RURAL POLICIES TO PROTECT AND ENHANCE BIODIVERSITY THROUGH THE PRESERVATION, CREATION AND MANAGEMENT OF LANDSCAPE FEATURES

SHERPA DISCUSSION PAPER

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Key messages

Conservation of heterogeneous landscapes, characterized by a high proportion of semi-natural habitats such as pastures and field margins, enhances and stabilizes pest control by natural predators and pollination by wild insects, and decreases sensitivity to climate change.

The implications for those drawing up CAP Strategic Plans are to ensure that the outcome of schemes will be the enhancement of biodiversity through the maintenance and restoration of semi-natural habitats and landscape elements (such as pastures, meadows, trees, hedgerows, forest patches, ponds and field margins) in agricultural landscapes.

The aim of the EU Biodiversity Strategy 2030[1] is to halt the loss of biodiversity and ecosystem services in the EU and help stop global biodiversity loss by 2020. The Strategy contributes to the global objectives of achieving the Aichi Biodiversity targets[2].

Biodiversity is a complex concept which refers to all existing plant, animal and micro-organism species that interact in an ecosystem. It satisfies a wide range of services expected by society in general, which seeks safe and quality products, produced with social and environmentally responsible standards, and is directly related to production. Conserving and improving biodiversity in production systems, above and below soil, is a fundamental part of sustainable agricultural practices. These practices also promote the improvement of biodiversity in other adjacent parts of the territory. The authoritative global assessments of biodiversity and ecosystem services published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reports that "indicators of regulating contributions, such as soil organic carbon and pollinator diversity, have declined, indicating that gains in material contributions are often not sustainable"[3].

[1] EU Biodiversity Strategy 2030 https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm

[2] Aichi Biodiversity Targets https://www.cbd.int/sp/targets/

[3] https://ipbes.net/news/global-assessment-summary-policymakers-final-version-now-available

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This Discussion Paper focuses on semi-natural habitats that include landscape features[4] and their contribution to improving the conservation status of habitats and species. Such features linked to agricultural activities (e.g. hedges, field margins, dry-stone walls, trees, ditches, wetlands, traditional orchards) represent essential elements of habitats and biodiversity. Landscape features can add value through how they create conditions for enhancing synergies of species with farming systems (e.g. agro-forestry systems in dry and marginal areas).

Climate change and changes in land use provide the principal direct drivers of pressures of change on ecosystems and the loss of such landscape features. Other drivers of such loss are: (1) pollution and nutrient over enrichment; (2) population growth/tourism and recreation; (3) invasive species and/or pest species; and (4) fire risk.

The major loss and poor management of landscape features is in turn one of the drivers of losses of biodiversity in the European Union. The proposals for the CAP 2021 to 2027 set an objective of "preserving landscapes and biodiversity". This means that ultimately there needs to be a means of assessing the impact of using CAP measures, either directly or indirectly, on such habitats and species.

Member States need to be able to understand how the decisions they make about the design, funding and operation of their CAP Strategic Plans affect landscape features, monitor changes in biodiversity associated with such features, and reflect on the extent to which this is the result of decisions taken (e.g. to spend money restoring landscape features in one location rather than another).

The mechanisms of the CAP interact with the amount, location, and suitability as habitat of such landscape features in several ways:

i. Conditions attached to the receipt of income support may require the protection of certain landscape features. Under cross-compliance all Member States are required to set rules for the protection of "landscape features" and a similar requirement is proposed for the new CAP under "conditionality". However, there is no requirement in the CAP rules for any specific type of feature to be protected and the lists of features chosen by individual Member States vary widely. Protection of a landscape feature type through cross-compliance means a farmer cannot remove it from their land. It does not require any specific form of management (for example, keeping pesticide spray away from stone walls so avoiding damage to their value as habitats);

ii. Conditions attached to income support may indirectly result in the protection of landscape features. Under current greening rules for Ecological Focus Areas as a minimum proportion of the arable area of a farm, and their proposed equivalent in the new CAP, areas of landscape feature may be declared, which can include hedges, field margins, dry-stone walls, trees, ditches, wetlands, traditional orchards;

iii. Rules which result in lower income support payments for farmers with landscape features deemed to be ineligible towards the area calculation which determines the size of payments, which could be an incentive for farmers to remove such features;

iv. Basic income support payments increase the economic viability of all types of farm, enabling those which are marginally economic to remain operational. Most such farms are on poor quality land which cannot be farmed intensively. Without support, less farming would take place on such land, prices would rise, and this would provide an incentive for further intensification of farming on other land;

