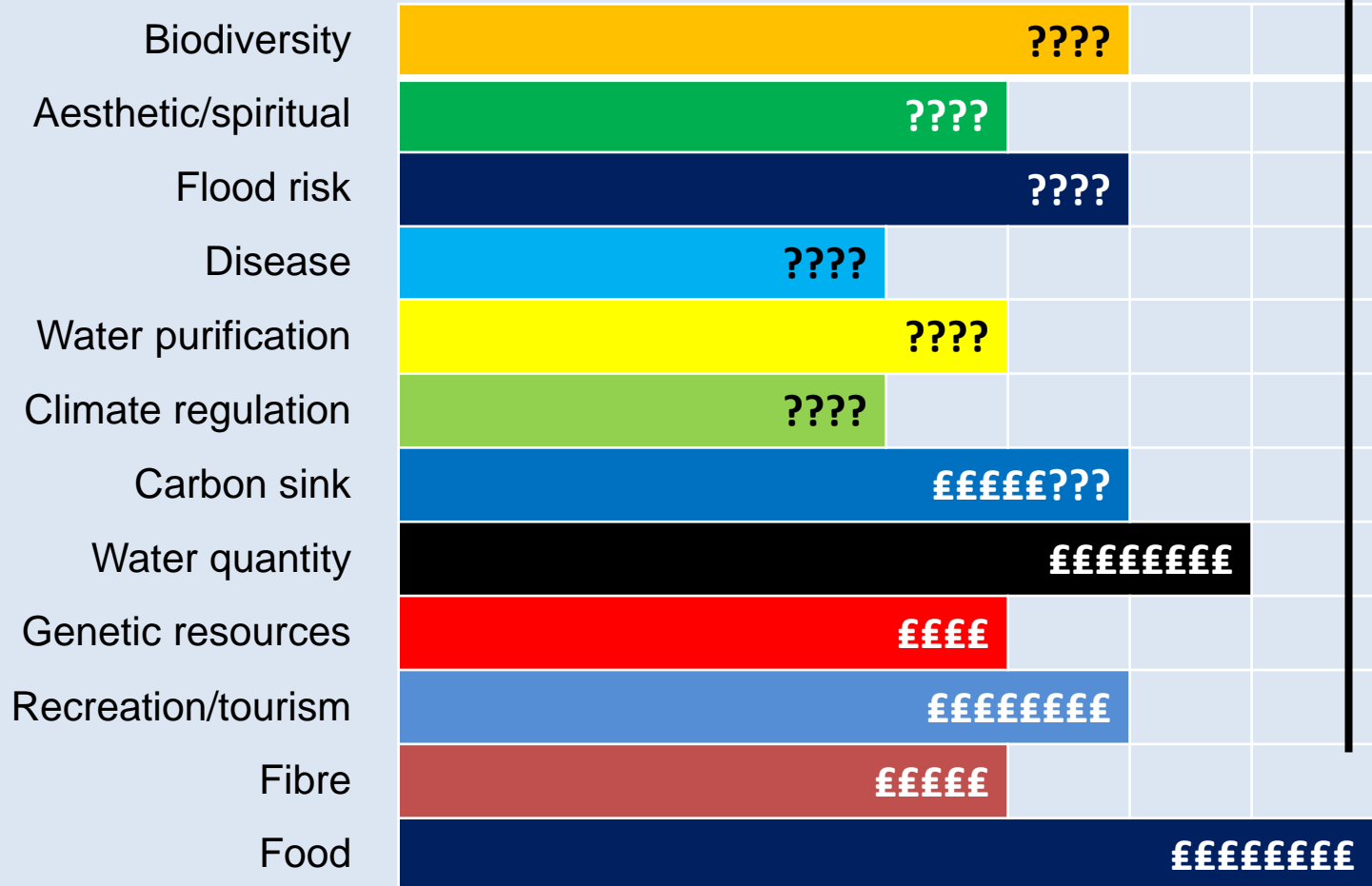
**Cyfoeth  
Naturiol  
Cymru  
Natural  
Resources  
Wales**





