



SECTORAL REVIEWS: WIND ENERGY

"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 wind energy review is overleaf, and the full review is available at:

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



SECTORAL IMPACTS ON BIODIVERSITY AND ECOSYSTEM SERVICES

Wind Energy

Wind energy is expected to contribute to over 90% of Ireland's 2020 renewable energy targets. Ireland has large onshore and offshore wind potential, with over 2000 MW of installed capacity to date, mostly at onshore locations, but offshore developments may significantly increase in the future. The potential impacts of these wind farm developments on Ireland's biodiversity remain largely unquantified. The aim of this paper is to highlight the potential positive and negative impacts of wind farms on Ireland's marine and terrestrial biodiversity, and identify areas for future research.

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Key areas for future research:

1. Development of bird/bat sensitivity maps.
2. Studies of population-level impacts to disentangle wind farm impacts from other threats and pressures.
3. Species specific studies to establish species-specific sensitivities to several types of large-scale wind farms.
4. Identification of migration routes/corridors and stepping stones of bats in Ireland.
5. Assessment of cumulative effects on onshore and offshore wind farms on birds and bats.
6. Preliminary research into impacts on Ireland's marine species and habitats in advance of increased offshore wind farm developments.

Key Messages

- For maximum effectiveness, wind farms are most suited to upland, coastal and offshore areas, potentially affecting a wide range of species and habitats of high conservation value.
- Very little information exists on impacts of wind developments in Ireland. Access to existing monitoring datasets and grey literature is limited.
- International studies suggest that birds, bats, and marine mammals are most vulnerable to the direct impacts of wind turbines, with consequences for direct mortality, or changes to behaviour, condition and breeding success.
- Impacts on birds and bats include collision, displacement due to disturbance, barrier effects and habitat loss. Effects are variable and context specific.
- Positive impacts on marine species include habitat creation, and creation of no-take zones and aggregation areas for fish. Negative impacts include habitat change and loss, provision of habitat for non-indigenous species, noise pollution, electromagnetic fields affecting orientation, and construction impacts.
- No studies have focused on impacts on entire habitats, or ecosystem services or indirect impacts. Habitat ecological and physical integrity, habitat fragmentation and the facilitation of invasive species remain largely under researched.
- Spatial analyses reveal overlap between wind resources and wind farm developments with habitats and species of conservation value.