[4] Agriculture – landscape features - https://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:Agriculture_-_landscape_features

v. Coupled income support, which is still widely available in sectors such as cattle, often incentivizes an increase in production[5]. This can lead to the removal of landscape features, for example to facilitate mechanization associated with the pursuit of higher yields;

vi. Rural Development Programmes contain measures which can fund, or help fund, the provision of new landscape features such as new hedges or stone walls, and/or the retention and maintenance of such features.

There are three important questions to be considered:

1. Which indicators show the current status of landscape features (i.e. their existence, degree of protection, management and track it over time)?
2. Which types of intervention have been successful in protecting, creating and managing landscape features on farmland that benefit biodiversity?
3. At what scales (regional or local) can the protection, creation and management of landscape features contribute to maximising biodiversity in a manner compatible with agricultural production in rural areas?

This Discussion Paper first considers the availability of indicators and then presents relevant findings from BiodivERsa and EKLIPSE, two Horizon 2020 funded activities. It is also informed by the findings of several other EU relevant funded projects, listed in Annex xx.

Availability of indicators

The Coordination of information on the environment (CORINE)[6]land cover inventory and database classifies land cover into 44 types using satellite and other data. For land cover, the spatial resolution of the mapping is 25 hectares for areal and 100 m width for linear features. Information about land use change can be provided down to five hectares. The database is updated every six years with the most recent data being for 2018.

Some Member States have mapped High Nature Value farmland, which is likely to be rich in landscape features. Based on the CORINE data of 2012, the EU Joint Research Centre (JRC) estimated the extent of HNV farmland for each NUTS 2 area in the EU-27 as 31.9% of agricultural land[7].

The Land Use and Coverage Area frame Survey (LUCAS)[8], carried out in 2009, 2012 and 2015, identifies changes in land use and land cover in the European Union. Landscape features are recorded which were found in the course of transects undertaken at approximately 300,000 locations across the EU. Photographs can be viewed online or ordered for download showing the landscape features found at each transect point, and maps can be generated from the data.

Remote sensing data are available from the Copernicus satellite array but its spatial resolution is too low to resolve many types of landscape features. Additional datasets are from several national, regional or local sources.

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[5] Unless other factors of production are fixed, e.g. the extent of available grazing and already acting as a constraint on increased production.

[6] CORINE Land Cover (CLC) https://land.copernicus.eu/pan-european/corine-land-cover

[7] Paracchini, M. L., Petersen, J.-E., Hoogeveen, Y., Bamps, C., Burfield, I. and van Swaay, C. (2008). High nature value farmland in Europe – an estimate of the distribution patterns on the basis of land cover and biodiversity data. Joint Research Centre. https://op.europa.eu/en/publication-detail/-/publication/10604b27-10b3-46c7-83f6-e7202684c36a/language-en

[8] Land Use and Coverage Area frame Survey (LUCAS), https://ec.europa.eu/eurostat/web/lucas

As regards farmland biodiversity indicators, the FP7 project BioBio[9] (Biodiversity indicators for organic and low-input farming systems) aimed at identifying a set of biodiversity indicators which are scientifically sound, generic at the European scale and relevant and useful for stakeholders. Due to its complexity, biodiversity cannot be measured as such, and no single all-inclusive index for biodiversity devised. Through scientific testing and subsequent stakeholder audit, the project yielded a set of 23 indicators with minimum redundancy within the components of habitat-, species- and genetic (livestock, crops) diversity, and a set of farm management indicators. Sixteen indicators are relevant for all farm types (field crops and horticulture, specialist grazing livestock, mixed crops–livestock, permanent crops), and seven to specific farm types.

Two Europe-wide model-based maps were produced by the QUESSA project. These maps are at a spatial resolution of 100 m and showing which areas of semi-natural habitat are exerting on pollination and pest control.

