

Science for Environment Policy

Adaptive management needed to maintain forests' ecosystem services under climate change

Forests may need to be converted to more drought-tolerant mixtures of tree species to prevent significant die-off under climate change, predicts a new study which modelled German forests. The researchers indicate that climate change is likely to lead to significant forest damage, which could be reduced through adaptive management.

Protecting forest goods and services under the uncertain conditions of a future [climate](#) requires forward-thinking management. Adaptive management strategies aim to enhance forests' resilience to future changes by favouring and planting tree species that are better suited to predicted conditions.

In this study, conducted under the EU's MOTIVE project¹, researchers used a mathematical model to assess the effects of different forest management regimes under the IPCC's A1B climate scenario². The impact of current and adaptive management regimes on timber production and forest biodiversity were modelled for the Black Forest, Germany, between 2001 and 2200.

The model projections suggest that both timber production and forest diversity would be severely reduced under climate change if adaptive management is not implemented. Past management in Central Europe has resulted in domination by the Norway spruce, a drought-intolerant species, which is likely to lead to reductions in timber production in the long-term, as this species starts to die-back under temperature increases of around 2°C and more.

Under adaptive management, which includes strategies which favour certain species by planting or thinning, the harvest of timber is expected to recover if more drought-tolerant species, such as Douglas fir or European beech, are planted to gradually replace Norway spruce. The researchers found that management that favoured Douglas fir yielded the highest timber production. However, this could have some adverse effects on biodiversity, particularly ground vegetation and bird life.

Furthermore, allowing one tree species to dominate puts the whole forest at risk of plant diseases, which are thought to become a more serious problem under climate change. Considering these factors, the researchers conclude that the best management approach under a changing climate would be an uneven-age, mixed forest strategy. This regime maintains timber production similar to current Norway spruce forests, but also supports high forest diversity which has benefits for wildlife.

The researchers acknowledge that such projections are accompanied by many uncertainties, such as uncertainty in climate change projections, natural disturbances from fire, how tree species will respond to such changes and how demand for goods and services may vary in future.

However, these results suggest that in this particular case of the Black Forest, alternative management strategies that aim to increase forest resilience to climate impacts may take up to 120 years to substantively change the forest's composition. Adaptive management strategies therefore need to be put in place far in advance.



4 July 2013
Issue 335
Subscribe to free weekly News Alert

Source: Temperli, C., Bugmann, H. & Elkin C. (2012). Adaptive management for competing forest goods and services under climate change. *Ecological Applications*. 22(8): 2065–2077. DOI: 10.1890/12-0210.1

Contact:
Christian.temperli@colorado.edu

Read more about:
[Climate change and energy, Forests](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "[Science for Environment Policy](#)": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. MOTIVE (Models for Adaptive Forest Management) was supported by the European Commission under the Seventh Framework Programme. See: <http://motive-project.net/>

2. For explanations of IPCC climate scenarios, see: www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspmp-projections-of.html