

Landscape-scale conservation: evaluating benefits for wildlife and people

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- The problem - setting the context
- Why landscape-scale conservation is advocated
- Investigation of the benefits of this approach
- Typology of landscape-scale conservation
- Use of scenarios to assess the benefits
- Findings for biodiversity
- Findings for ecosystem services
- Key sensitivities of the approach
- Overall conclusions

The problem....

For wildlife....

- Continuing biodiversity loss, despite gains for some species
- Isolated nature reserves
- Lack of opportunities for dispersal and migration
- Lack of resilience to climate change

For people...

- Food and fuel security
- Water supplies
- Flood risk
- Reduced well-being / Stress



Isolated fen
in a sea of
arable land

C. Gerrard

Landscape-scale conservation - a solution?

Dynamic & connected environment with greater resilience to perturbations ... including the impacts of climate change

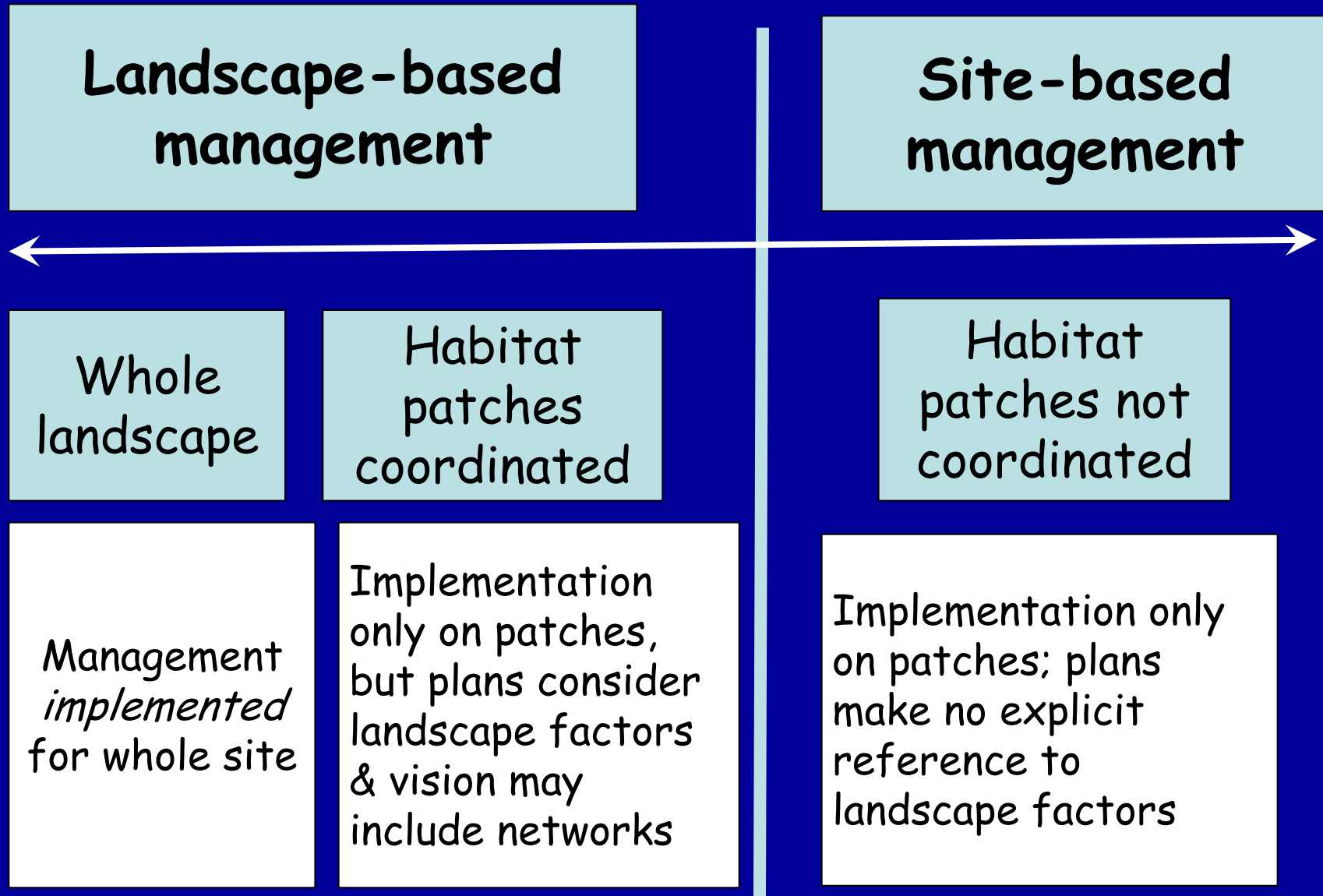
Enhanced provision of ecosystem services: C-sequestration, flood mitigation, enhanced wellbeing



Our research on the relative benefits of
'Alternative approaches to Conservation'
explored the extent to which landscape scale
conservation could ...

- Enhance biodiversity through increasing habitat area and connectedness
- Enhance the provision of ecosystem services including mitigation of climate change

