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Modelling the impacts of the European Water Framework Directive: implementing the ecosystem services approach

A Rural Economy and Land Use Programme research project implementing the ecosystem services approach through integrated modelling of the likely impacts of the European Water Framework Directive upon agricultural land use, water quality and farm incomes.

Photo by Paulette Posen

Policy and Practice Notes

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The Rural Economy and Land Use Programme is a UK-wide research programme carrying out interdisciplinary research on the multiple challenges facing rural areas. It is funded by the Economic and Social Research Council, the Biotechnology and Biological Sciences Research Council and the Natural Environment Research Council, with additional funding from the Scottish Government and the Department for Environment, Food and Rural Affairs.

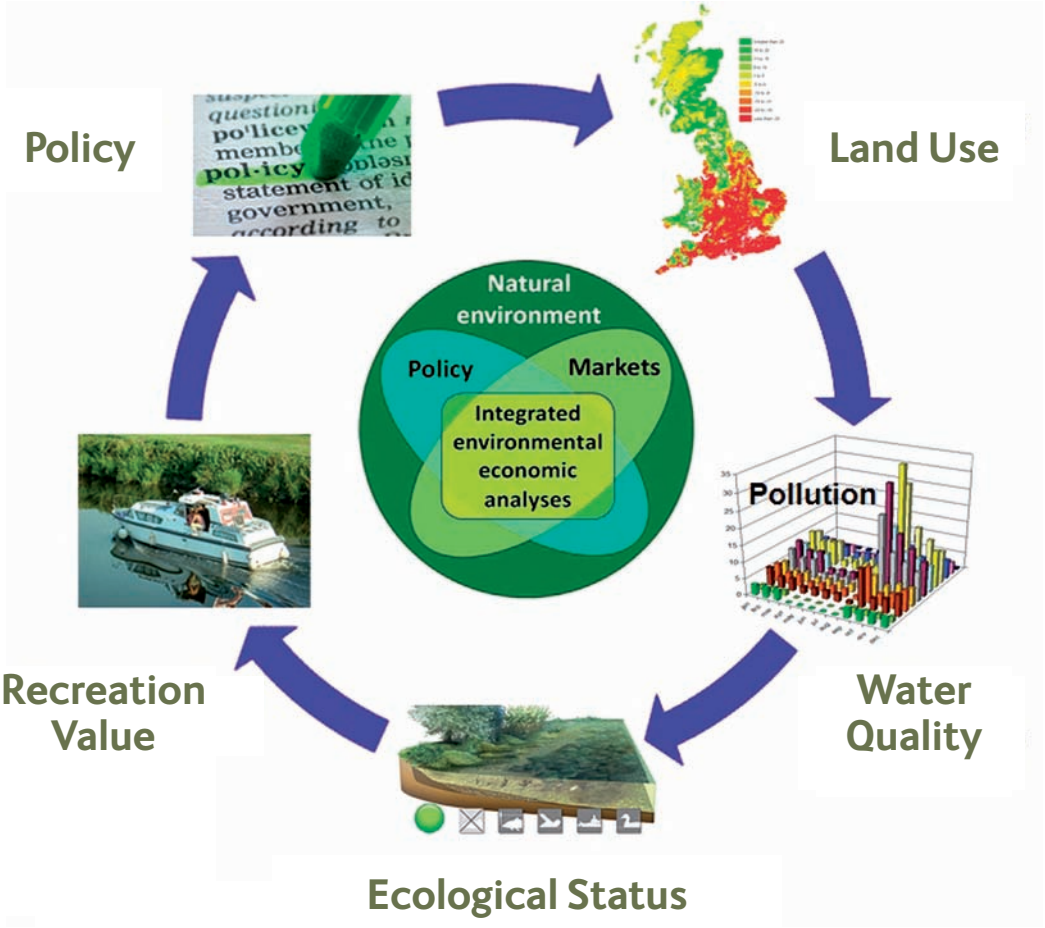
The natural environment and the ecosystem services it provides are vital for human wellbeing. Everything we do, and particularly how we use the land, affects the natural environment. Thus, government policies, which tend to drive land use, will affect the environment and its ecosystem services. How, in deciding on the use of land, can we get best value? To do so, we need to be able to put a value on all the services that the environment provides.

How can integrated modelling help?

Modelling is a means of looking at a range of different factors at the same time. Integrated environmental economic models can examine how changes in policy or market conditions are mitigated, constrained or amplified by variation in the natural environment.

These models can be used to:

- Combine diverse data on the natural environment with detailed information on the economic performance of farms, to predict land use changes in response to shifts in environmental, policy, or market forces.
- Assess how such changes in agricultural land use are likely to affect levels of diffuse pollution to rivers.
- Examine consequences for the ecological status of rivers and, therefore, changes in their suitability for recreation.
- Provide scope to adjust decisions in the light of new information.



Can we put a price on ecosystem services?

Financial analysts tend only to be interested in the prices of marketed goods such as food, but not all ecosystem services are traded in this way. In order to make a complete economic analysis we have to find a way of valuing the full range of services that contribute to human well being, including clean rivers and biodiversity.

