BESTMAP

BEHAVIOURAL, ECOLOGICAL AND SOCIO-ECONOMIC TOOLS FOR MODELLING AGRICULTURAL POLICY

Horizon 2020 BESTMAP project recommendations for post-Brexit Environmental Land Management scheme design

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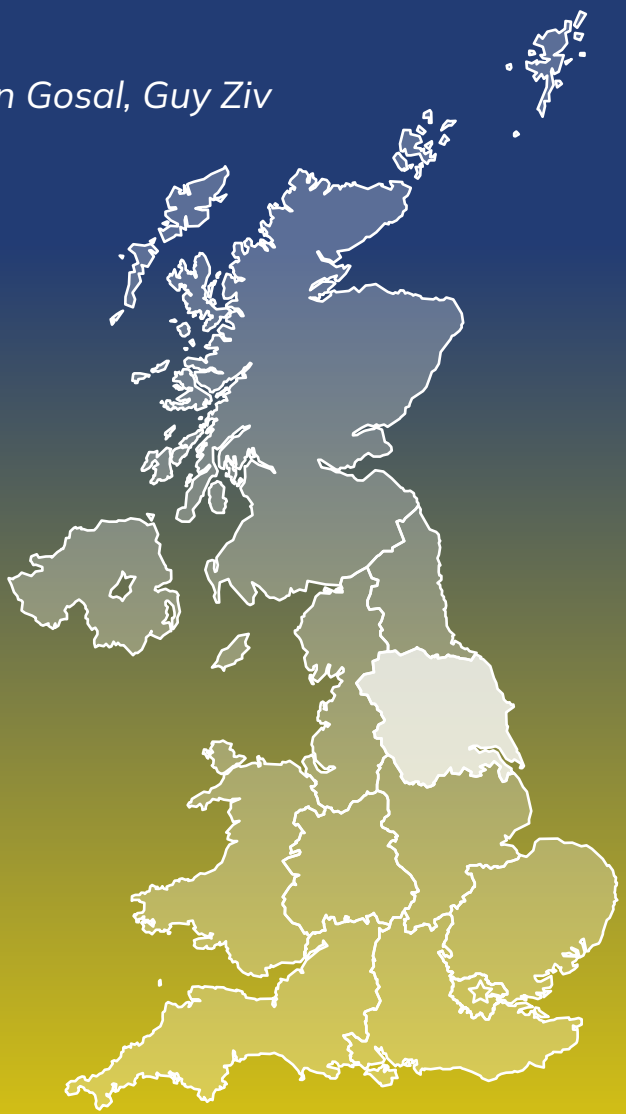

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Executive summary

EU-project BESTMAP developed a new framework, which involved modelling the impact of certain agri-environment practices (AEP, an umbrella term including agri-environment schemes (AES) and ecological-focus areas (EFA)) in five heterogeneous case study areas, including the Humber catchment area in north-east England.

BESTMAP primarily explored the spatial allocation of AEPs, the complexity of farmers' decision-making and preferences relating to AEP adoption and the impacts of AEP on ecosystem services and biodiversity.

The main findings in the Humber study area indicate that, firstly, almost all AEPs occur most frequently on economically large, general cropping farms, especially cover crops, fallow land and vegetation buffers. Organic AEPs occur on a plethora of farm types. Secondly, farmers choose not to participate in AEPs as they do not provide a surplus of income nor do they feel they have enough advisory support. Lastly, AEPs were found to improve water quality, soil organic carbon and biodiversity, but they did not improve the production of food and fodder.

In response to the research findings, in this policy brief we suggest that improving advisory and financial support for farmers will increase overall AEP uptake, and that AEP objectives and benefits should be better clarified to farmers.

Policy context

Around 75% of the UK's land area is used for agricultural purposes, much of it has been intensively used to produce feed and food at the expense of varying degrees of environmental degradation. To combat this, the 2014-20 EU Common Agricultural Policy (CAP) features agri-environment schemes (AES), which function to compensate farmers for adopting environmentally-friendly practices. However, since the UK's withdrawal from the EU, the UK has moved away from CAP and towards a collective framework known as the Environmental Land Management schemes (ELMs), which will progressively replace current subsidies by 2027. In the House of Commons Environment, Food and Rural Affairs Select Committee 2020-21 inquiry 'Environmental Land Management and the agricultural transition', the select committee noted their objective is to investigate: "What lessons should be learned from the successes and failures of previous schemes paying for environmental outcomes?" (House of Commons, 2021: p.6). This policy brief therefore functions to address decision makers by conducting analysis on CAP AEP adoption within a UK context, and making recommendations for the design of policies during this transitional time period to contribute towards the official ELMs launch.