Results and recommendations from EU funded research

The **BiodivERsA** project is an ERA-NET COFUND scheme funded under Horizon 2020 the aim of which is to promote Pan-European research on biodiversity and ecosystem services. Since 2005 it has launched seven calls for proposals totalling €180m which have funded around 70 projects. BiodivERsA publishes a range of policy briefs drawing together findings from its projects. In 2019 it published policy briefs on how "*Green infrastructure within agricultural landscapes strengthens the provision of ecosystem services*"[10], and how "*The Common Agricultural Policy can strengthen biodiversity and ecosystem services by diversifying agricultural landscapes*"[11]. These documents are based on the results of the EU FARMLAND[12], APPEAL[13], CONNECT[14], EC21C[15] and ECODEAL[16] projects.

ECOSTACK[17] is an ongoing Horizon 2020 project investigating ways to improve crop production via stacking of ecosystem service providers and biologically-inspired tools for crop protection. EKLIPSE is a knowledge synthesis project which in 2019 produced a report on "*Understanding farmer uptake: what measures are most promising to deliver on supporting biodiversity and ecosystem services in the next round of the Common Agricultural Policy (CAP)*"[18].

Key results

The key results obtained as regards landscape differentiation and its effect on biodiversity are the following:

- Ecosystem services such as pollination and natural pest control depend strongly on the amount of semi-natural habitat patches on farmland. The preservation of such patches will become more important due to the effects of climate change.
- Diverse landscapes and semi-natural habitats enhance pest control and pollination for crops: better conservation of heterogeneous landscapes, characterized by a high proportion of semi-natural

[9] http://www.biobio-indicator.org/project.php
[10] https://biodiversa.org/1283
[11] https://www.biodiversa.org/1237
[12] http://farmland-biodiversity.org/
[13] http://www2.ekol.slu.se/appeal/
[14] https://www.biodiversa.org/1096
[15] https://www.biodiversa.org/1045
[16] https://www.biodiversa.org/1079
[17] https://www.ecostack-h2020.eu
[18] http://www.eklipse-mechanism.eu/apps/Eklipse_data/website/EKLIPSE_CAP-AgriReport_Final_DigitalVersion.pdf

habitats such as pastures and field margins, enhances and stabilizes the biological control provided by natural predators in agroecosystems. Benefits from pest control from diversifying landscapes are independent of any benefits secured from crop rotation, meaning that they occur even in monocultures.

- Benefits to biodiversity, pest control and pollination are greater in landscapes with smaller rather than larger fields, for the same area of habitat provided. Smaller fields with more field margin habitats have more biodiversity and the impact of this biodiversity on yields and yield quality is greater.
- Having enough semi-natural habitat can buffer negative effects of climate change. Having 17% or more semi-natural features in the farmed landscape has been found to protect species diversity and abundance from the effects of temperature rises in the case of wild bees.
- There are wide variations in the effectiveness for biodiversity of the different measures currently available as Ecological Focus Area. Agroforestry, buffer strips, landscape features and land lying fallow are generally more effective for biodiversity than measures such as cover crops and legumes.

Recommendations

In the absence of suitable datasets Member States need to establish systematic, sample-based monitoring of the impact of CAP interventions on their biodiversity objectives using baseline monitoring data and with an appropriate counterfactual. They should aim to quantify the contribution of semi-natural habitats such as hedgerows, grass strips, woodland, and extensive pasture to key ecosystem services as part of achieving an objective of sustainable agriculture in Europe. For example, if a Member State seeks to support field margins in order to increase pollinator populations, it should survey those populations at a sample of locations at which intervention is taking place, as well as some similar "control" locations where intervention is not taking place.