Typology of landscape-scale conservation



Examples of landscape-scale conservation

Landscape-based
management

Site-based
management

Whole
landscape

Habitat
patches
coordinated

Habitat
patches not
coordinated

Ennerdale
Knepp,
Great Fen

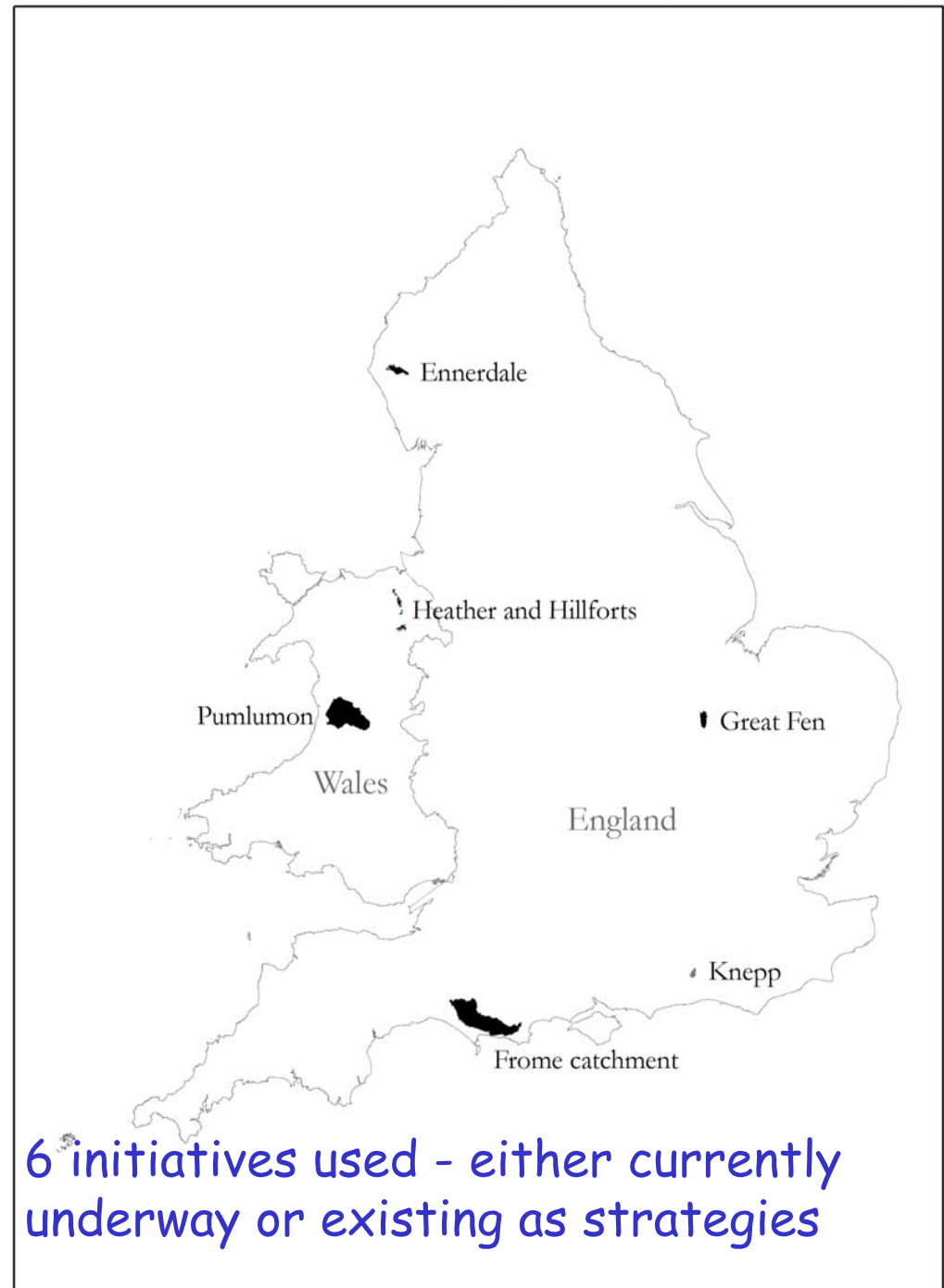
Frome catchment
Rebuilding Biodiversity,
Heather & Hillforts,
Living Landscape
Pumlumon

'Business as Usual'
scenarios for case
studies.

Evaluating through scenarios

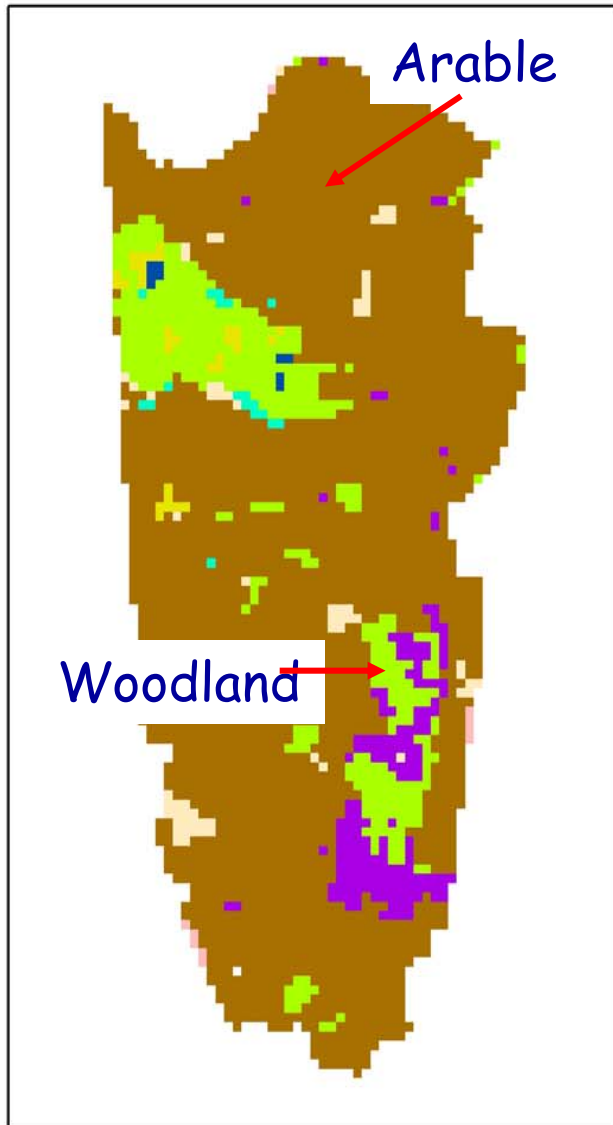
What would the outcomes be if current visions & strategies for landscape-scale conservation were realised?

Stakeholder-defined scenarios built to map the land cover change hoped for in the long term when the projects have been successfully applied.

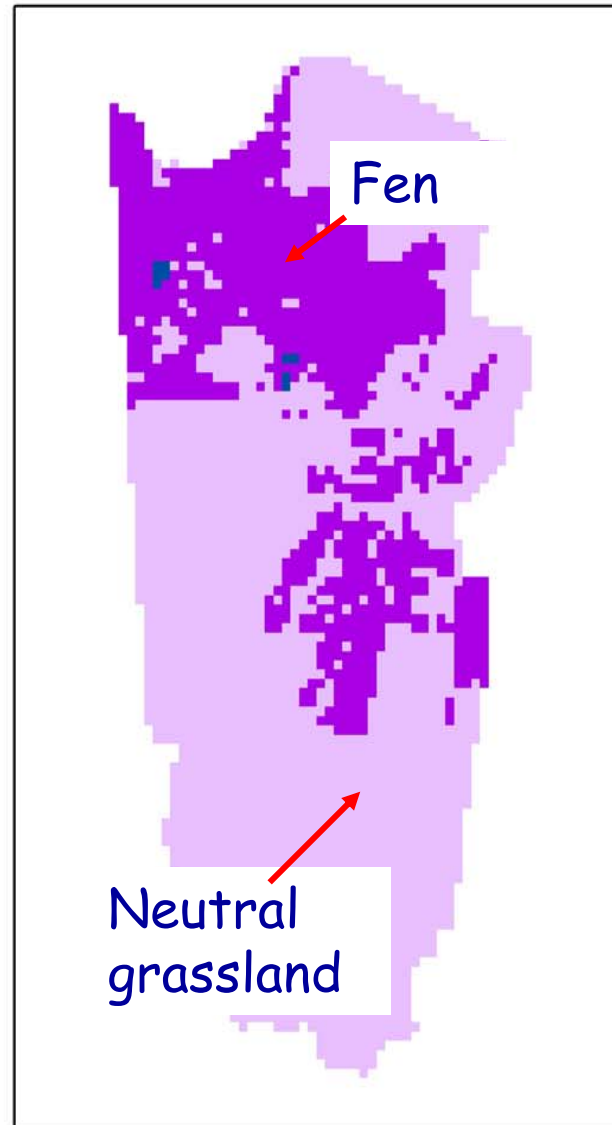


6 initiatives used - either currently underway or existing as strategies

Great Fen



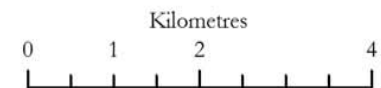
Pre-project



Landscape-scale

Habitat type (LCM)