BESTMAP approach

The overall objective of the Horizon 2020-funded BESTMAP project (www.bestmap.eu) is to develop and enact a methodological framework for modelling the adoption and the impact of AEPs (agri-environment schemes and ecological-focus areas) on the agricultural landscape. The project considers farmers' decision-making and preferences, as well as the environmental impact of AEPs on biodiversity (specifically farmland birds) and ecosystem services (water quality, soil carbon sequestration, and food and fodder production). BESTMAP explored these factors in five contrasting case studies around Europe, including one in the Humber, UK, of which this policy brief centres on.

The Humber catchment study region is located in the northeast of England (Fig. 1). The shape of the study area is based on five National Character Areas (NCAs), which are each a distinct natural area defined by a unique combination of ecological, cultural and economic activities (Fig. 2). It covers an area of 4,664 km^2 consisting of flat peatlands to hilly terrain, and a temperate and maritime climate. Hydrologically, the Southern section of the catchment area drains via the River Ancholme into the Humber estuary, and further south drains through the River Eau towards the Wash (Ziv et al., 2020). As well as featuring several urban areas and semi-natural habitats, the Humber catchment region is also a major agricultural area, with fields covering ~80% of the case study area and an average Farm Business Income of ~£48,000 per farm in 2019/20 (DEFRA, 2023). Livestock, including pigs, sheep and cattle, also constitute a substantial proportion of agricultural land in the area (Ziv et al., 2020).

Figure 1. Adult sheep feeding in lush meadows of England.

RESEARCH OBJECTIVES

Based on the BESTMAP approach, we focussed on the following key questions:

