

EU CAP Network Focus Group

Enhancing the biodiversity on farmland through high-diversity landscape features

Starting Paper - Report



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Introduction

The aim of this discussion paper is to start discussions at the first meeting of the EIP Focus Group (FG) on High-Diversity Landscape Features. The FG - consisting of experts from different Member States - will together share their knowledge and experiences and look into how the FG will contribute to the efforts for achieving the target of at least 10% of agricultural area under HDLF, by collecting good practices, identifying needs and barriers from these practices and proposing relevant innovative actions and research projects.

The stated question for this collaboration is: How can farmers create and maintain HDLF that positively impact farmland biodiversity?

To answer this question, the FG will carry out the following main tasks:

- Identify the challenges and opportunities for farmers in introducing more HDLF to increase both the diversity and area of habitats and/or better connectivity between habitats
- Collect and highlight good practices and inspiring success stories, including "small changeslarge gains" approaches and methodologies for introducing and maintaining HDLF at different spatial scales
- Identify examples of valorising (from the social and economic point of view) the ecosystem services provided beyond HDLF
- Identify capacity building experiences with interlinkages between learning, advice and practice and needs for implementation of HDLF
- Suggest innovative HDLF and appropriate maintenance, including digitalisation and precision farming tools/management models essential to the value of landscapes and HDLF for wildlife
- Identify further research needs from practice and possible gaps in technical knowledge
- Suggest innovative ideas for EIP-AGRI Operational Groups and other innovative projects

1. High-Diversity Landscape Features: What are they?

a. Definition

Agricultural landscape features are small fragments of natural or semi-natural vegetation and specific habitats in agricultural land which, compared to their relatively small size, provide important contributions to ecosystem services and biodiversity. They have long-standing historical and cultural roots in the agricultural landscapes of Europe, but with the advent of intensive agriculture, landscape features became threatened, as stated in the JRC report <u>Landscape features in the EU Member States</u>

Landscape features include several non-productive elements of traditional European agricultural landscapes, such as buffer strips, hedges, ponds, ditches, trees in line or in group or isolated, field borders, terraces, dry-stone or earth walls, flowering borders, patches of natural habitats that receive no fertilizers or pesticides.

Although playing a major ecological role, forest edges represent an important part of the landscape features.



HDLF are also productive spaces, one of their qualities often forgotten. Permanent meadows are grazed (or mowed), the maintenance of hedgerows produces wood for energy, trees in open-air orchards produce fruit, fallow land provide nectar and pollen to pollinating insects, starting from there honey, ponds provide water for different species. They are fully part of the agricultural area and are managed extensively, mostly by farmers.

In addition, HDLF corresponds to any habitat of an agroecosystem in or around which spontaneous vegetation develops essentially composed of biennial, multi-annual or perennial species or a so-called "service" cover and intentionally unharvested.

This semi-natural habitat can have various forms as Jean-Pierre Sarthou (Inrae, France) in the <u>Ecophytopic website</u> mentions it:

- Linear such as rows of trees and their grassy strips at the edge or inside the fields, forest edges, hedges, embankments, low walls, edges of ditches, streams ...;
- Areal such as floodplains, meadow orchards, rangelands, wastelands, groves, wetlands...;
- Punctual such as ponds, springs, isolated trees, rocks ...
- b. Description and characteristics of the main HDLF

As old as agriculture, but developed very widely in the nineteenth century, "traditional" HDLF include tree formations: hedges, groves, meadow orchards, isolated trees and alignments. In addition, there are extensive meadows; Grass strips, extensive crop strips, ground beetle benches and flower fallows are of recent design, even more recent than agroforestry plots that combine trees and crops. Main of these landscape features are shortly describe below and can be classified in 4 main types: woody features, grassy features, wet features and stony features.

The hedge offers living spaces to a wide variety of shade species, light, dry or wet atmospheres. The hedges, subject to a wide of at least two metres, are interfaces of great biological interest between the field and the forest, between open and closed environments.





Isolated trees and groves: these are forest species alone, scattered or grouped in clumps of less than 5 are.







Perennial grass strips and fields borders, provided they are neither fertilized nor treated, are the dominant HDLF in the great cereal plains.





Fallow land (called floral or ecological fallow) is also considered HDLF if it is neither treated nor fertilized.



In addition, unfertilized grasslands present, on the surface, the backbone of HDLF. They are often associated with tree formations: hedges, meadow orchards, scattered trees and groves developed above. Finally, "collective" pastures, summer pastures, meadows, salt meadows, scrubland, some floodplains and marshes are spaces kept open by extensive grazing and are, somehow, linked to HDLF.