- Acid grassland
- Arable and horticultural
- Bog
- Broadleaved woodland
- Calcareous grassland
- Fen, marsh, swamp
- Improved grassland
- Neutral grassland
- Standing water/canals



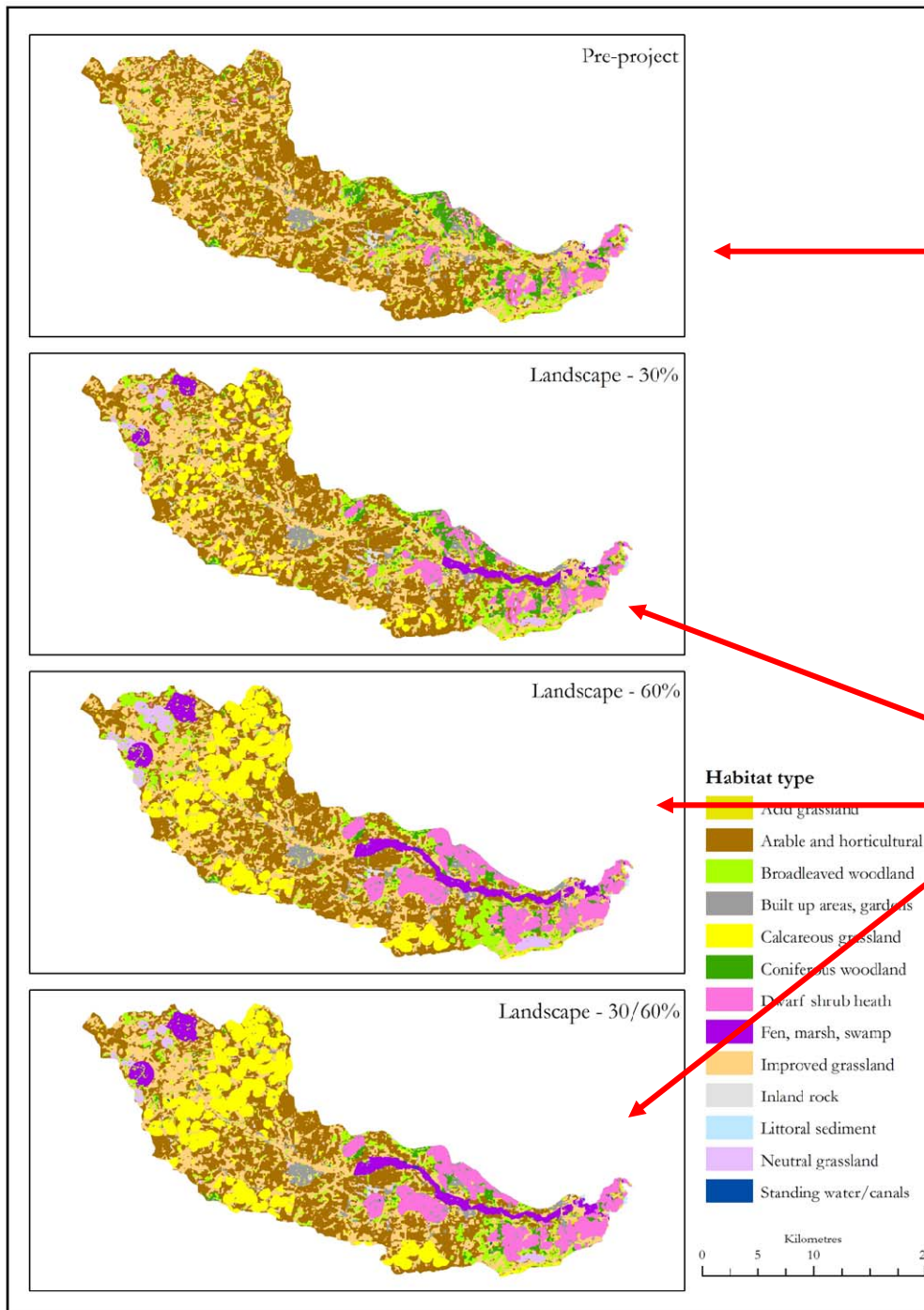
Frome catchment

Without landscape-scale intervention

With landscape-scale intervention

Giving 3 potential interpretations of the rebuilding biodiversity regional strategy

Strategic Nature Areas expanded by 30%, 60% or a combination (30&60)



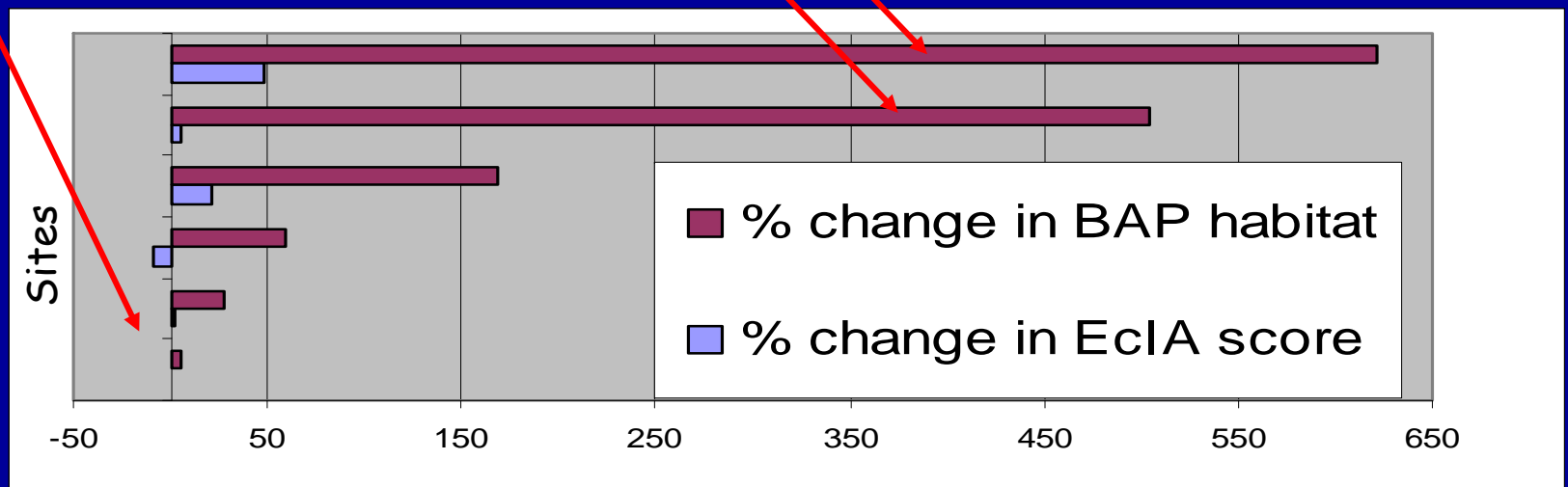
Biodiversity benefits

A range of initiatives chosen - so **increase in priority habitats** reflected the amount of restoration required - e.g. high with arable conversion