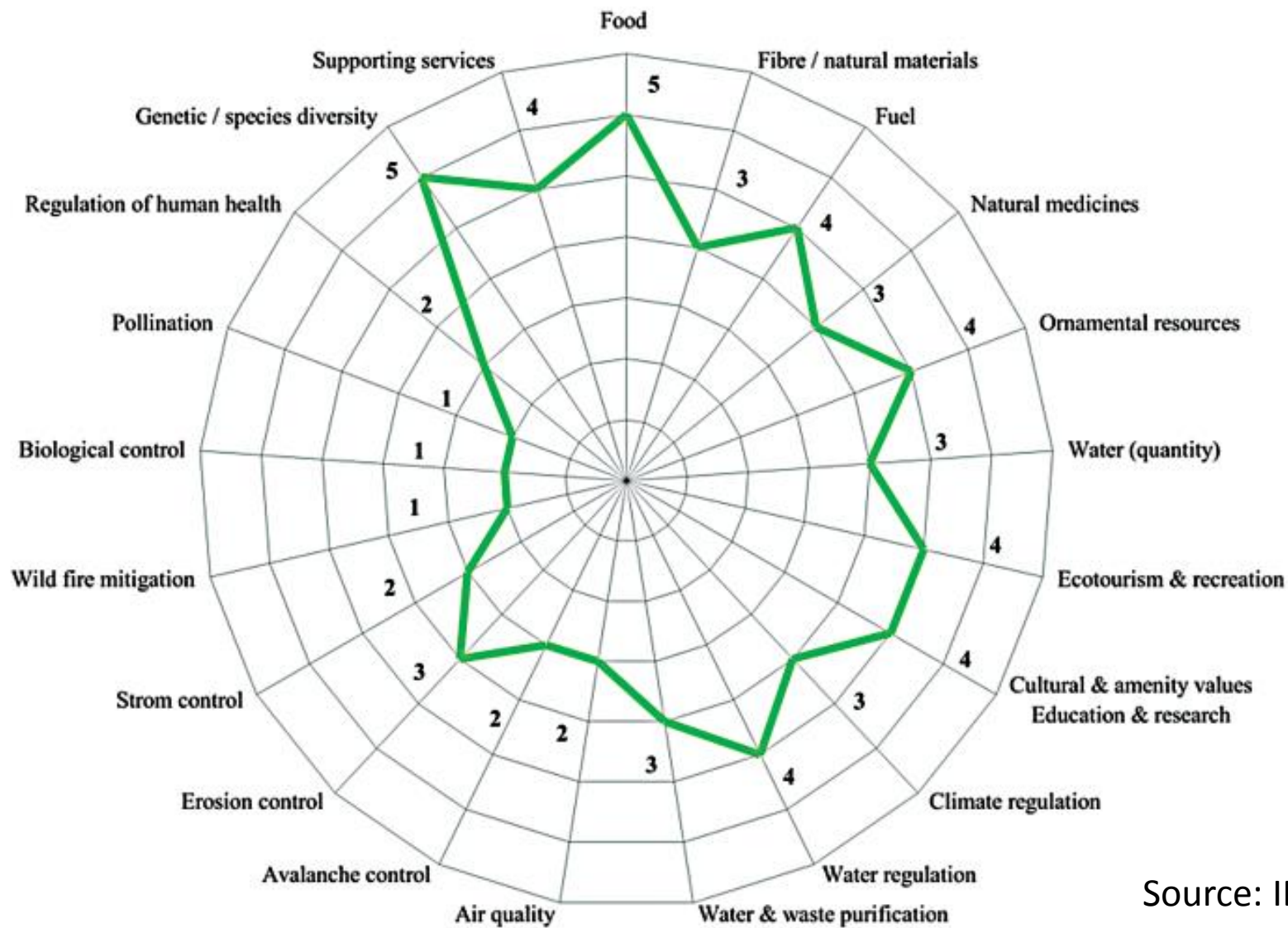


# Valuing Ecosystem Services

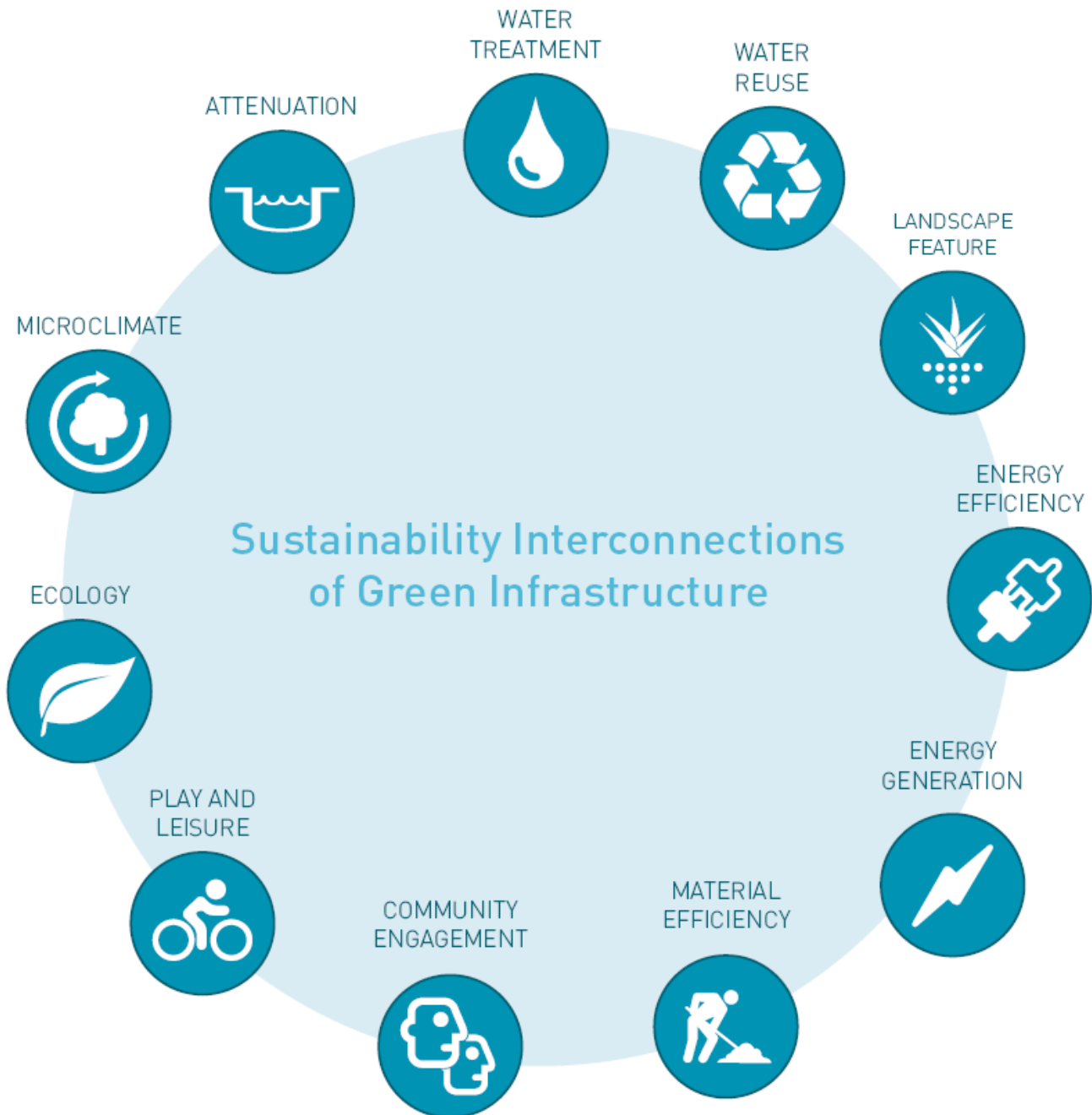


Increasingly challenging

**EXAMPLE: Illustration of the importance of ecosystem services provided  
by a Natura 2000 site.  
(Importance on scale 0-5)**