Building on the key messages mentioned above, the policy brief "*The Common Agricultural Policy can strengthen biodiversity and ecosystem services by diversifying agricultural landscapes*" produced the following policy recommendations:

- Set policy targets for the minimum proportion of uncropped areas (e.g. wildlife seed mixes, semi-natural habitats, and landscape features) in arable farmland areas needed to maintain the stability and resilience of biodiversity and ecosystem services under climate change.
- Set CAP policy targets for the conservation and restoration of semi-natural farming habitats, especially the habitats in the Natura 2000 network. Rural Development Programmes should be used as a key source of funding for the network.
- Increase the funding of agri-environment climate measures and their targeting to maintain semi-natural habitats that are most at risk, or in need of restoration (thereby also contributing to the EU Biodiversity Strategy Target of restoring 15% of degraded ecosystems).
- Modify the rules and weightings for Ecological Focus Areas (EFAs) to encourage the selection of semi-natural vegetation options by farmers, and promote measures to make farmers aware of the benefits (e.g. from enhanced pollination of crops and natural predator control of pests). EFAs could offer more wild bee and pest predator habitats on farmland if they provide enough undisturbed nesting habitat and floral resources close to fields. The current EFA option for field margins is not being used by many farmers for various reasons which are partly to do with the rules, and partly because there is a low level of awareness of the benefits both to biodiversity and to farming.
- Use the CAP to maintain mixed farming landscapes against the pressure of specialisation. The CAP can help maintain and promote mixed and diverse farming systems with animals and crops that

have diverse landscapes rich in green infrastructure. Most European regions with mixed farming have small average field sizes (1-2 ha or smaller) with a dense network of field edge habitats. Improved coherence of CAP measures and CAP implementation could help maintain such systems and landscapes against the pressures of specialisation.

In addition to these recommendations, the evidence points towards a need to ensure that farmers are aware of the nature and scale of the ecosystems services associated with semi-natural habitat.

Potential topics to discuss

What would a policy target for the proportion of uncropped areas in the geographic area of the Multi-Actor Platform look like?

What would be needed to deliver it?

How can the research summarized in this discussion paper help to support the development and implementation of suitable policies and measures?

Projects consulted

- ✓ Biodiversa, and projects it funded - FARMLAND, APPEAL, CONNECT, EC21C, ECODEAL
- ✓ EU COST Action FP1401 (Global Warning)[19], Action FP1193 (FRAXBACK)[20]
- ✓ FP7 BACI[21], QUESSA[22]
- ✓ H2020 ECOPOTENTIAL[23], AgriEcoServices, FUNCITREE[24]
- ✓ EKLIPSE

[19] COST Action FP1401 Global Warning http://www.ibles.pl/en/web/cost/globalwarning examines how natural systems such as trees may be used to provide early warning of invasive alien species.

[20] COST Action FP1103 Fraxinus dieback in Europe https://www.cost.eu/actions/FP1103/#tabs|Name:overview aims to pool knowledge and expertise in dealing with ash dieback across Europe.

[21] BACI – towards a biosphere atmosphere change index http://www.baci-h2020.eu/index.php/Main/HomePage aims to combine space- and earth-based observations to create a better understanding of how ecosystems perform.

[22] Quantification of Ecological Resources for Sustainable Agriculture http://www.quessa.eu/ which examined the impact of three types of landscape feature on pollination and pest control at 18 sites in 16 case studies in 8 EU countries.

[23] https://www.ecopotential-project.eu/ which assesses ecosystem conditions and services in selected protected areas of international significance.

[24] https://funcitree.nina.no/ The project investigates agroforestry systems in semi-arid and arid regions.

Annex – Statistics on EU funded projects on biodiversity (first version)

Theme-related projects	**26**		
FP6 projects	**9**	INTERREG projects	**1**
FP7 projects	**8**	H2020 projects	**1**
ESPON projects	**1**		

Total budget spent	**€ 88 939 604,98**
FP6 projects budget	**€ 12 571 836,00**
FP7 projects budget	**€ 30 811 082,60**
H2020 projects budget	**€ 45 556 686,38**

Maximum project budget	Minimum project budget	Average project budget	Completed projects	Ongoing projects
€ 10 457 923,75	**€ 212 532,00**	**€ 3 866 939,35**	20	**6**

No budget-related details are available for the ESPON and INTERREG projects. Therefore, this information is not presented for the two projects identified.

Figures 1 to 3 show an overview of the proportion of projects funded under EU Research and Innovation Frameworks 6 and 7 and Horizon 2020, the total funds allocated to biodiversity and landscape, and the countries of the coordinating partners of projects under this topic.