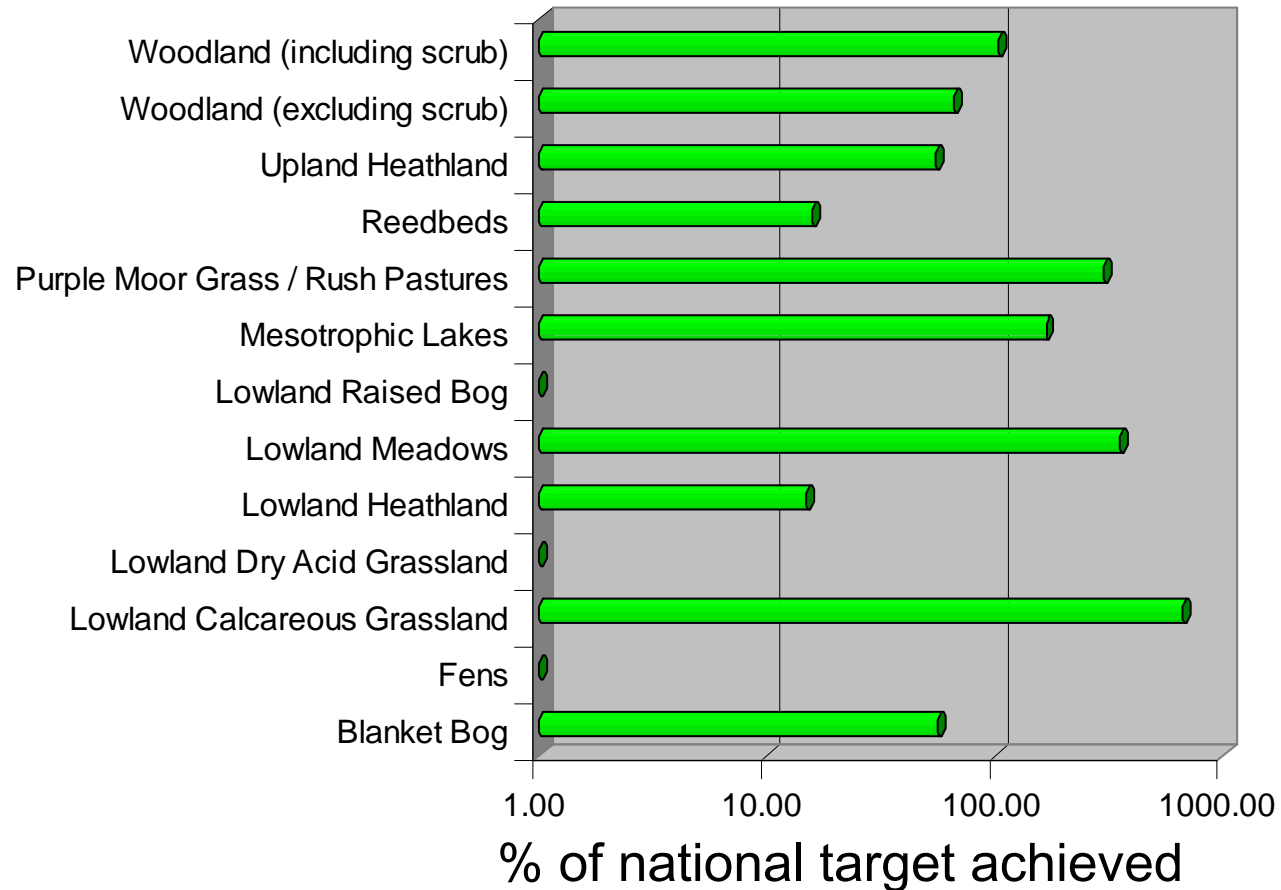
Ecological Impact Assessment

- scored habitat increase in terms of national resource (Rouquette et al 09)

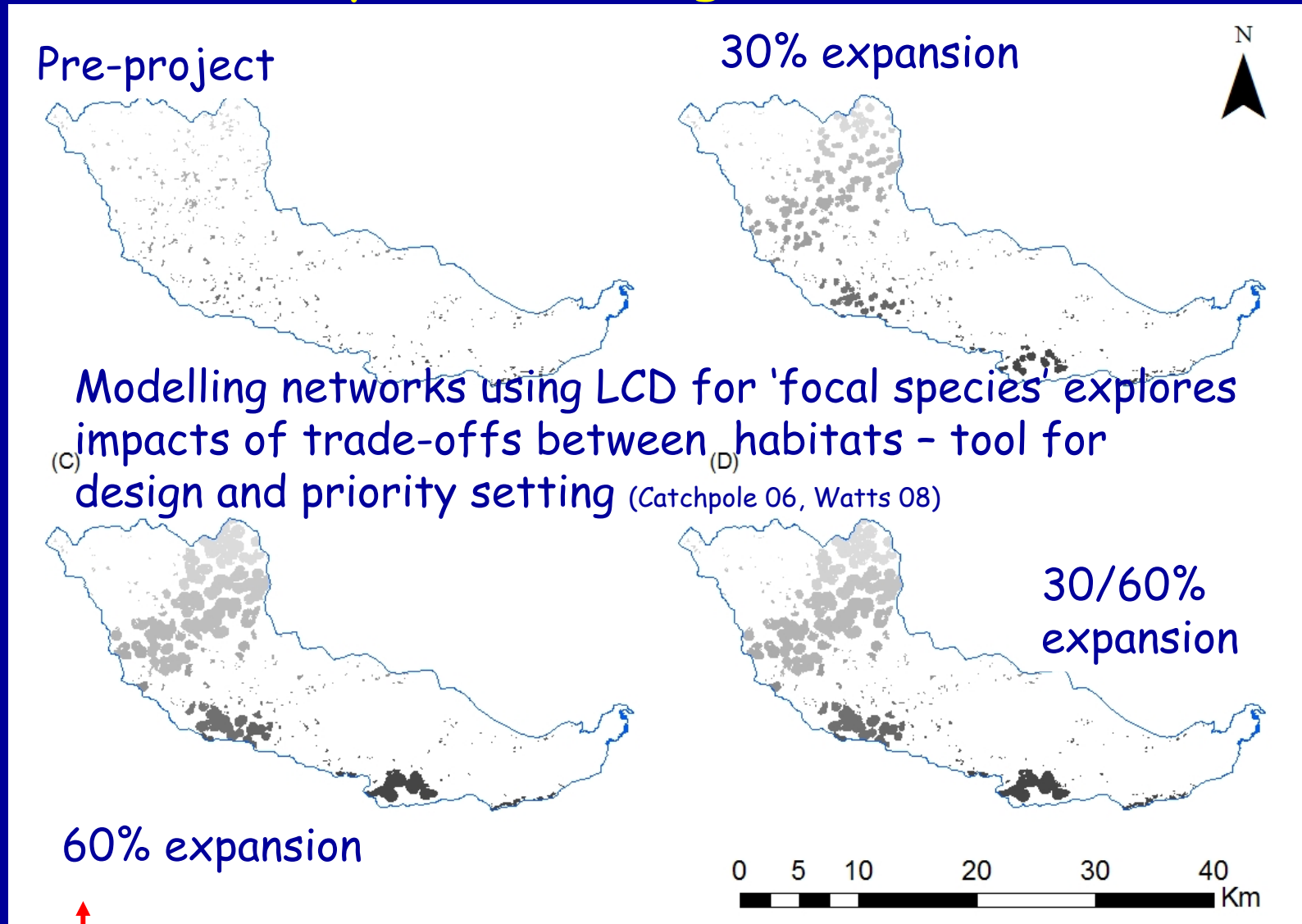
EcIA low where changes focus on improving habitat condition