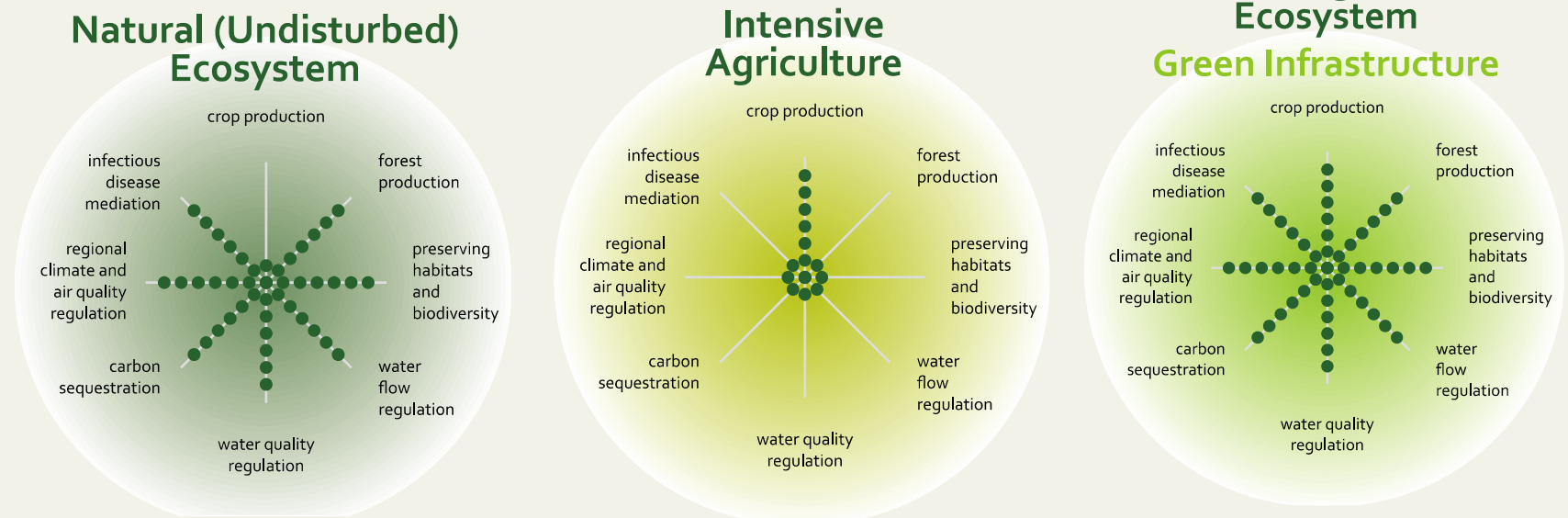


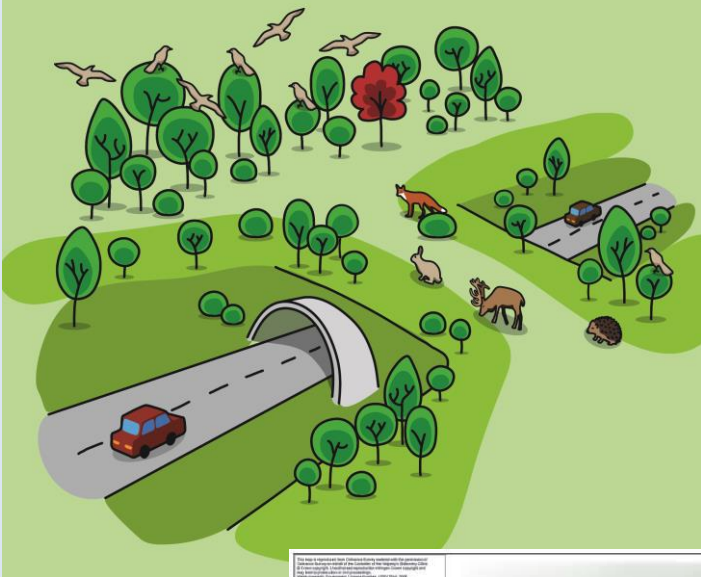
Source: IEEP



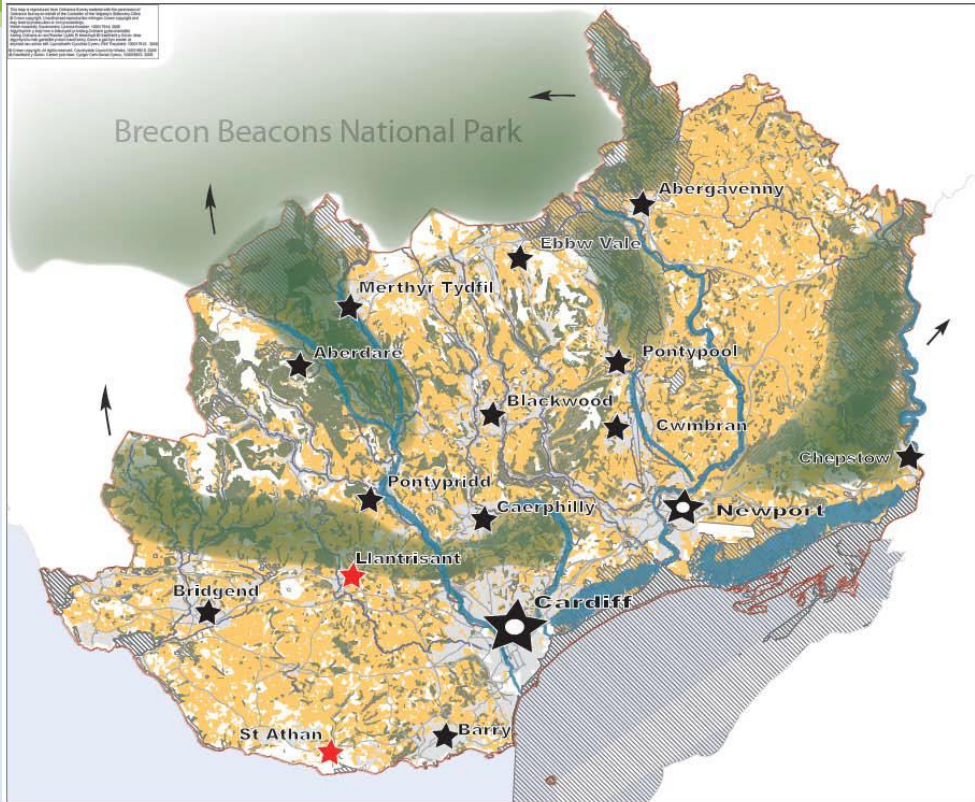
## How to build Green Infrastructure?

### Integrated planning needed





Welsh Assembly Government  
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### South East Wales

Natural Connections

- Legend**
- Study Area
  - Rivers
  - Major Roads
  - Broadleaved woodland
  - Designated Sites
  - Ancient Woodland
  - Woodland
  - Grassland
  - Urban Areas
  - Blue Natural Connections
  - Green Natural Connections
  - Wider Area Connections
  - Primary Key Settlement
  - Strategic Opportunity Area
  - Key Settlement of National Importance



Data Source: ESRI, Ordnance Survey, Welsh Assembly Government, CCW and EDAW

Map Source: © OS Crown copyright. All rights reserved 100020419. 2008

Last Updated: September 2008

# Resourcing the ecosystem approach

- **Supra-State** – e.g. European ERDF, ESF, Horizon 2020, Life+, CAP/RDP “greening” funds (“Glastir”)
- **State** - e.g. the Welsh Government’s “Nature Recovery” and “Ecosystem Resilience” Funds. Sêr Cymru research fund for low carbon, energy and environment. The “Pont Bren” farm-based ecosystem services initiative in mid-Wales, and the Community Land Advisory Service Wales, both secured funding from the Heritage Lottery Fund.
- **NGOs and civil society** – volunteering, “citizen science”, membership and project funds.
- **Private sector** – e.g. Dwr Cymru/Welsh Water’s operational funds and the new “Water Framework Directive Fund” (research)
- **“Payments for ecosystem services”**



*Reducing Risks – Ecosystems, Land-use and Human Well-being*  
*Working with other sectors*

## Case Study 2: PFI highway management

A55 Llandegai to Holyhead, built 1999 –  
2001 under DBFO contract

UK Highways plc operate the road, including  
management of landscape features and the  
habitat creation areas

Private company has flexibility to make  
decisions with less bureaucracy, so  
can respond to ideas and innovation