Agricultural ponds, a major biodiversity preservation stake: Once frequent, agricultural ponds, like other elements of the landscape, have gradually disappeared from the countryside. Their great biological richness, however, makes them a major biodiversity preservation stake and also allows them to be true allies of agriculture.

Ditches, when their sides are vegetated, play a role in purifying runoff water. They also help maintain remarkable species.





Raw, cut, stacked, piled up: the stone serves as a refuge for a wide variety of spiders, wasps, birds, reptiles and small mammals. Strong components of our vineyard landscapes, low walls, terraces are part of HDLF.

These short descriptions are taken from different French sources: <u>SOLAGRO, 2009 Les infrastructures</u> agroécologiques, <u>CRAO, 2018 fiche technique IAE</u>, <u>METRO, 2019 mares agricoles</u>

2 High-Diversity Landscape Features: What are the benefits for farmland biodiversity?

a. Main benefits

Landscape features are the place of permanent or intermittent life, allowing reproduction, feeding, refuge, aestivation or wintering of biological groups belonging to the six kingdoms of life (archaea, bacteria, protists, fungi, flora, fauna).

HDLF also actively participate in the preservation of biodiversity and the implementation of the Green and Blue Grid policy (Carles-Mejane and al, 2022) for the connectivity of environments by allowing the circulation of species and genetic mixing, guaranteeing adaptation to climate change. They also participate in the completion of all or part of the water cycle, the carbon storage, nitrogen and all other mineral elements, future nutrients of microorganisms and plants. They also contribute to sustainably supporting the agricultural production function, by allowing a lower use of certain inputs (pesticides, fertilizers, water) thanks to ecosystem services of biological regulation (Sarthou, 2022).

b. Biodiversity benefits



As said above, these habitats can be sources of food, resting places and shelter (from predators, weather and infield farming operations) as well as sites for breeding, rearing and over-wintering for a range of animals, from soil organisms and invertebrates to small mammals and birds. An evaluation of the greening measures in the 2014-20 CAP (European Commission, 2017, 133 – 135) summarised evidence for the biodiversity benefits of some landscape features described below:

<u>Hedgerows and wooded strips:</u> hedgerows and other woody field boundaries benefit wildlife by providing habitats, feeding sites, refuges, and movement corridors for invertebrates, birds, mammals, reptiles and amphibians, and also support some wild species that would not otherwise exist in arable landscapes (Batáry, Matthiesen and Tscharntke, 2010; Belfrage, Björklund and Salomonsson, 2015; Farmer et al, 2008; Feber et al, 2007; Hinsley and Bellamy, 2000). However, individual hedges vary greatly in their character and management and hence their biodiversity value.

<u>Trees, tree lines and tree groups or copses:</u> isolated mature trees can provide more resources for tree-hole nesting birds and bats compared to treeless arable fields (Eglington and Noble, 2010; Kalda, Kalda and Liira, 2015), while groups of trees provide refuges and key foraging habitats for generalist invertebrates (Farwig et al, 2009), plants and common farmland birds in arable areas (Sanderson et al, 2009), and can also provide corridors between habitats for mammals.

<u>Ponds and ditches</u> can be hotspots of high biodiversity value, e.g. for freshwater invertebrates and amphibians, but biodiversity benefits may be low if levels of nutrient pollution are high and riparian vegetation is lacking (Céréghino et al, 2012; Mountford and Arnold, 2006; Williams et al, 2004). There is evidence that large numbers of farmland ponds have been lost particularly in Western Europe in recent decades (Curado, Hartel and Arntzen, 2011; Ferreira and Beja, 2013).

<u>Stone-walled terraces</u>, which are typical of Mediterranean regions, provide disturbance-free habitats with specific micro-climates for plants, reptiles, amphibians, invertebrates, etc. typical of dry and stony habitats. Earth bank terraces can provide strips of exposed habitats suitable for some threatened arable plants and invertebrates, such as solitary bees, if the soil is of low fertility with bare patches.

There is also a large body of evidence on the biodiversity benefits of grass strips, flowering bands and fallow lands, as described below:

<u>Field margins, buffer strips, strips along forest edges:</u> Depending on the plant species planted and the method of maintenance, auxiliary insects and wildlife may be favoured. Permanent grass field margins and grassy buffer strips can have high densities of soil macrofauna, such as litter-consumers (that tend to be missing from arable systems), which benefit from lack of soil cultivation and a substantial surface litter layer (Nieminen et al, 2011; Smith, Potts and Eggleton, 2008). They also act as a reservoir or refuge of soil biodiversity which can recolonise arable fields after disturbances such as tillage.