Increase in habitat area in relation to national targets (from BARS)



Connectivity - visualising habitat networks



Grassland species shown - grass & heath given precedence in SNAs so woodland connectivity declines (Brenman 05)

Summary - biodiversity

- The landscape-scale schemes could provide large **increases in priority habitat** - especially where intensively farmed land is restored
- The envisaged increases in priority habitat are **substantial in relation to current targets**
- Some **trade-offs between habitats** could result in losses
- Indices such as EcIA could be improved by **taking account of enhanced habitat condition**
- The increases in **connectedness of habitat can be visualised** using scenarios - this provides a useful tool for exploring the way in which restoration of one habitat affects others in the area

Ecosystem services

Can landscape-scale projects provide win-win solutions for people and wildlife?

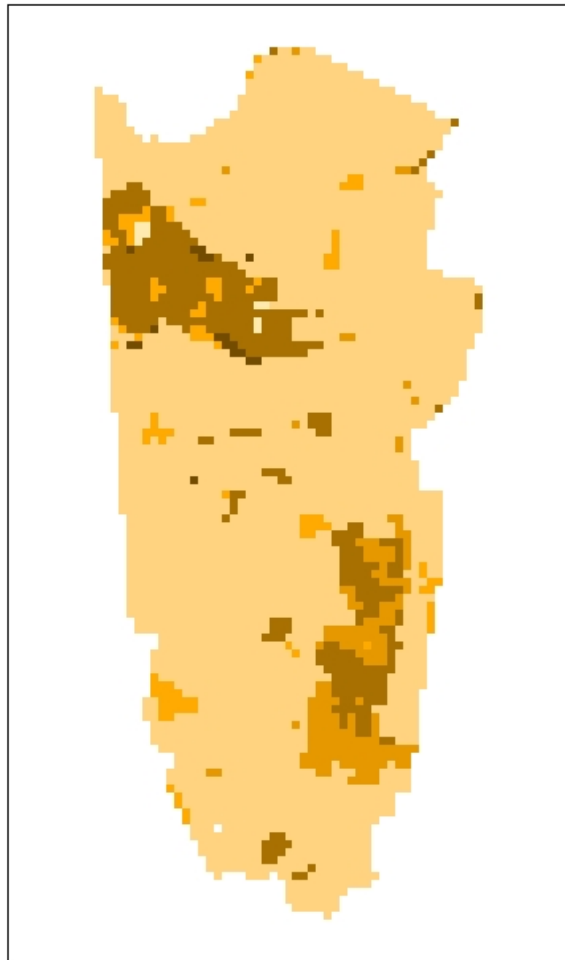
What might their impact be on the provision of ecosystem services?



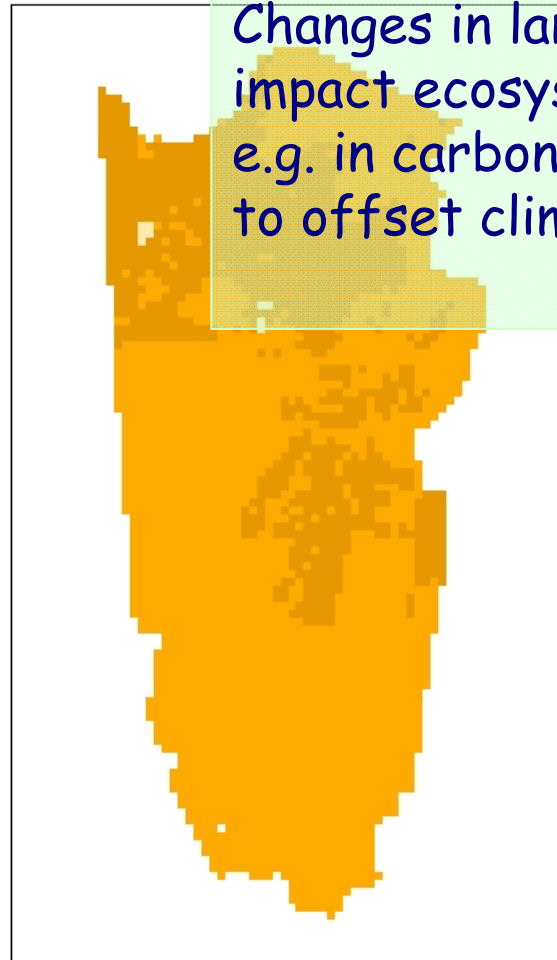
Landscape-scale management & premium meat...

