

Integrating adaptation with mitigation and biodiversity objectives

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Outline

Context for integration

Evidence of opportunities for integration

What can affect the success of integration

Cross-sectoral working

Context for integration

“We cannot halt biodiversity loss without addressing climate change, but it is equally impossible to tackle climate change without addressing biodiversity loss”

Biodiversity Policy - Beyond 2010, Message from Athens, 2009

Context for integration

Explore the possibilities to improve policies and develop measures which address biodiversity loss and climate change in an integrated manner to fully exploit co-benefits and avoid ecosystem feedbacks that accelerate global warming

EU White Paper on Adaptation, 2009

Context for integration

The Climate Change Act 2008 set legally binding greenhouse emission reduction targets for 2020 of 34% and for 2050 of at least 80%.

Adapting to Climate Change Programme – National Adaptation Programme 2012

to “enhance and protect the natural environment, including biodiversity and the marine environment, by reducing pollution and preventing habitat loss and degradation” - Defra Structural Reform Plan

What is the role of biodiversity?

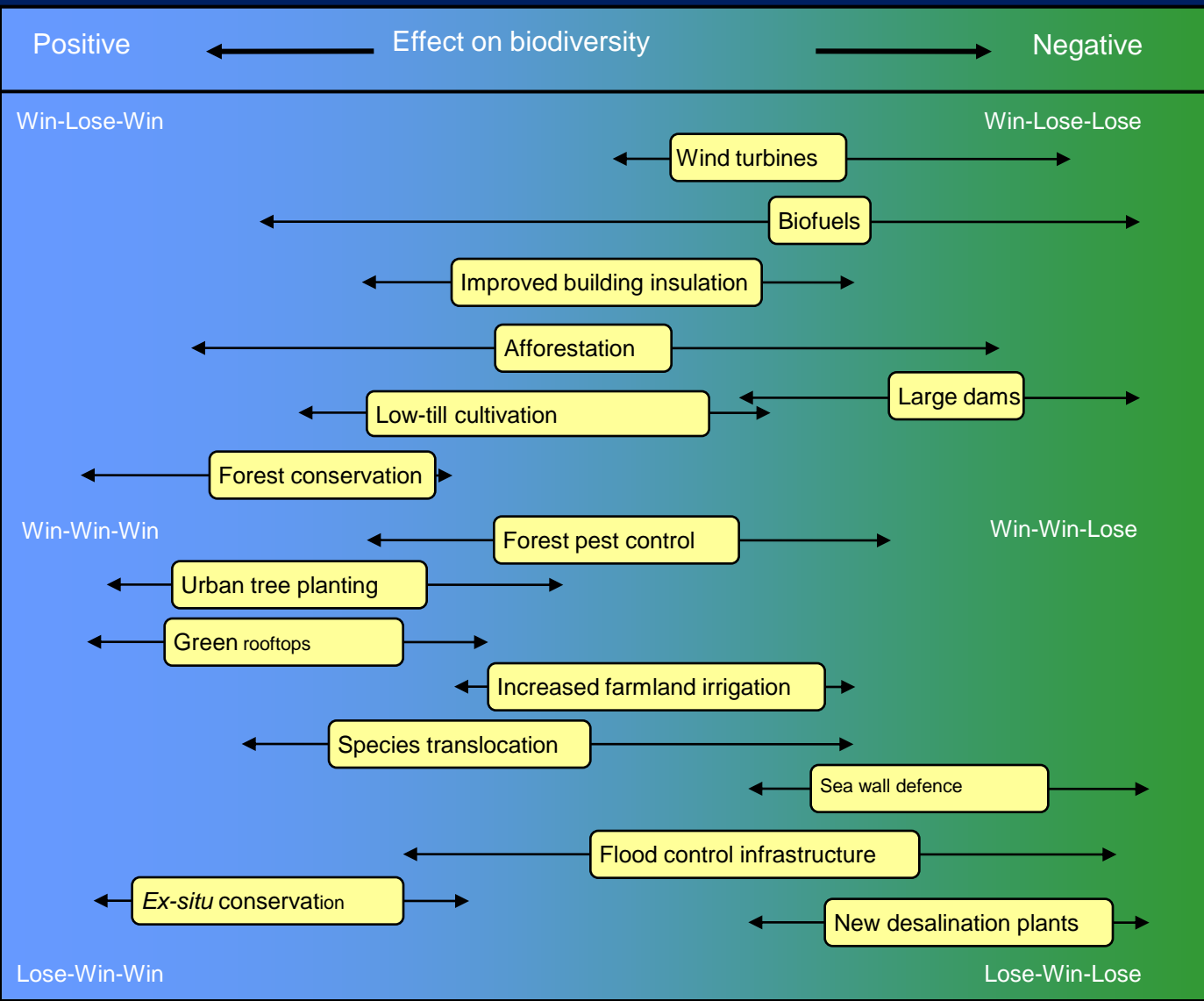
Underlines the vital importance of biodiversity and resilient ecosystems for climate change mitigation and adaptation....