1 What types of fields are AEPs implemented?

2 Why do farmers choose (not) to participate in AEPs?

3 What is the impact of AEPs on biodiversity and ecosystem services?

4 What recommendations can be made for the future design of AEPs in the UK?

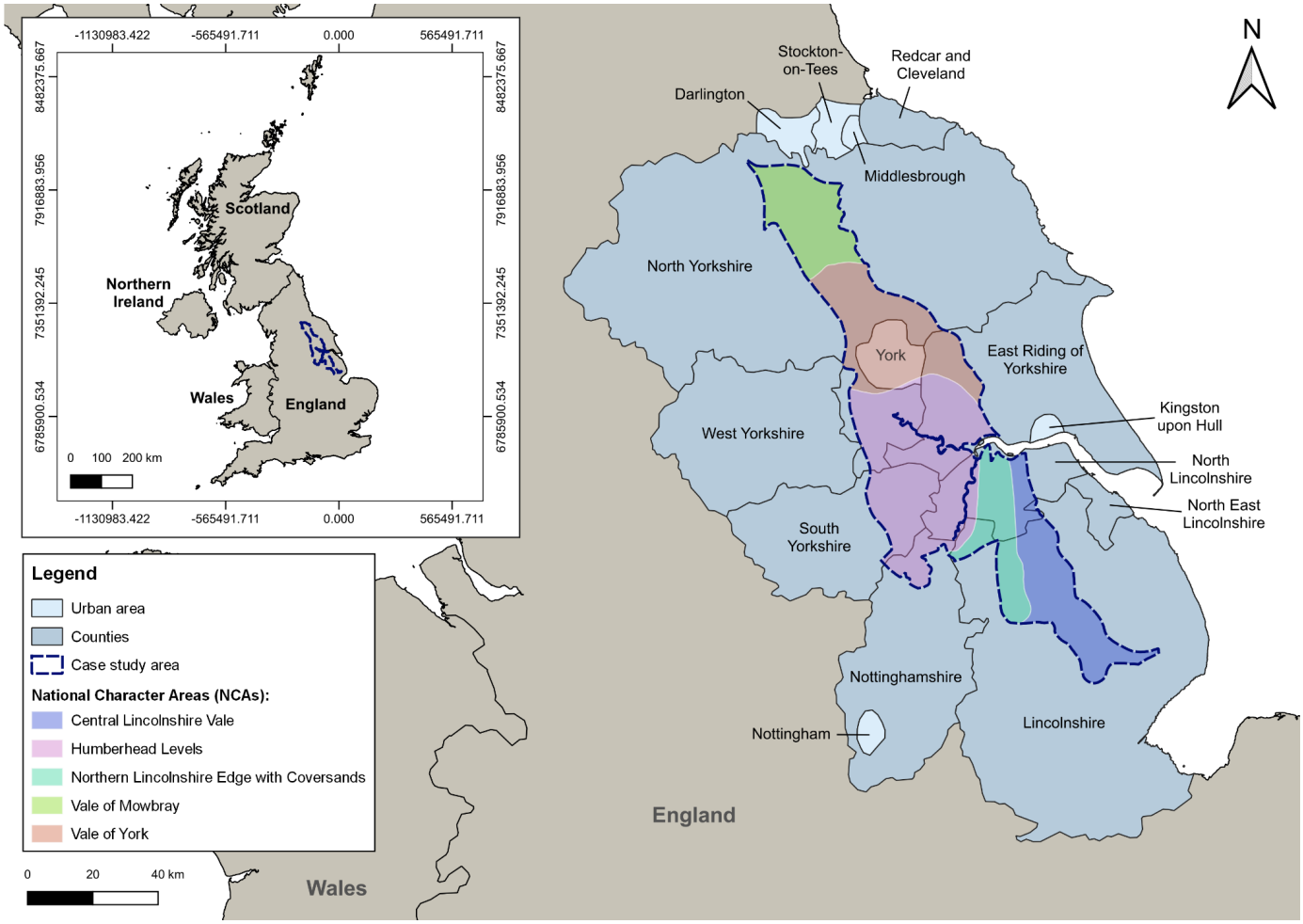

Figure 2. Geographic location of the case study region, with reference to the placement within the UK in the insert map, and the counties and NCAs in the main map. Produced using QGIS software and taken from Wool et al. (2023).

Results

What types of fields are AEPs implemented?

Using spatially-explicit data from the Rural Payments Agency (RPA), farms were classified based on their economic size (annual gross output in Euros) and type of production system according to the simplified Farm Accountancy Data Network (FADN) methodology. This classification into "farming system archetypes" revealed that the majority of the Humber case study farms focus on general cropping (P1), followed by farms focusing on grazing and livestock (P4) and farms combining both farm specialisations (mixed). All categories of economic sizes are common across different farm specialisations. However, the majority of grazing and livestock farms (P4) are small (<25k EUR) or very small (<2k EUR; the inclusion threshold used by FADN). The majority of general cropping farms (P1) and mixed farms belong to the large economic size category (>25k EUR).

When it comes to AEPs, BESTMAP considered seven interventions namely cover crops, maintaining permanent grassland, buffer areas, organic farming, conversion to permanent grassland, conversion to forest, and fallow land. All practices besides organic were most likely to be located on farms that were economically large and used for general cropping (Fig. 3). Cover crops, fallow land and vegetation buffers were almost exclusively (over 80%) located on this type of farm. Grassland maintenance, conversion to grassland and conversion to forest also appeared on small grazing and livestock farms or mixed large farms, and lastly organic AEPs were placed on the largest variation of farm types. Non-adopting farmers were most likely to be associated with small (2k-25k EUR) and very small (<2k EUR) farms.