Research carried out by the project helps us to:

— Consider the value of both market-priced goods (such as agricultural produce) and non market goods (such as open access to rivers and recreation).
— See how reducing water pollution impacts on the value of leisure opportunities and other non market goods.
— Link this back to the changes in land use that would help to achieve such reductions in water pollution.
— Consider the various costs and benefits for everyone involved, including farmers and people using the rivers for leisure, within the same framework.

This framework enables us to find the most cost-effective solutions. That could mean targeting areas:

— With the highest populations.
— Where people actually want to use waterways.
— Where the quality of those waterways is most in need of improvement.

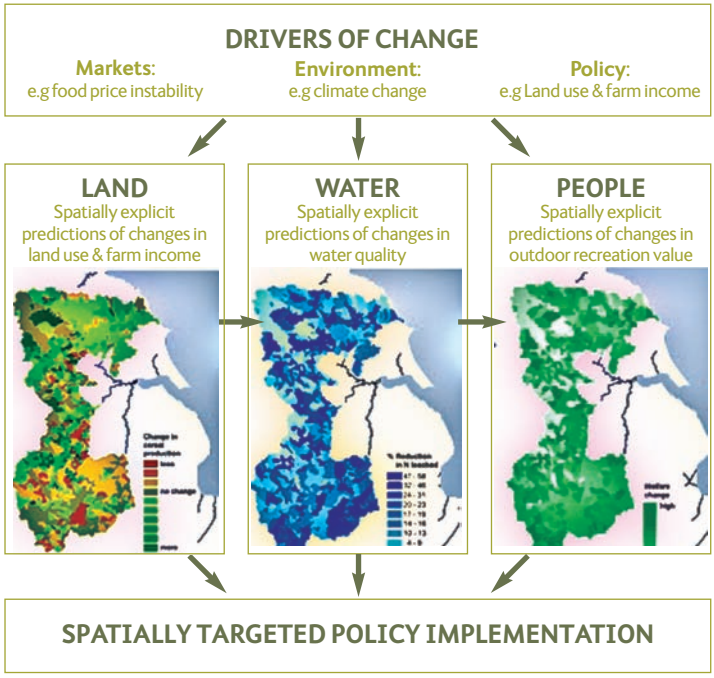
Focusing resources on geographical areas which have all of these characteristics, and where it is possible to identify and rectify upstream causes of pollution, would be the most cost-effective approach.

Why is this important?

Efficient use of resources is essential, particularly in times of austerity. Economic analyses of ecosystem service often fail to incorporate the natural environmental variation that is characteristic of the real world. This means that they cannot recognise that spending in some areas is likely to be far more productive than in others.

By using integrated modelling we can:

— Link land use, farm incomes, water quality and recreation value, and highlight how each varies spatially.
— Enable decision-makers to target scarce resources to those areas which will respond most positively to additional spending, thus avoiding waste in comparatively unresponsive areas.



What are the messages for policymakers?

There are some clear messages for policymakers on implementation of the European Water Framework Directive:

- Policies designed to change agricultural land use could achieve significant improvements in river water quality, but at the expense of farming incomes.
- This would be bad for rural prosperity and could make some communities unsustainable.
- Urban populations would benefit more than rural ones, and at the latter's expense.
- Within any given locality, once initial improvement of the water quality has been achieved, further improvements make little difference.
- The most efficient policy would be to target specific urban rivers in need of improvement, rather than pursuing the Water Framework Directive objective of improving all rivers in all areas to pristine standard.
- Faecal contamination cannot be adequately controlled through purely rural land use measures such as reductions in livestock intensities, appropriate strategies for urban sewage disposal are also important.
- In rural areas, the most cost-effective approach to improving water quality is via simple measures such as fencing to prevent livestock from fouling watercourses.

What are the wider applications of the research?

The ecosystems services approach, as developed in this research, provides a useful framework that could be applied more widely as it:

- Unifies natural science and economic analyses.
- Enables policymakers to create a "level playing field" when balancing the demands of traded and non-traded goods.
- Provides a means of valuing the contribution the environment makes to human wellbeing.
- Helps to identify the real environmental priorities of individuals and communities.
- Enables climate change to be incorporated within the analysis.
- Feeds into important analyses such as the National Ecosystem Assessment.

Further information

The research has been carried out at the universities of East Anglia, Manchester, Cranfield, Aberystwyth, Centre for Ecology and Hydrology (Wallingford) and Askham Bryan College.
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Project Website: www.uea.ac.uk/env/cserge/research/relu/index
Useful resources: Bateman, I.J. (2010). Bringing the real world into economic analyses of land use value: Incorporating spatial complexity, Land Use Policy, 26, 1, S30-S42.

Fezzi, C., Hutchins, M., Rigby, D., Bateman, I., Posen, P. and Hadley, D. (2010). Integrated assessment of Water Framework Directive nitrate reduction measures, Agricultural Economics, 41, 123-134.
Hutchins, M., Fezzi, C., Bateman, I.J., Posen, P. and Deflandre-Vlandas, A. (2009) Cost-Effective Mitigation of Diffuse Pollution: Setting Criteria for River Basin Management at Multiple Locations, Environmental Management, 44(2): 256-267.
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