Permanent grassy margins are of little value for flower-visiting arthropods unless they are left uncut, but provide relatively undisturbed refuges for predatory arthropods (Holland et al, 2015; Inclán et al, 2016), nesting bees, small mammals (Rodríguez-Pastor et al, 2016) and birds overwinter until the first cut (Vickery, Feber and Fuller, 2009), whilst temporary field margins and in-field buffer strips sown with diverse flowering plant mixes can provide foraging resources for these groups (Scheper et al, 2013; Wood, Holland and Goulson, 2015).



They are also ecological corridors for wildlife. At the landscape level, grass strips are refuge areas for wildlife because of their little disturbed character.

<u>Flowering bands</u>: The flowering bands are a food resource of pollen and nectar for insects. These are refuge areas for crop auxiliaries (ground beetles, staphylins), predators of pests. Many auxiliaries depend on the pollen or nectar resource to ensure the regulation of pests (parasitoid hymenoptera, hoverflies, lacewings ...). Like grass strips, they promote the movement of species by recreating ecological corridors.

<u>Fallow lands</u>: Uncultivated agricultural land, fallow must meet the needs of wildlife and biodiversity. A minimal maintenance with an annual grinding in autumn highlights the essential role of fallow land in the expression of local floral biodiversity within cultivated areas (Nitsch et al, 2017). Fallows, whether floristic or hunting, are particularly favourable to the nesting of birds in spring, and especially for species nesting on the ground. Many other wild species, settle there. Fallow land therefore seems to fully meet its objective of preserving and increasing biodiversity.

To conclude, HDLF contribute to the preservation of biodiversity in different ways:

- by promoting functional biodiversity, i.e. biodiversity useful to farmers,
- by working on the relationships between agriculture, biodiversity and ecosystem functioning,
- by allowing the connectivity of environments, and thus the circulation of species,
- by providing meeting places for genetic mixing that promotes the evolution of species and their adaptation to climate change,
- by providing habitat and food for the development of these species, including crop auxiliaries.

The connection of the LF, between them, makes it possible to develop the landscape in such a way as to develop a wealth of fauna and flora by creating vital habitats and circulation networks specific to each species. This is called an ecological corridor.

Finally, the biodiversity value of landscape features depends not just on their characteristics but on their spatial location (in relation to agricultural land and other features/habitats), their 'patch' size and their contribution to diversity of land cover at local scale (i.e. an area of contiguous farmland under different ownership or management units).

3 High-Diversity Landscape Features: relevant good practices and studies

The following is based on the 42 projects or practices that the experts of the FG 47 (list of the members in Annex 3) are or have been involved in.

a. Good practices

The landscape features are classified in the same way than in the chapter 1b: woody features, grassy features, wet features and stony features. 3 more types have been added: various landscape features, specific actions for pollinators and general studies (not directly linked to LF).



Woody features

Hedges are known to represent a belt of primarily forestry vegetation positioned in agricultural lands to support the biodiversity of the agricultural lands. Their benefits are well-recorded:

They represent microhabitat, source of food, nesting place, for different small mammals, insects and birds. In *France*, an assessment of recent hedgerows (> 15 years) showed that they harbour similar diversity of diverse taxonomic groups (carabids, vascular plants, butterflies) in comparison with old traditional hedgerows and grassy margins.

Hedges have also the capacity to sequester carbon, improve water infiltration and provide shelter for livestock, a better thermoregulation of animals in summer and wind protection.

They also constitute an extensive ecological network within a cultural landscape recognized.

Preservation of scattered trees, small woods and linear tree formations:

• TOF (Trees Outside Forests) project in in the UNESCO WHL site "The hills of Prosecco" in *Italy*.

Preservation of forest edges:

- Preservation of the forest patches adjacent to the extensive grassland in *Germany*.
- Maintain scattered and isolated trees in grassland in *Italy*.
- Maintaining forest edges as a transition zone forms a biodiversity gradient between agricultural and forest ecosystems in *Slovenia*.