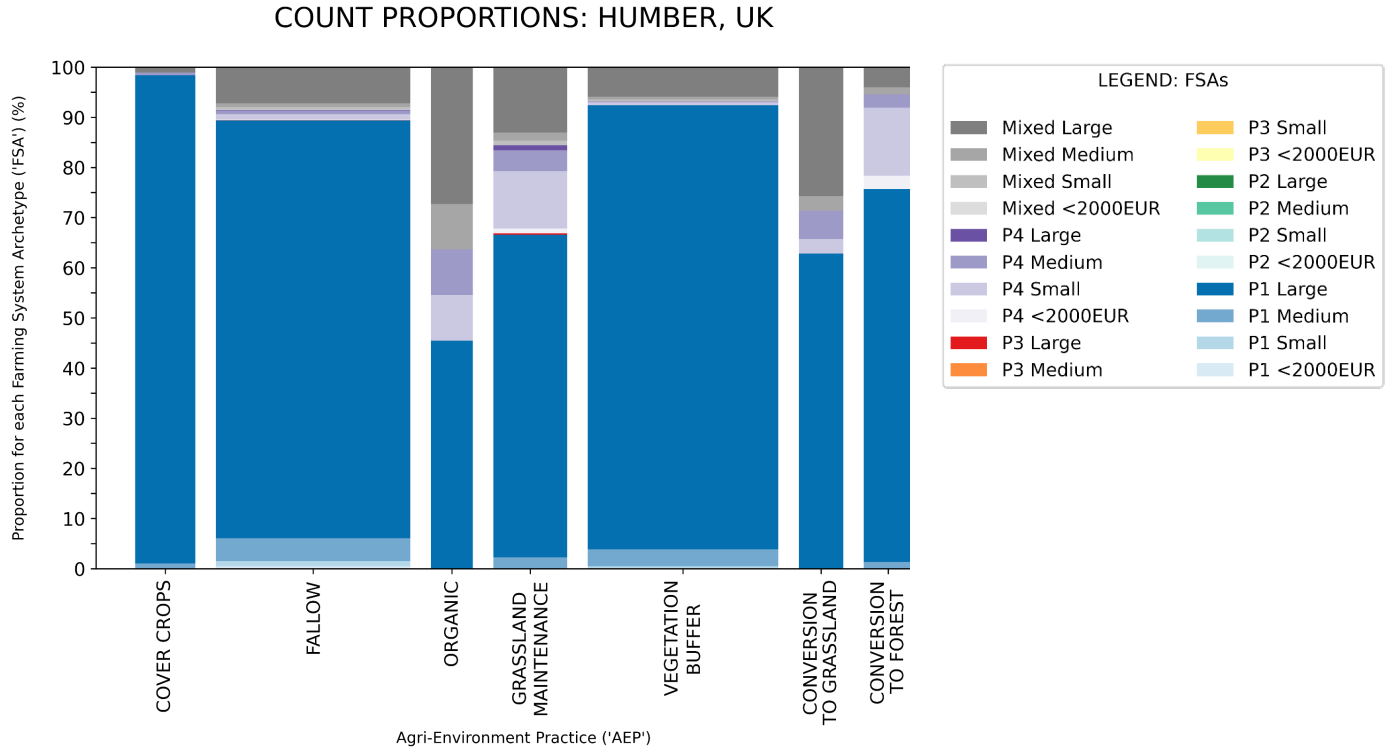

Figure 3. The relationship between FSAs (P1 = general cropping; P2 = permanent crops; P3 = horticulture; P4 = grazing and livestock) and AEPs. The bar width is proportional to % of total number of farms , with the maximum total bar width being up to 10x the fixed minimum width. The total sample is calculated by the total sum of all farm counts adopting each AEP category, so a farm could 'count twice' or more in the 'total sample' if it adopts multiple AEPs. Taken from Václavík et al. (2023).

Why do farmers choose (not) to participate in AEPs?

Firstly, it is important to address the overall low AEP adoption rate in the Humber. In 2019, the most commonly adopted type of AEP was fallow, and this was adopted on less than 8% of fields. Second was buffer strips, at ~3% of fields. Conversion to permanent grassland, cover crops, organic and maintaining permanent grassland AEP types were all adopted on less than 1% of fields in the area.

Secondly and according to interviews with 16 farmers conducted by BESTMAP during January to May 2020, reasons for farmers participation in AEP were:

- Receiving monetary compensation for implementing practices that fit well with the farming system already in place on the farm.
- The satisfaction of doing something good for biodiversity and/or the environment.

Reasons for non-participation included:

- Lack of support
  - According to a discrete choice experiment, advisory support is one of the most important factors in adopting AEPs, but it is not good enough.
  - Lack of flexibility of the schemes and subsequent fear of an increased scrutiny of the government on individual farms' practices.