European Parliament resolution of 21 September 2010 on the implementation of EU legislation aiming at the conservation of biodiversity

Integrating mitigation, adaptation and biodiversity

Issue	Adaptation action	Positive effects on biodiversity	Maximize positive effects	Negative effects on biodiversity	Minimize negative effects	Comments and case studies
Forestry						
Over-arching management policies to reduce impacts of CC	Increase adaptive management systems (A)	Where forests are currently subject to unsustainable land use activities, Increase use of sustainable forest management including regular monitoring and research on effects of management actions Increased recognition of biodiversity as a part of the managed forest; Increase forest ecosystem resilience Reduce over-harvesting	Increase practices to entire forest land base Increase application of community forestry Reduce illegal logging High mitigation benefit			National impact Best approach to ecosystem-based adaptation in forests. Case studies – successful application in various countries. Co-benefit of improved C-sequestration

Convention on Biological Diversity,
Technical report 41, 2009



Mitigation

Adaptation

Adaptation mitigation & biodiversity



Cover crops

Mitigation: ploughing of cover crop into the soil helps to sequester carbon

Adaptation: Incorporating organic matter into the soil can help reduce erosion and increase the water-holding capacity of soils thereby helping farmers adapt to warmer conditions

Impact on biodiversity: Positive and negative

Impact on biodiversity: Positive and negative

+ addition of organic matter to soils, especially depleted soils, will be beneficial for soil fauna and soil functioning

- Nitrate leaching may increase

+/- birds



Summary of impacts

Crop Production Mitigation or Adaptation Strategy	Biodiversity Impact		Habitats affected									Taxa affected						
	Impact under worst practice	Impact under best practice	Marine	Coastal	Inland surface waters	Mires, bogs and fens	Grasslands and tall forb habitats	Heathland, scrub and tundra	Woodland and other wooded areas	Unvegetated or sparsely vegetated habitats	Agricultural, horticultural and domestic habitats	Mammals	Birds	Amphibians/ Reptiles	Fish	Invertebrates	Plants	Soil biota
Cover crops	↘	↗				•	•	•	•	•	•	•	•	•	•	•	•	•
Water management	↘	↔			•						•	•	•	•	•	•	•	•
Soil compaction	↔	↗			•		•				•	•	•	•	•	•	•	•
No-till	↘	↗									•	•	•		•	•	•	•

↗ Highly beneficial for biodiversity, ↘ Moderately beneficial for biodiversity,

↔ No known effect on biodiversity, ↘ Moderately detrimental for biodiversity,

↓ Highly detrimental for biodiversity,

↗ Moderately beneficial for biodiversity,

↘ Moderately detrimental for biodiversity,

What can affect the success of integration?

Location

Scale

Management practices

Habitat(s) involved

Taxa involved

Effectsof scale on impacts of coastal hard defence structures

Factor	Spatial scale	Temporal scale	Direction of change	Predictability
Soft-bottom species richness	Local	Short to medium	↑ ↓	**
	Regional	Long	↑ ↓	*
Hard-bottom species richness	Local	Short to medium	↑	***
	Regional	Long	↑ ↓	*
Fish and mobile fauna	Local	Short to medium	↑	***
	Regional	Long	↑ ↓	*
Ephemeral and nuisance species	Local	Short to medium	↑	***
Non-native species	Regional	Medium to long	↑	**
Dispersal barriers	Regional	Medium to long	↓	*
Habitat fragmentation	Regional	Medium to long	↑	*

Both direction of change (↑=increase, ↓=decrease) and estimates of the current ability to make predictions (*=low, **=moderate, ***=good). Modified from Airoidi et al., 2005.

