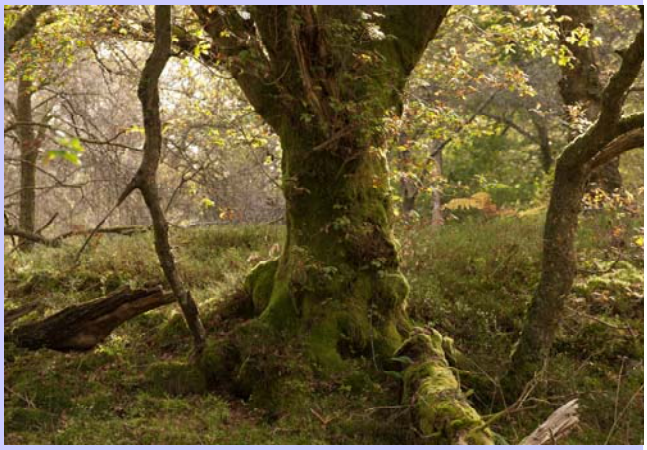
Cost-effectiveness of forestry for climate change mitigation

Forests potentially have a very important role to play globally in climate change mitigation as carbon sinks and through use of wood products in displacing more fossil carbon intensive materials and fuels. The amount of carbon stored by forests is currently of a similar order of magnitude to the total amount of carbon now in the earth's atmosphere.

Cost-effectiveness analysis is important if policies are to minimise the costs of meeting climate change mitigation targets. It is useful both in comparing different forestry options and in comparing these with alternative ways of mitigating climate change.



Background

The current concentration of atmospheric carbon dioxide (CO_2) is at an unprecedented level and rising fast. To prevent 'dangerous' climate change, international agreement reached at Cancun in 2011 sets out the objective of limiting associated average global temperature rise to no more than 2°C above pre-industrial levels, with consideration of adopting a limit of 1.5°C. A tool to assist decision-makers select mitigation measures, cost-effectiveness analysis is in essence very simple. The extra cost of deploying the mitigation measure is divided by the extra reduction in the atmospheric carbon achieved. Measures may then be ranked to form a Marginal Abatement Cost Curve, or estimates compared to a benchmark. In the UK cost-effectiveness estimates are compared to a benchmark based upon social values of carbon. The latter are set to be consistent with meeting national targets (contributions to meeting the international targets).

Objectives

This research aimed to:

- review previous cost-effectiveness estimates of forestry options and underlying approaches, focusing especially upon UK studies.
- set estimates for forestry in the context of those for other mitigation measures.
- provide a succinct synthesis of current information on global carbon balances and climate change, on the global and UK potential for forests to contribute to climate change mitigation, and on studies on methodological issues such as discounting and how these affect estimates of the cost-effectiveness of forestry for climate change mitigation.
- highlight existing evidence gaps.

Methods

- This work comprised desk-based literature and web research and review.

Findings

The range of approaches and assumptions in previous studies analysing the cost-effectiveness of measures often hampers direct comparison of estimates. Nonetheless, the available evidence indicates that forestry options are relatively cost-effective compared with a range of alternatives. Whether this conclusion holds in particular cases could be expected to vary between projects and regions, as well as being dependent upon the approach adopted.

Recent studies in the UK, for example, whether developing a Marginal Abatement Cost Curve, or focusing upon wider benefits of forests, suggest that forestry options are generally very cost-effective as climate change mitigation measures judged by current UK government benchmarks.

Achieving the international target of limiting global average temperature rise due to human causes to 2°C is challenging. It is thought to require reductions in annual global carbon emissions occurring no later than 2015, and emissions far below 2000 levels by 2050. A balance of scientific opinion considers this goal is not yet impossible, although the International Energy Agency's Chief Economist recently warned that "… the door to 2 degrees – which is a must for a decent life – is closing forever". Given their relative cost-effectiveness, the urgency of the challenge, as well as the significance of emissions from global deforestation, the review argues that forestry options will be critical if this objective is to be met. However, at present incentives for forest owners to implement climate change mitigation activities are generally weak.

Current research gaps include robust evidence on impacts of afforestation on forest soil carbon balance, a paucity of comprehensive GHG balances for forest stands, carbon stock changes during early tree growth and once stands reach maturity, and on carbon displacement benefits. Research on albedo, evapotranspiration and other biophysical factors, remains at an early stage. Better evidence is also needed on opportunity costs and on leakage effects.

Recommendations

- Opportunities for climate change mitigation by forestry are currently being lost in the existing institutional structure, with more effort required to develop mechanisms that take account of the climate change mitigation benefits of forests - including payment for ecosystem services schemes.
- To the extent that the cost-effectiveness of forestry options depends upon the methodology adopted and benchmark used, future comparisons could benefit from greater methodological transparency and consistency. Lack of transparent methodology in some studies has been raised as a particular concern.

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Reports and Publications

Valatin, G. and Price C. (2013). How cost-effective is forestry for climate change mitigation? Forthcoming in: Fenning, T. (ed) Challenges and opportunities for the world's forests in the 21st century, Springer, http://www.forestry.gov.uk/website/forestresearch.nsf/ByUnique/INFD-97CDM2 (pre-publication version).