



SECTORAL REVIEWS: ENERGY CROPS

"Global warming may dominate headlines today. Ecosystem degradation will do so tomorrow."

Corporate Ecosystem Services Review, World Resources Institute, 2008

"...biodiversity underpins the functioning of the ecosystems on which we depend for food and fresh water, health and recreation, and protection from natural disasters. Its loss also affects us culturally and spiritually."

Ban Ki-moon, Secretary General of the United Nations

The SIMBIOSYS Project

Biodiversity and associated ecosystem services are fundamental to humanity but are increasingly threatened by human activity in a range of sectors. The SIMBIOSYS project addressed impacts of human activity in three key sectors: bioenergy crop cultivation, road landscaping and aquaculture. Impacts of these sectors on genetic, species and landscape biodiversity were assessed. The effect of sectoral activities on the delivery of ecosystem services, including carbon sequestration, pollination, pest control via natural enemy predation and resistance to alien species invasion were also investigated. This was done by combining large-scale field-based surveys with focused smaller-scale experiments. By understanding the relationships between biodiversity and the delivery of ecosystem services, policy and management strategies within each sector can be optimized.

www.tcd.ie/research/simbiosys

Project Details

Start Date: 01/04/2008
Duration: 54 months
Funding: € 1.6 million
Coordinator: TCD
Partners: UCD, UCC, NUIG

Sectoral Reviews

In addition, part of the SIMBIOSYS project involved carrying out in-depth policy-orientated reviews of bioenergy crop production, road landscaping, aquaculture and wind farms on biodiversity and ecosystem services, and reviewed sectoral impacts on coastal marine ecosystems. A summary of the energy crops review is overleaf, and the full review is available at:

www.tcd.ie/research/simbiosys/outputs/strategicreviews/index.php



Energy Crops

To mitigate global climate change and act as a substitute for fossil fuels, bioenergy is becoming an important component of national energy portfolios. However, if not managed correctly, bioenergy crops could further accelerate land-use change and associated biodiversity loss, and their large-scale cultivation may actually increase greenhouse gas emissions and environmental degradation, or introduce risks for food security. The expansion of bioenergy crops and conversion of existing crops or of relatively unmanaged and "marginal" land will result in complex effects on biodiversity and ecosystem functioning and thus the ecological services those ecosystems provide. The aim of this paper is to highlight the effects commercial biomass production could have on biodiversity and ecosystem services and to raise issues for decision makers regarding mitigation to promote sustainable biomass production in Ireland.

Authors

Jens Dauber

Institute of Biodiversity,
Johann Heinrich von Thünen-
Institute (vTI),
Braunschweig, Germany
✉: jens.dauber@vti.bund.de

Mark Emmerson

School of Biological Sciences,
Queens University Belfast
✉: m.emmerson@qub.ac.uk

Mike Jones

School of Natural Sciences
and Trinity Centre for
Biodiversity Research, TCD
✉: mike.jones@tcd.ie

Jane Stout

School of Natural Sciences
and Trinity Centre for
Biodiversity Research, TCD
✉: jane.stout@tcd.ie

John Finnan

Teagasc, Oakpark, Carlow
✉: John.finnan@teagasc.ie

Key Messages

- Miscanthus is the most widely planted biomass crop in Ireland although willow has also been established.
- Increased commercial-scale biomass crop cultivation will affect biodiversity and ecosystem services in unpredictable ways. There is not enough evidence to make firm conclusions on impacts.
- During the early years after planting, the number of species of birds, invertebrates and plants varies with biomass crop type and management. However, long term effects are unknown.
- Pest control measures, vegetation structure, and heterogeneity at the field scale will influence within-crop biodiversity.
- The location and size of biomass plantations will influence landscape level biodiversity and the delivery of ecosystem services.
- Regionally, the location of plantations in relation to processing infrastructure, along with other socio-economic factors, will affect environmental impacts, and biomass production should be subject to EIA and be part of regional SEAs.
- Prospects for biomass production depend on economics of other farming enterprises and price of fossil fuels and carbon. If energy prices rise, energy crop production should be economically sustainable. If food becomes relatively more valuable, it might be more profitable for farmers to stay in food production.