Some biodiversity impacts of coastal hard defence structures

Additional habitat for rocky shore species

Increased local habitat diversity on sandy shore

Suitable habitat for early settlers and juvenile fish and mobile fauna

Act as stepping stones

Disrupt natural barriers

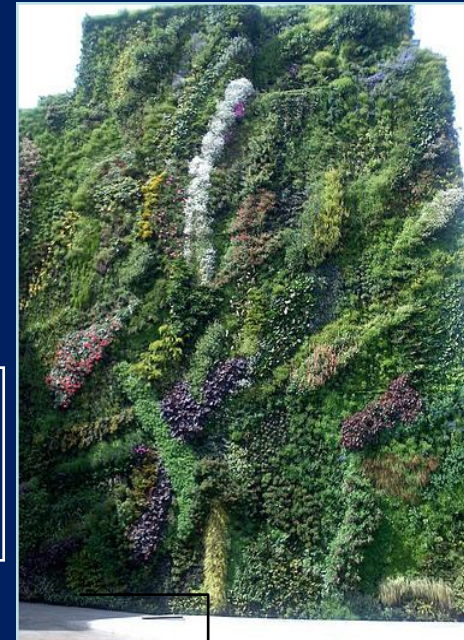
Facilitate the dispersal of rocky coast species

Green rooftops and walls

Lower temperatures – summer
Increased temperatures – winter
(c 2°C Toronto)



Lower energy use/reduced emissions



Remove 0.2 to 2 kg dust/m²

Health benefit

Reduce wind chill 75%
Heating demand 25%

Green rooftops and walls

Lower runoff – ↑ 100% summer
– ↑ 50% winter



Lower flood risk



Remove
pollutants

Improve water
quality

Improve (river)
biodiversity

Sequester carbon
(375g/m²)

Effects of management on integration

Habitat	Management for mitigation	Contribution to adaptation	Ecosystem service(s)
Agriculture	Reduce disturbance – no or minimum tillage	Increases flood and drought resistance by increasing organic matter content and reducing compaction; it also reduces water needs by improving soil water retention	Water regulation; water quality
Wetlands	Restore water levels in peat	Improves water (habitat) quality	Water & climate regulation
	Re-create habitat	Increases habitat area, possibly connectivity	Water & climate regulation
Woodlands	Re- or afforestation	Increases habitat area	Timber, Climate, hazard & soil regulation