Examples all involve some extra  
input from UKH, justified by benefits  
to UKH and wildlife



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Richards, Moorehead & Laing Ltd



*Reducing Risks – Ecosystems, Land-use and Human Well-being*  
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## Grazing agreements

With local farmers and with Grazing Animals Partnership

UKH identified sites, installed extra fencing and drinking, and benefit from reduced cost of management by cutting

Achieves better sward diversity, some poaching, control of invasive species in areas that machines could not reach



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## Goodwill work

Contribution to cost of nest boxes for locations away from the road

Helps work of voluntary programme to support Barn Owl population

Mitigation for problem of road casualties – various other initiatives in progress together with Trunk Road Agency and voluntary sector



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## Goodwill work

Arrange additional works using equipment and resources already on site – eg management of drainage , forming scrapes

Arranged informally, within scope of UKH overall site management, to achieve improvement for wildlife

Modest or no additional cost involved



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## Experimental work

Yellow Rattle – parasitic to reduce grass vigour and maintenance costs



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RML and UKH practical contribution to MSc student project studying establishment methods

Potential saving in cutting frequency, cost, fuel use and highway disruption



*Reducing Risks – Ecosystems, Land-use and Human Well-being*  
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- **Why do UKH get involved?**

Genuine desire to help if they can – often personal interest of individuals in UKH, RML and Employer's Agent

Benefits to UKH – in goodwill, reduced long-term costs, knowledge and expertise of others, good publicity



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## Biodiversity Action Plan

### Main Contents

- Foreword from the Transport Minister
- Message from the Chief Executive
- Executive Summary

### Background to the HABAP

- Introduction
- The aim of the HABAP
- Development and Scope of the HABAP
- The Highways Agency Biodiversity Partnership
- Audit and Assessment
- The HABAP
- Implementation - Monitoring and Reporting

### Background to Biodiversity

- What is Biodiversity?
- Biodiversity Policy in the UK
- Biodiversity and Sustainable Development Policy

### England's Motorway and Trunk Road Network

- The Network
- The Soft Estate
- Maintenance, operation and improvement

### Biodiversity and the Work of the Highways Agency

- Biodiversity and Roads Policy
- Existing Guidance
- Current Ha initiatives
- Interaction of the HABAP with other plan

### Delivery of the HABAP

- Implementation

### Appendices

- Glossary
- List of abbreviations
- Bibliography/useful references

### The Action Plan

- Contents

The Highways Agency manages approximately 30,000 hectares of land, supporting a wide range of habitats, including over 40 million trees. Network Rail manages over 20,000 miles of track and has an interest in over 200 SSSIs (in England) covering over 650 hectares.

HA are due to publish their new Biodiversity Action Plan (HABAP) later this year, which will reflect changes in UK Government policy since the last (2002) HABAP.

Natural England (Clare Warburton and Nick White) are advising on this work.





NEWP 32 Transport Green Corridors: Literature Review,  
Options Appraisal and Opportunity Mapping



Report by: Helen Davies BSc MSc AIEEMA ACIEEM  
Marion Frandsen BSc MSc CMLI

Date: April 2014

Submitted to:  
Clare Warburton  
Natural England  
3rd Floor Bridgewater House  
Whitworth Street  
Manchester  
M1 6LT

Prepared by:  
ADAS UK Ltd  
11D Park House  
Milton Park  
Abingdon  
Oxfordshire  
OX14 4RS

“The transport ‘soft estate’ has the potential to deliver a range of regulating, provisioning and cultural ecosystems services, some of which could help transport operators better manage risk and adapt to the impacts of climate change, whilst others could deliver biodiversity and wider benefits for the natural environment.”

Literature review due for publication this summer

“Natural England are undertaking opportunity mapping exercises in the Morecambe Bay and Humberhead Levels Nature Improvement Areas. These are looking at how the road and rail soft estate can be managed in a way that takes account of the surrounding habitats, both in terms of biodiversity value and the potential to deliver ecosystems services, looking at the area up to 200m either side of the linear corridor.”

# Wales Environment Research Hub

[www.werh.org](http://www.werh.org)

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