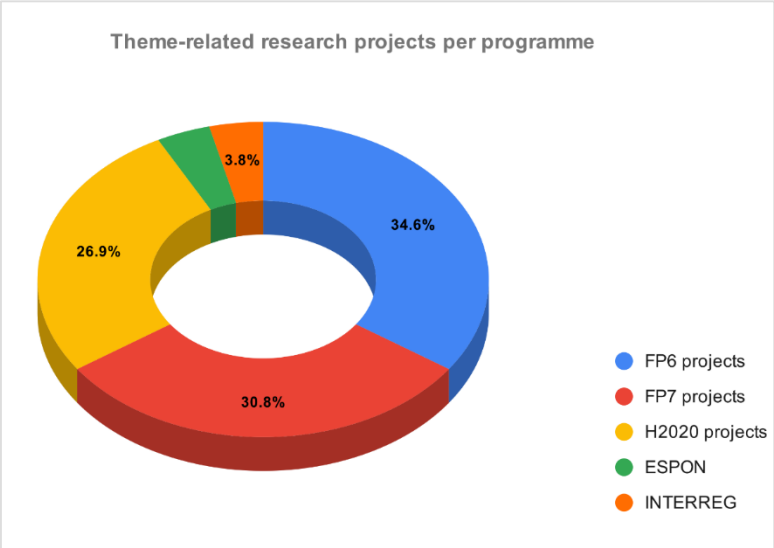

Figure 1. Biodiversity and landscape - related projects per project programme.

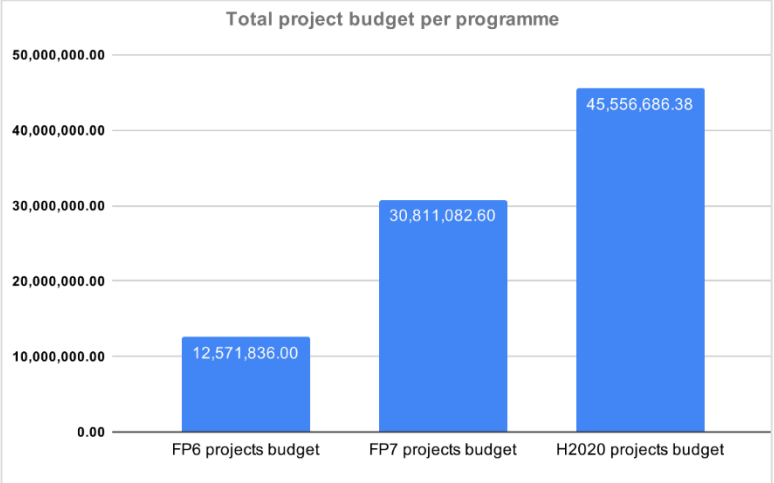

Figure 2. Biodiversity and landscape - related project budget per programme.

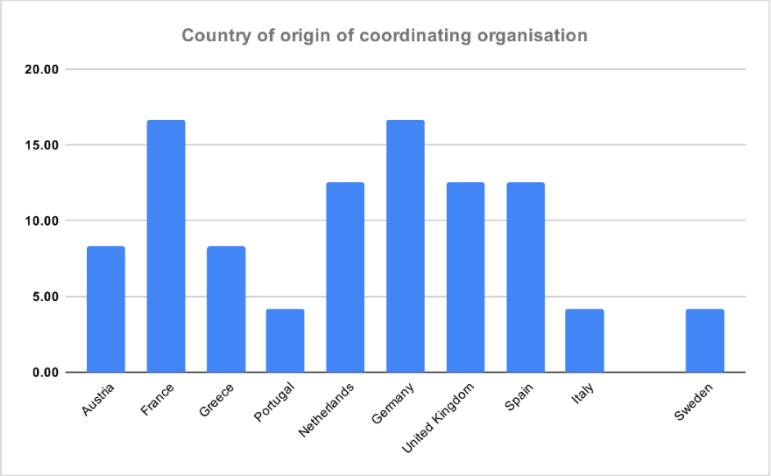

Figure 3. Relative frequencies of European countries participation in coordination of projects related to the biodiversity and landscape topic.