C. Faulkner

Great Fen carbon storage

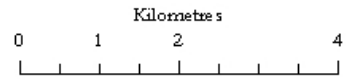
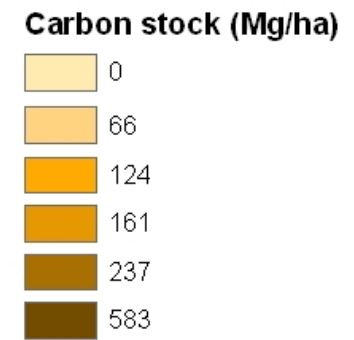


Pre-project

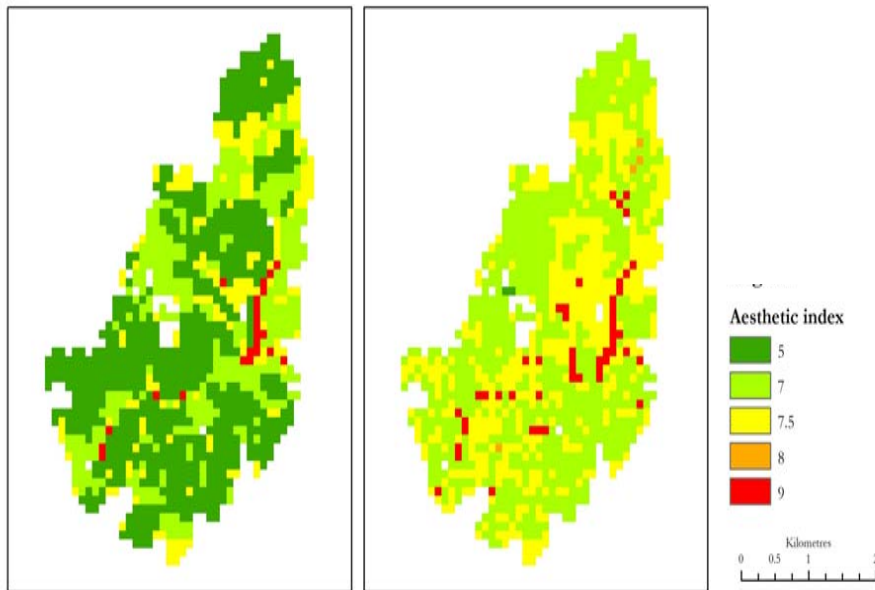


Landscape-scale

Changes in land cover would impact ecosystem services e.g. in carbon storage benefits to offset climate change.

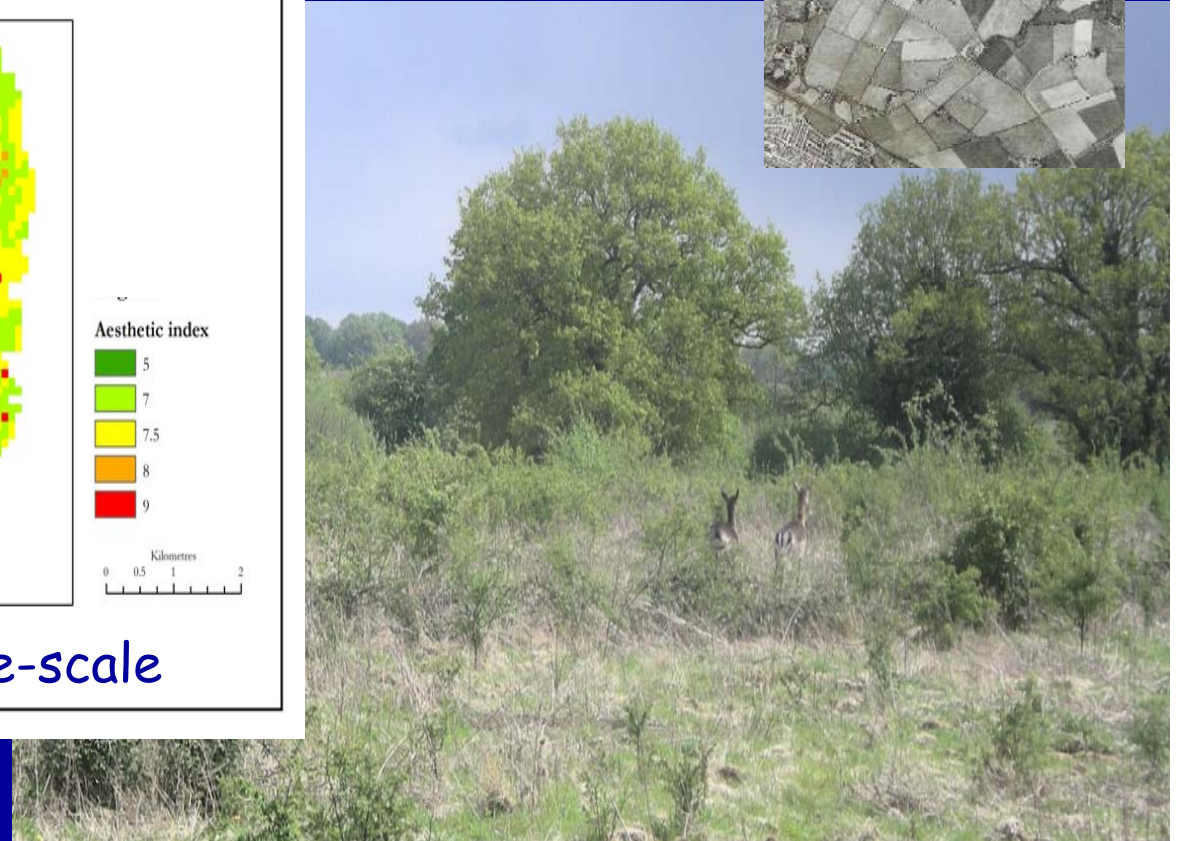


Knepp castle - Aesthetic Index



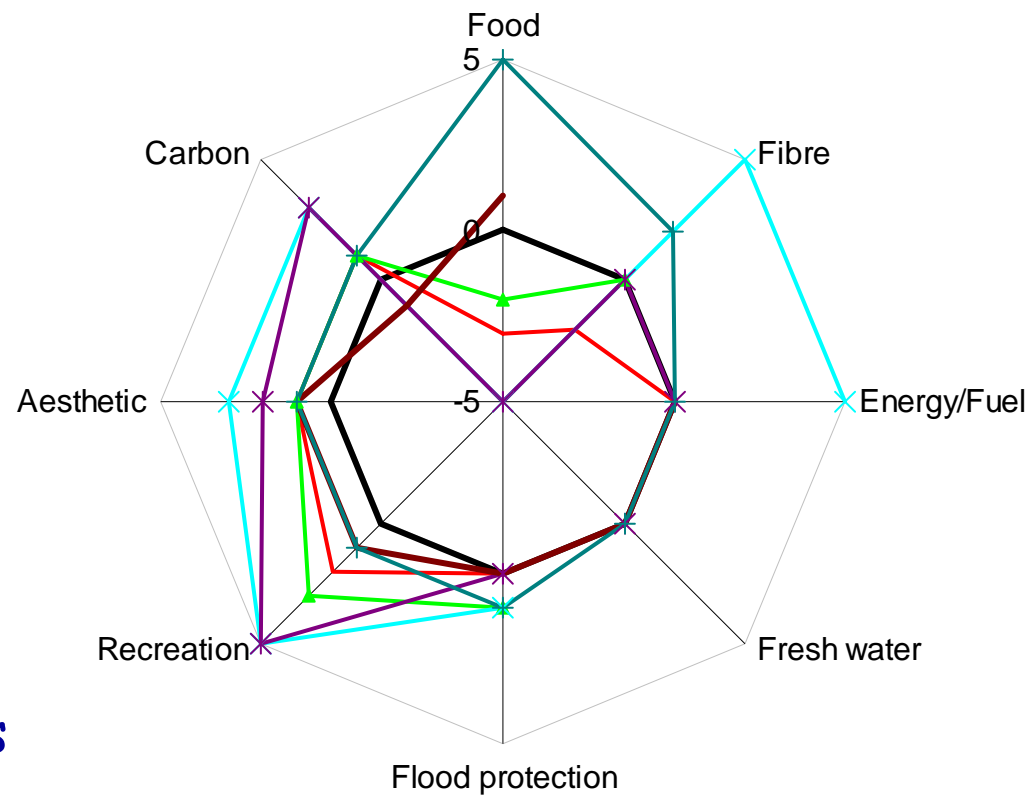
Pre-project

Landscape-scale



Well-being is related to access to landscape of high aesthetic value. An index based on CPRE values showed that change from arable fields to 'rewilded' mixed habitats increases this index

