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Spatial targeting brings new opportunities for agri-environment schemes

Improved accessibility to large spatial datasets and digital mapping tools brings opportunities for agri-environment schemes to be more spatially targeted, helping to maximise biodiversity outcomes and to manage trade-offs with other environmental outcomes.

Photo by Chloe Hardman

Living With Environmental Change Policy and Practice Notes

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The Living With Environmental Change Partnership brings together 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies. The private sector is represented by a Business Advisory Board.

Agri-environment schemes (AES) provide payments to farmers who voluntarily agree to carry out environmental land management. Protecting and enhancing biodiversity has been one of the goals of these schemes since they began in 1987. Evidence suggests that targeting habitat options towards particular landscapes will increase the effectiveness of AES for enhancing biodiversity.

Why is there greater opportunity for spatial targeting under new schemes?

Schemes across the UK offer opportunities for spatial targeting:

- Under new Rural Development Programmes for the period 2014-2020, competitive AES were launched in England (Countryside Stewardship) and Scotland (Agri-Environment Climate scheme). Applications are scored on various criteria including how far the proposed management meets regional priorities.
- The non-competitive schemes in England (Entry Level Stewardship) and Scotland (Land Managers Options) are no longer available to new applicants.
- The Welsh AES (Glastir) includes a spatially targeted scheme (Glastir Advanced) and a scheme open to all farmers (Glastir Entry).
- The process of spatial targeting used in these schemes could be enhanced further through incorporating some key ecological concepts.

How does the surrounding landscape influence the effectiveness of an AES?

Several types of AES management, such as sown flower strips and organic farming, have been found to enhance biodiversity within the farm. Whether AES management has increased population sizes, or whether the effects seen within farms are due to species moving in from surrounding areas, is not yet well understood. However, evidence from studies throughout Europe shows that areas of croplands managed under AES contain more species:

- When situated in landscapes of intermediate complexity (1-20% semi-natural habitat). These landscapes have more sources of wildlife to colonise farms than cleared landscapes (<1% of semi-natural habitat). In complex landscapes (>20% semi-natural habitat) the effect of the AES tends to be masked by high colonisation rates everywhere.
- When the management creates a high contrast with the surrounding landscape in important resources or habitat quality. For example, flowers added to a landscape with very few flowers attract more pollinating insects than the same density of flowers added to a landscape where lots are already growing.

Are AES more effective when many farmers in a landscape take them up?

Although AES are usually implemented at the farm scale, coordination of AES on multiple farms to create landscape scale implementation is important because:

— Over a third of the breeding bird, mammal, reptile, amphibian and bumblebee species on English farmland use areas larger than the average farm size.
— Birds and bees need sufficient foraging resources within range of their nesting sites in order to breed and it may not be possible for this to be provided by a single farm.

Evidence from England shows that delivery of AES by many farmers in the same landscape can be more beneficial for biodiversity:

— Upland fields in the Peak District surrounded by landscapes with more land in AES (within a 500 metre radius) supported more upland specialist birds and species of conservation concern.
— In Oxfordshire 10 km x 20 km landscapes that were targeted for AES were compared with non-targeted control landscapes. In the targeted landscapes farmers were encouraged to apply for AES and were assisted with their applications. After two years, the amount of AES hedgerow management increased in targeted landscapes relative to controls. Hedgerow trees in the targeted landscapes supported a higher abundance and diversity of moths compared to controls.
— In England, arable fields in landscapes with high amounts of organic farming (on average 17.2% in the surrounding 10 x 10 km landscape area) supported more butterflies and bumblebees than those in landscapes with low amounts of organic farming (on average 1.4%).

Will spatial targeting for biodiversity also deliver other environmental objectives?

Spatial targeting needs to take multiple objectives and trade-offs into account:

— AES in England, Scotland and Wales all prioritise maintenance and enhancement of biodiversity and water quality, as well as flood management, preservation of the historic environment, educational/public access and support for organic farming.
— The Scottish and Welsh AES prioritise measures to combat climate change. In England's AES, this is not an overall priority, but is part of prioritising woodland creation capital grants.
— England's scheme also aims to improve genetic conservation and landscape character.
— In some locations, AES agreements do enable multiple environmental objectives to be achieved. For example, a study from Ireland showed that organic dairy farms supported higher species diversity of plants and higher pollination service to hawthorn compared with conventional dairy farms.
— There are also trade-offs, where management that supports one outcome reduces an alternative outcome. For example, the optimal choice of management options for reducing surface water nitrate may be sub-optimal for conserving a diversity of pollinators.
— Spatially explicit decision-making tools can assist with management of trade-offs, helping overall environmental outcomes within landscapes to be predicted, optimised and zoned. However, the implicit trade-offs in land management objectives mean that there are limitations on how far a certain area of land can go towards meeting multiple objectives. Therefore increasing the amount of land managed under AES is vital for increasing the capacity of land to deliver multiple objectives.

What are the implications for policymakers?

The current evidence shows that spatial targeting is a cost-effective way to deliver quality habitat in optimal locations. In addition, uptake of AES at landscape scales is important for delivering biodiversity outcomes whilst managing trade-offs with other environmental objectives.
Policy makers should continue to:

- Implement competitive AES assessed against regional priorities.
- Use large datasets and mapping tools to create regional priority maps. Data currently being used include locations of target species, priority habitats, priority areas for water quality, climate change and landscape features.
- Work with farm advisers to support the generation of collaborative AES applications.

Policymakers could encourage more effective spatial targeting through:

- Targeting AES management that aims to increase biodiversity within farms (eg field margins and organic farming) to landscapes of intermediate complexity (with between 1% and 20% of semi-natural habitat).
- Creating maps of important wildlife resources. This will require estimation of resource provision from various land uses and AES options for different taxa. The maps will reveal where AES management options are needed to provide resources that are currently limiting populations, for example, providing winter bird food in landscapes where this is lacking.
- Continuing to monitor the effectiveness of spatially targeted AES for the range of target outcomes to help refine and better target future management interventions.

Further information

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Useful resources:

Batáry, P., Dicks, L. V., Kleijn, D. & Sutherland, W. J. The role of agri-environment schemes in conservation and environmental management. Conserv. Biol. 29, 1006–1016 (2015). DOI: 10.1111/cobi.12536

Scheper, J. et al. Environmental factors driving the effectiveness of European agri-environmental measures in mitigating pollinator loss-a meta-analysis. Ecol. Lett. 16, 912–20 (2013). DOI: 10.1111/ele.12128

English Countryside Stewardship Scheme:
https://www.gov.uk/government/collections/countryside-stewardship-statements-of-priorities

Scottish Agri-Environment Climate Scheme:
https://www.ruralpayments.org/publicsite/futures/topics/all-schemes/agri-environment-climate-scheme/

Welsh Glastir Scheme:
http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/?lang=en

Relu Policy and Practice Note No 37 Improving the success of agri-environment initiatives
http://www.relu.ac.uk/news/policy%20and%20practice%20notes/37%20Bullock/PPN37.pdf

Relu Policy and Practice Note No 38 Sustainable agricultural landscapes: thinking beyond the boundaries of the farm
http://www.relu.ac.uk/news/policy%20and%20practice%20notes/38%20Benton/PPN38.pdf

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