

Interactions between climate change, land use, and the provision of ecosystem services

Introduction

Climate change is widely recognised as the most serious environmental threat facing our planet today, and is becoming central to policy-making and land-use decision-making.

The recently passed Scottish Climate Change Bill commits the Scottish Government to a reduction of GHG emissions of 80% by 2050. However, despite such efforts globally, it is generally accepted that some climate change will still occur, and that humans and ecosystems will need to adapt to this.

Consequences of GHG reduction targets and adaptation responses for Scotland's environment, land use, and rural communities need to be better understood, as do the management systems needed to encourage sustainable landscapes in the face of changing climate.

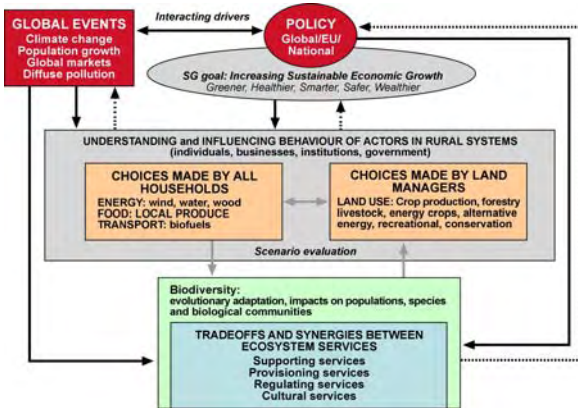


How will changes in land use affect the provision of ecosystem services?

Will Scottish peatlands maintain their carbon in warmer climates?

An integrating framework

Climate change interacts with land use in two ways – firstly by direct influence on ecosystem processes and services (impacts), and secondly on the way that actors within the system respond to it, causing change in behaviour, which in turn affects various ecosystem processes (mitigation/adaptation).



All rural households make choices regarding their energy consumption, food, and transport, while households managing land additionally make choices regarding land use.

With the exception of changes in commuting patterns, all of these have implications for the balance of ecosystem services – choices to substitute fossil fuels with biofuels raises issues of where biofuel crops will be grown, choices to buy local food to reduce food miles raises the issue of where the local produce will be grown, while choices to switch to renewable energy sources raises issues of where wind-farms, small-scale hydro schemes, and biomass crops will be located.

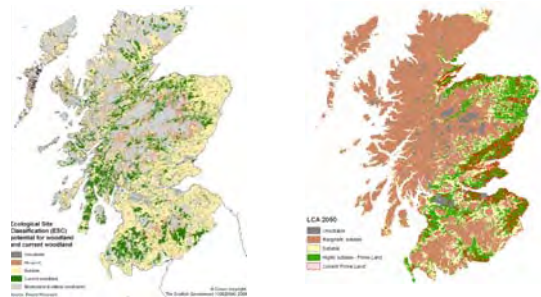
All of these will influence choices by land managers responsible for different land cover and land management practices, which may have implications for ecosystem services such as carbon sequestration, water quantity and quality, and biodiversity.

Tradeoffs and synergies

Because the total land area is fixed, tradeoffs and synergies will inevitably occur, between human mitigation and adaptation responses on the one hand, and biodiversity and ecosystem services on the other. Thus, it is essential to consider the impact of responses to climate change on biodiversity and ecosystem services if we are to understand their impact on the sustainability of the overall system.

Target: Increase forest cover from 17-25%

Agriculture under future climates



Forestry in Scotland is planned to increase to a target of 25% by 2050. However, land where trees might be planted is also predicted to become more suitable for agriculture. How do we balance the tradeoffs between these ecosystem services?

Multi-functional landscapes

- Green-space?
- Forestry?
- Local food?
- Landscape quality?
- Nature conservation?
- Flood Risk management?
- Water quality regulation?
- GHG emissions?
- Access & recreation?
- Soil conservation?
- Renewable energy?



A Visual Landscape Theatre can be used to explore the implications of different landscapes to help build consensus between stakeholders on land use choices.

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