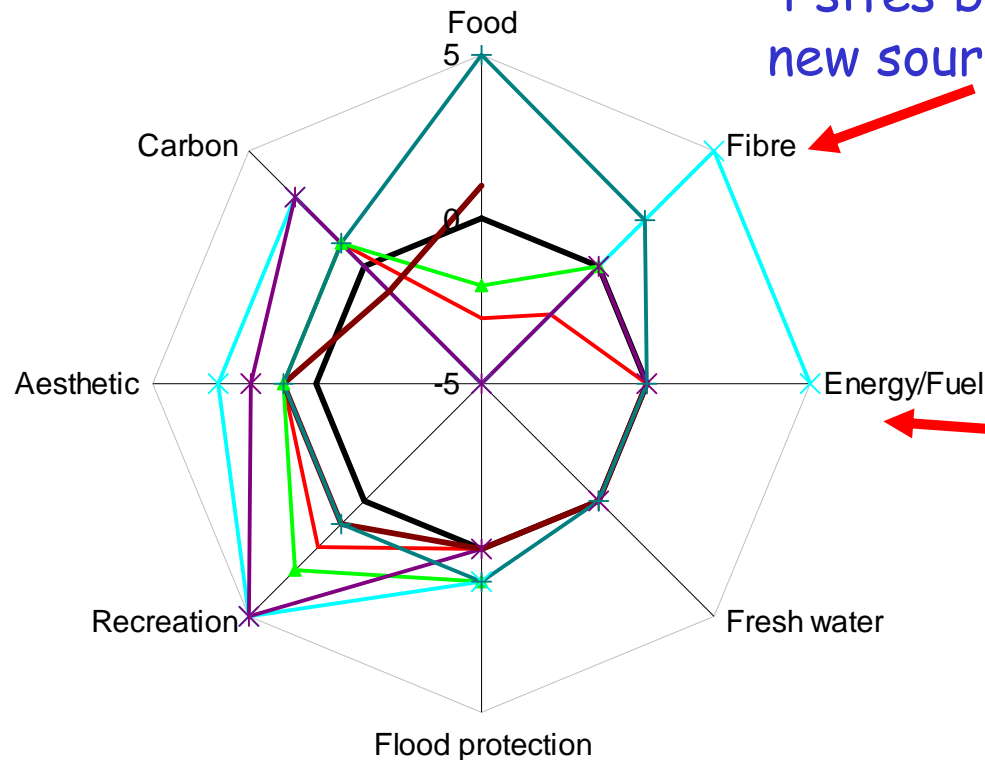
Projected change in ecosystem service provision for the six landscape-scale conservation projects



Scoring enables combination of monetised and qualitatively assessed benefits

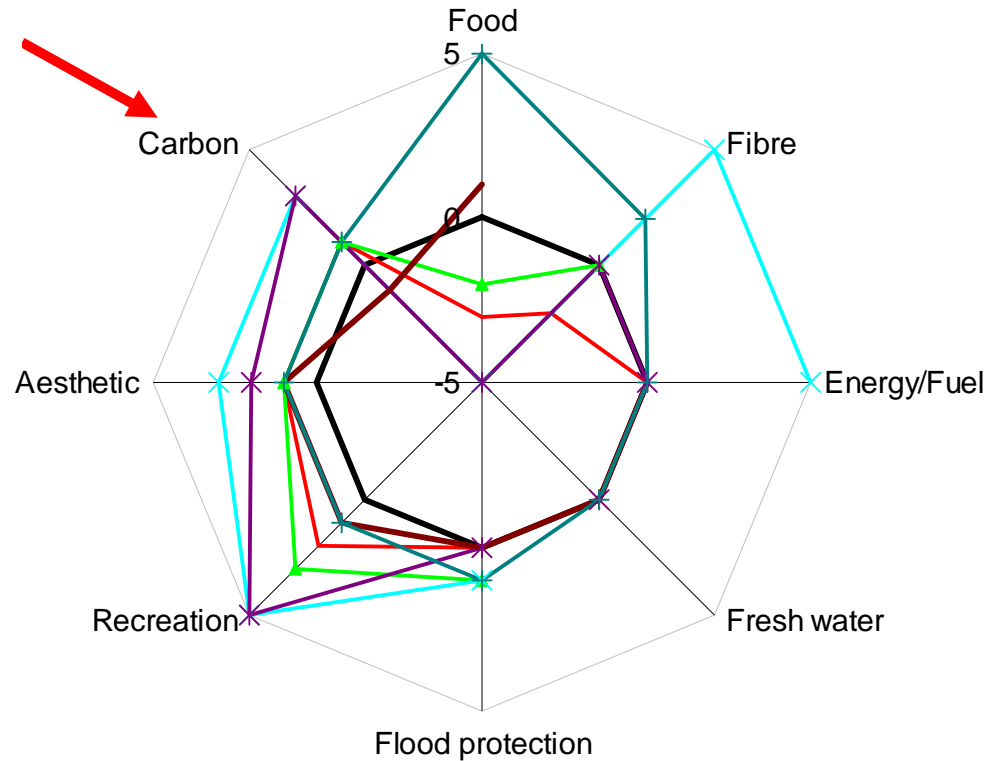
Food - decreased in 4 sites but increased where premium prices predicted e.g. meat

Fibre decreased where plantation forestry removed 4 sites but increased with new sources e.g. reeds



Aside from willow coppice at 1 site, increases in this benefit were not adequately planned to value - but an aspiration

Carbon always increased
- one anomaly - conifer
loss not compensated by
any habitat gain



Large increases in
recreational and
aesthetic value -
always envisioned

Flood protection thought to
increase but not quantified

Benefits vs Costs

- Scores are used to integrate monetary and other values - useful as valuation is not complete
- Using benefits that *do* have monetary values...
- E.g. for Ennerdale - Benefit:Cost ratio (over 50 years) is positive (13)
- BUT if carbon is excluded, it becomes negative (-0.01).