- Loss of consultancy service due to change from personalised approach (Natural England) to a computerised system.
- Trust between advisors and farmers is low.
- Lack of time or resources to spend on understanding how to apply to a scheme, and what the different options within schemes are.

The AEPs do not provide a surplus of income for the land destined to them, and, for farms located on very productive land, AEP participation is seen as a loss of potential income. Of multiple policy scenarios tested, a 10% increase in payments is likely to improve the uptake of buffer strips and grassland management AES.

What is the impact of AEPs on biodiversity and ecosystem services?

Comparing the present-day AEP adoption vs. a scenario with the removal of all AEPs, BESTMAP set of spatially-explicit models built using socio-economic and environmental data revealed that:

Overall, AEPs improved water quality (by reducing nutrient export from farms), soil organic carbon (by increasing it very slightly), and biodiversity (by increasing farmland bird numbers), but had no effect on food and fodder production (expressed as standard output) (Fig. 4).

Nitrogen export was improved the most on general cropping (P1) and mixed farms as a result of AEPs.

Soil organic carbon was improved the most on economically large, general cropping (P1) farms as a result of AEPs.

Biodiversity was improved the most on general cropping (P1) farms as a result of AEPs, but was negatively impacted on economically large, permanent crop (P3) farms.

The effect of individual AEPs varies for different ecosystem services and biodiversity according to their specific targets.

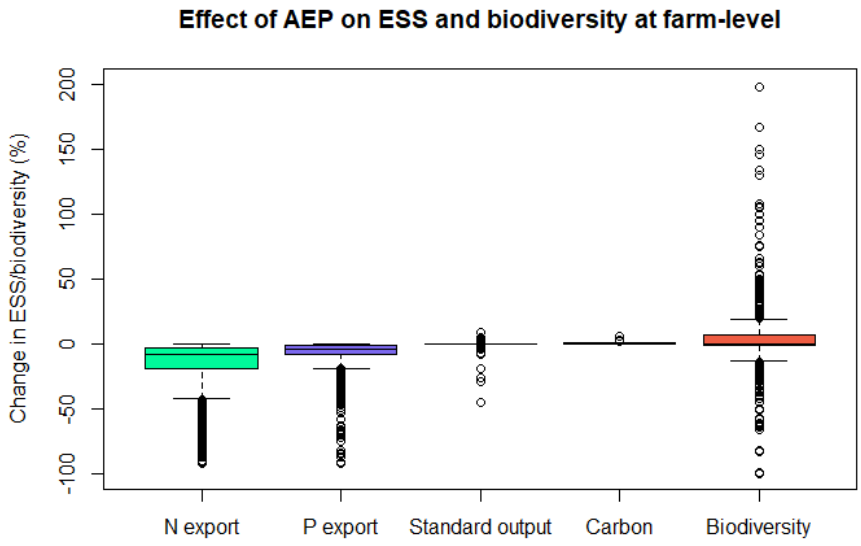

Figure 4. Farm-level values of the percentage change of the modelled biodiversity indicator and ecosystem services between the two AEP adoption scenarios in the Humber case study area. Certain outliers (i.e. biodiversity >200%) were removed from the plot to ease visualisation.

What recommendations can be made for the future design of AEPs in the UK?

To increase AEP uptake by farmers, we recommend:

- **Improve farmer advisory support.** Difficulty understanding the options and the rules involved leads to mistrust and fear of sanctions, discouraging AEP adoption. Better advisory support could include the tailoring of suggestions based on farm systems, bringing back personalised support and building farmers' trust, especially through this substantial transition period in UK agriculture.

- **Increase financial incentive.** The monetary support must fully compensate farmers for their lost profit, and this is particularly true of highly productive land that suffers income loss when adopting AEPs. It is important to consider also the farmers risk and need for training and upskilling when setting payment levels.

To increase AEP environmental effectiveness, we recommend:

- **Increase the connectivity of AEPs.** A larger proportion of total land under AEP would provide improved environmental benefits as per our results but would also increase the connectivity of a system of nature-friendly practices.

- **Clarify AEP objectives and benefits.** As different farms benefit differently from AEPs depending on their local factors (i.e. near to water network), make sure it is clear to farmers which AEP would be best in satisfying goals related to biodiversity and ecosystem service provisions.

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