Landscape-scale conservation: evaluating benefits for wildlife and people

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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

New native forest for biodiversity and recreation

Blocked drains rewet the uplands... carbon and water storage
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

- **Landscape-based management**
  - Whole landscape
  - Management implemented for whole site
  - Implementation only on patches, but plans consider landscape factors & vision may include networks

- **Site-based management**
  - Habitat patches not coordinated
  - Implementation only on patches; plans make no explicit reference to landscape factors

- **Habitat patches coordinated**
  - Implementation only on patches, but plans consider landscape factors & vision may include networks
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.
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
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.

EcIA low where changes focus on improving habitat condition.

Ecological Impact Assessment - scored habitat increase in terms of national resource (Rouquette et al 09)
Increase in habitat area in relation to national targets (from BARS)
Connectivity - visualising habitat networks

Modelling networks using LCD for 'focal species' explores impacts of trade-offs between habitats - tool for design and priority setting (Catchpole 06, Watts 08)

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

What might their impact be on the provision of ecosystem services?
Changes in land cover would impact ecosystem services e.g. in carbon storage benefits to offset climate change.
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.
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