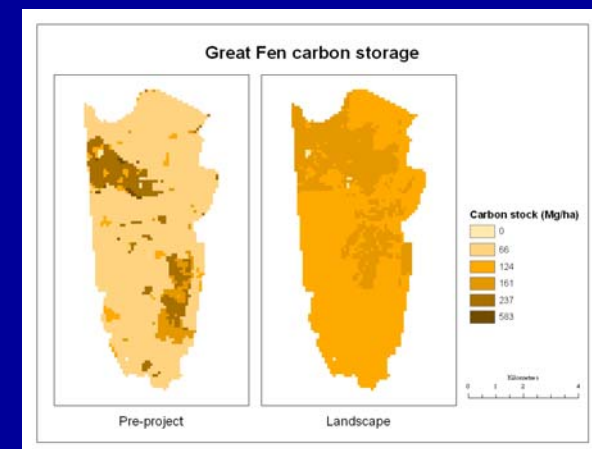
So benefits outweighing costs - dependent on C-values

However, monetisation of other services e.g. flood mitigation could reduce this effect

Carbon sensitivity

The difference in value between the Business-as-usual & Landscape-scale scenarios was heavily dominated by carbon values

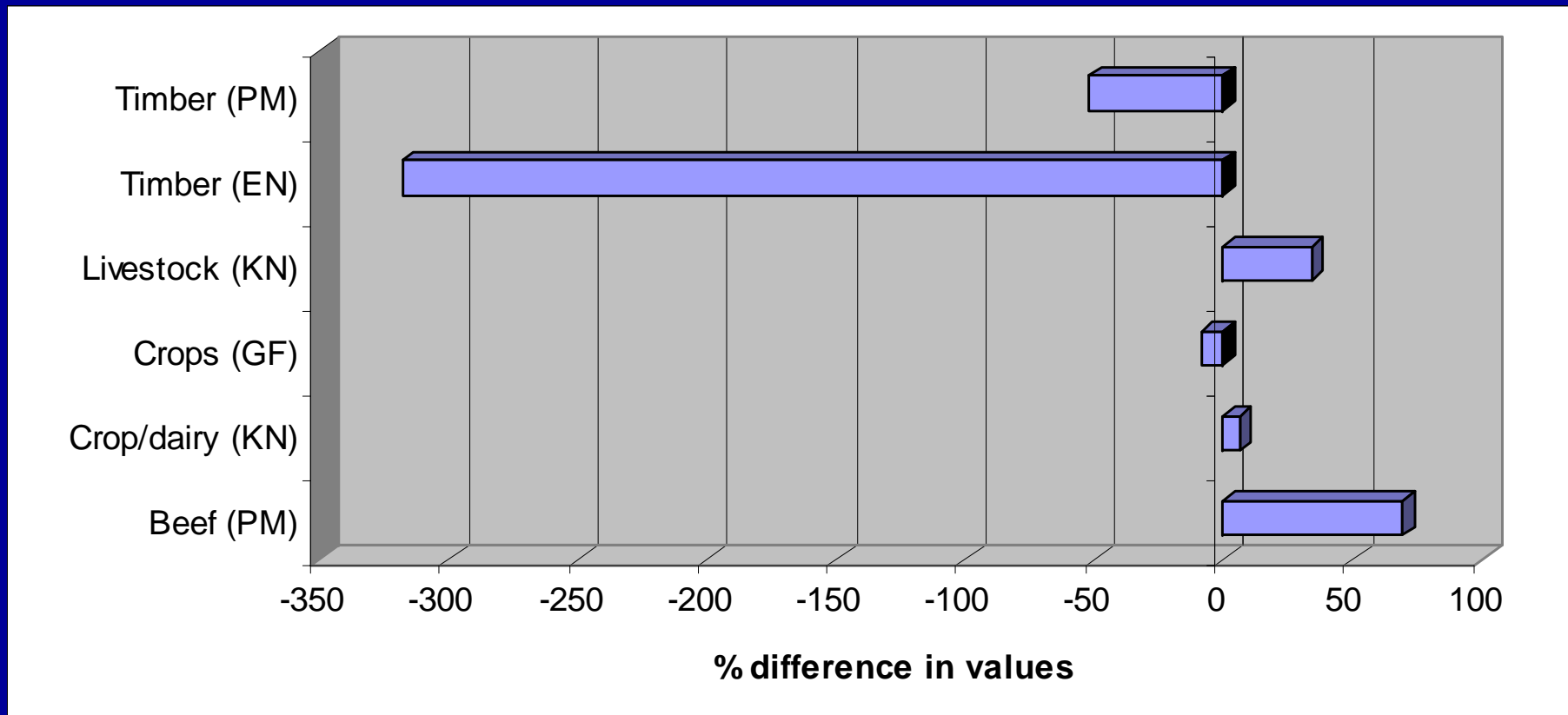
Mean of 96% of the difference (minimum 87%) was attributable to carbon



Context sensitivity

Using benefits transfer rather than local values could distort the results factors not accounted for...

- Timber over-valued - extraction costs in upland terrain
- Livestock tended to be under-valued - premium meat



Solutions? refine benefits transfer / use local values / more emphasis on relative indices rather than monetisation

Summary - ecosystem services

- Large differences in provision of services were envisaged - particularly where much land was restored
- Recreation, aesthetic value and carbon increased - replacing production of food and fibre
- Exceptions included new outputs (e.g. reed)
- Difficult to envisage or value all possible services -uncertainty
- Despite incomplete valuation, benefits could outweigh costs but this depends on C-values
- Context was very important - with major differences evident when local and transferred values were compared

Conclusions

- Increases in area & connectivity of priority habitat envisaged in the future scenarios would enhance the ability of wildlife to adapt to climate change
- Priority setting will be necessary where there are conflicting goals for habitat restoration
- Ecosystem services will be underestimated as some are not monetised - so indices enable comparisons and show overall gains in ecosystem services
- Valuation studies should be very aware of context sensitivity
- C-sequestration a dominant factor in valuations
- Benefits outweigh costs but only when C values included

Feasibility

- Commercially exploited ecosystem services indicated by the case studies integrate projects with the local economy - important for long-term sustainability
- Other instruments for support of landscape-scale schemes may include PES & C-offset
- All schemes were heavily dependent on agri-environment funding - continuity of this funding was crucial
- Even for larger partnership projects, lack of continuity in funding was identified as a limiting factor.

The challenge of making space for nature will require ecologists, economists and practitioners to work together to find effective solutions



Acknowledgements

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For more information:

Hodder, KH; Douglas S; Newton, AC; Bullock, JM; Scholfield, P.; Vaughan, R. Cantarello, E; Beer, S; Birch, J. *in press*.
Analysis of the costs and benefits of alternative solutions for restoring biodiversity. Final report, Defra project WC0758/CR0444.