



SECTORAL REVIEWS: AQUACULTURE

"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 aquaculture review is overleaf, and the full review is available at:

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



Aquaculture

World aquaculture now produces half of the fish and shellfish consumed by humans. Aquaculture is a significant industry for Ireland, particularly in remote coastal communities. Industry output in Ireland is focused on high quality, low volume niche markets, such as organic or eco-certified products. To ensure the sustainability of this industry, it is essential to better understand the interactions between aquaculture, biodiversity, ecosystem services and society. Changes to biodiversity can affect the functioning of ecosystems, altering rates of production, nutrient cycling, etc., which in turn can influence the benefits to society that ecosystems provide. The aim of this review is to highlight some of the ways in which aquaculture can interact with biodiversity, emphasise possible consequences for society and suggest key areas for future research and policy development.

Authors

Myriam Callier

School of Biology and
Environmental Science, UCD
✉: myriam.callier@ifremer.fr

Tasman Crowe

School of Biology and
Environmental Science, UCD
✉: tasman.crowe@ucd.ie

Danielle Green

School of Biology and
Environmental Science, UCD
✉: daniellesgreen@gmail.com

Judith Kochmann

School of Biology and
Environmental Science, UCD
✉: judith.kochmann@ucd.ie

Francis O'Beirn

Marine Institute, Co. Galway
✉: francis.oibeirn@marine.ie

Grainne O'Brien

Bord Iascaigh Mhara, Co
Dublin
✉: obrien@bim.ie

Key Messages

- Ireland's aquaculture is mostly less intensive than in many other nations.
- Sustainability is supported by a number of successful national voluntary programmes that focus on best practise. These do not necessarily require environmental benefits to be assessed or enforced.
- Aquaculture can influence biodiversity and ecosystem functioning and services in a number of ways, including: interactions with wild fisheries resources, physical damage / replacement of habitat, organic and nutrient enrichment, vector for invasive species and via interactions with seals and birds. The relative importance of impacts varies with context.
- A key unresolved issue is the extent to which aquaculture is compatible with maintaining favourable conservation status in Natura 2000 sites.
- Coordinated monitoring programmes and research are required to understand (a) changes to communities and ecosystem processes in the water column; (b) extent of influence of individual aquaculture installations and how this combines and interacts with other local and global pressures; (c) the resistance and resilience of coastal ecosystems and the carrying capacity of Irish embayments and (d) how ecological changes induced by aquaculture translate into changes in provision of ecosystem services.