Effects of management: Reduced tillage or no-tillage



Mitigation: decreased fossil fuel usage
increased carbon sequestration

Adaptation: increased resilience to drought and flooding

Biodiversity: mixed

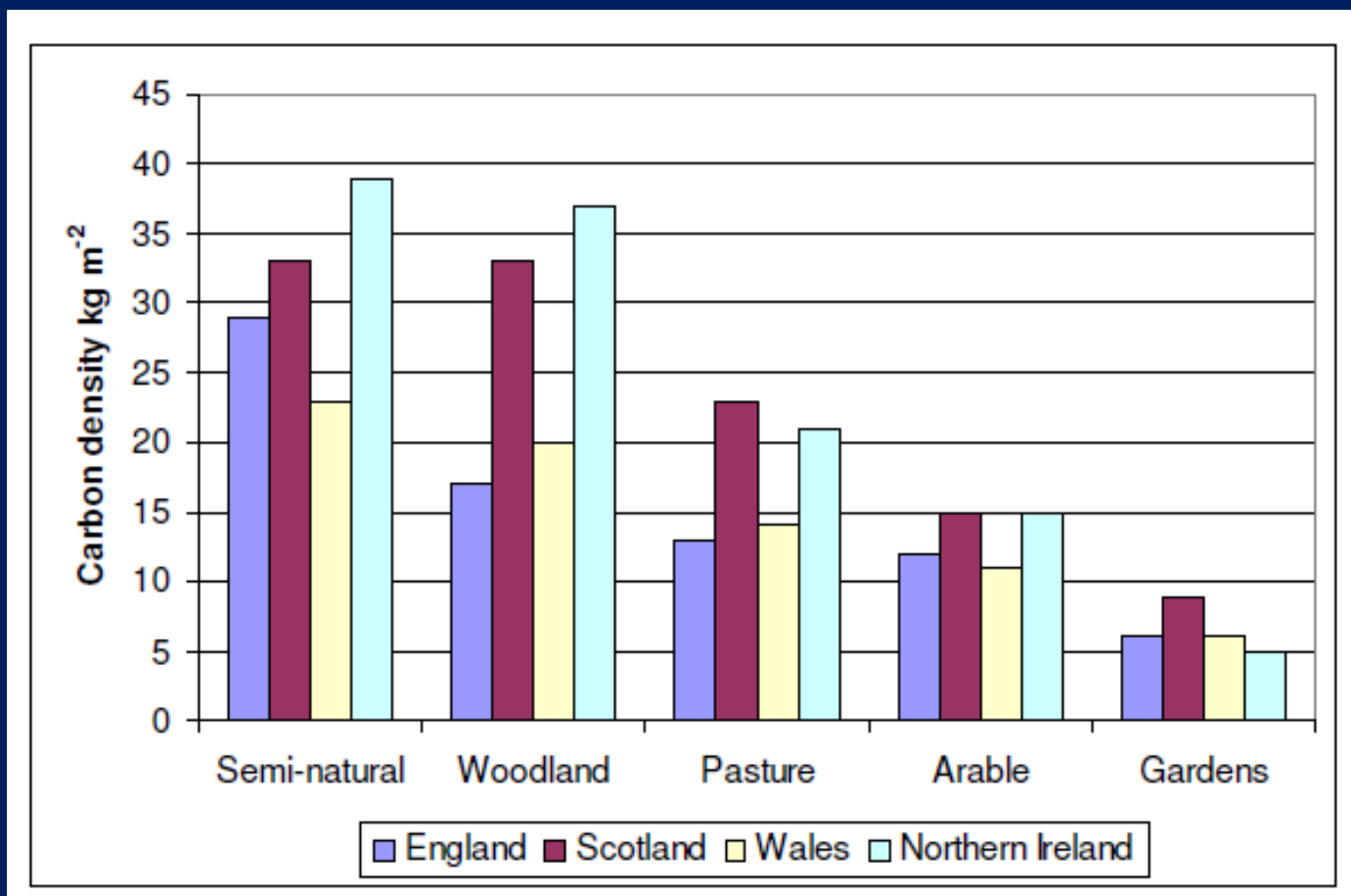
Positive

increased soil biota
reduced runoff and so water pollution
increase in birds and mammals

Negative

increased phosphorus and herbicide in runoff
increased groundwater leaching
increase in slugs

Effects of habitat e.g. Soil carbon density 0-100cm under different land use types in the UK



(from Bradley et al., 2005)

A examples of cross-sectoral issues

	Agriculture	Forestry	Energy	Built environment	Flood management	Tourism and leisure	Health
Conservation	Numerous connections: 1- abandonment of agricultural land could be highly beneficial; 2-reduction in agrochemical use would benefit adjacent conservation areas.	Continuous cover forestry offers less disturbance for wildlife. Creation of firebreaks in woodland natural reserves may harm biodiversity. New species used for forestry may be invasive in woodland nature reserves.	Renewable energy schemes requiring large areas of land or water (hydro, tidal, wind) may destroy nature reserves or have negative downstream effects.	Increase in green spaces. Tree planting for shade.	Dikes and embankments – protect reserves from erosion but could lead to loss of coastal grazing marsh. Coastal realignment – loss of coastal grazing marsh. Dredging for sediment for beach nourishment – loss of marine organisms, but could create dune systems	Matrix management an increase or creation of new protected areas could enhance the tourism and recreational potential of an area	Increase of open space or afforestation to reduce the urban heat island effects on health could be beneficial. Introduction of vector control agents – benefits questionable



How can integration be achieved?

1. Building adaptation and mitigation (and biodiversity) considerations into all activities
2. Promote synergistic, triple win actions
3. Indicative spatial planning
4. SEAs, EIA, etc

Aims of the Wallasea Island project

1. to create new intertidal habitats to compensate for losses in Crouch and Roach estuaries
2. to avoid the flood damage risks
3. to create an extensive area of accessible coastal land for recreation
4. to demonstrate adaptation to climate change and sea level rise
5. to build on the success of the 110ha managed realignment scheme

Benefits

- habitat creation/compensation
- flood protection
- recreation e.g. fishing
- socio-economic e.g. oyster beds
- climate change mitigation and adaptation



Trade - offs

- physical conditions in the estuary
- certain species negatively affected e.g. corn bunting, badgers, adder
- noise and other disturbance during construction phase, especially for breeding birds
- Loss of agricultural production.



Benefits of integration

:) Cost-effective and efficient measures that address climate change, biodiversity and ecosystem services and sustainable development.

$EbA + EbM = EbAM$

Needs and challenges of integration

- > Evidence of the effectiveness of measures in integration
- > The quantification of the triple win situations
- > Mechanisms for handling trade-offs
- > Cross-sectoral working



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