Hedgerow restoration and creation:

- Agroforestry hedgerows planted in *Brittany (France)* on farms with several objectives: restore biodiversity, prevent nitrogen leaching for water protection, re-densify the bocage (spatial planning), create windbreaks, provide shelter for livestock, and produce valuable products from trees.
- Hedgerow restoration and creation on two farms in **England** about 180 acres of mostly permanent pasture along with some ASNW farm woodlands, several sites of nature conservation interest (SNCI), site of a Roman fort and other related archaeology.
- Particular woodland management with undesirable species removal and infill planting of a variety of native species re-established habitat, particularly for woodland birds in England.
- Leader of an EIP-AGRI project on hedges in *Slovenia* with the idea to introduce (among other elements) also local and high production species and genotyped of fruiting/flowering plants (trees and shrubs) and bring in in mycorrhizal symbiosis also edible fungi.

Creeping shrubs creation:

• Complete restoration of waste landfills and drilling sites in **Bulgaria** by creating massifs of creeping shrubs to be a refuge for wild animals, to provide places for nesting and feeding.

<u>Grassy features:</u> Fallows, flower strips, grassland buffer strips, inter-row covering plants, field margins

Grassy features enhance the value of biodiversity and ecosystem services in agricultural landscapes. They provide support for pollinators, reduce soil erosion and more abundant soil life.

Flowering strips, field margins, or even inter-row coverts are a positive response for the establishment of a more robust trophic chain and the improvement in biodiversity of the fauna of the soil, pollinators, natural enemies of cultivated plants, birds and small mammals.



Preservation and creation of fallows and flower strips:

- Preservation and creation of set-aside field in *Germany*.
- **French Study** about the use of flower strips in autumn/winter to host aphids, natural enemies and limit the risks associated with BYDV: the flower strip indeed hosted more ground dwelling arthropods than the neighbouring cereal fields.
- Biodiversity stripes in vineyards in the framework of a Life project "VineAdapt" in *Austria*.

Creation of grassland buffer strips:

- **Estonian LIFE project** actually conducted in pilot fields for testing the benefits of grassland buffer strips and unsown patches in arable land for skylark populations. These tested measures could be will officially be part of Estonia agricultural support schemes.
- Bases for the implementation and monitoring of multifunctional field margins within the framework of the new eco-schemes in *Spain*.

Implement of inter-row covering plants:

• Multi-species inter-row covering project in vineyards and orchards in *Hungary*

Re-established native grassland vegetation:

• The rehabilitation of kurgans on arable land in *Hungary* to provide important resting, overwintering and nesting habitat for multiple bird, reptile and amphibian species, habitats for pollinators and pest antagonists and extend the boundaries of protected natural areas.

Wet features

Ponds are important habitats for amphibians, water insects and other species, they are also important element of landscape diversity. They ensure water supply for wildlife increasing the biodiversity of the entire ecosystem.

Ponds are also semi-natural or artificial, man-made elements in karst areas, used to provide water for people and livestock.

Maintain or creation of ponds:

- **Finnish farm project** of creation of pond between two fields and maintain of brands and natural trees on the sides of the pond. The pond works as a settling basin that collects water from 60 hectares, but the pond is also an oasis for wildlife such as deer's and moose, but also smaller animals and insects
- *Italian farm project* of maintaining and/or creation of water ponds in pastures and forests for silvopastoral management
- *Croatian project* of maintaining water ponds.

Stony features

Dry stone walls provide an important habitat for many plants and animals and are particularly important for lichens, mosses, ferns, and a number of invertebrates. Several bird species use dry stone walls as nest sites. Dry stone walls are important element of landscape diversity and they also act as a corridor between larger areas of other habitats.

Maintain, restoration or creation of dry stone walls:



- Italian project of restoration of drystone walls in Lamole, a small village in Chianti (Tuscany), traditionally characterized by vines and olive tree cultivations on drystone terraces. In that case, dry stones are mainly use as a defence from soil erosion and to improve the quality of the wine, but with positive impacts on the preservation of traditional landscape and on biodiversity.
- *Croatian project* of maintaining, protecting, reconstructing and creating dry stone walls.

Various Landscape features

- Creation of **woodlands**, small **orchards** or **wildlife ponds** in hare's corners in *Ireland* to provide shade and water for animals at times of drought. The term 'Hare's Corner' is an old farming expression for the corner of a field or an area of rough ground which wasn't intensively farmed, so instead it was 'left to nature'.
- Extensive manage of pastures, meadows and wetlands; creation of dry stone walls, plantations of flowering strips, high trunk fruit trees, hedges and perennial herbs on the forest edge in that cattle farm of 18ha in the black forest in *Germany*. Benefits for biodiversity are various: Space of retreat for insects, habitat and food source for birds, insects and much more, movement of seeds and small animals, higher diversity of plants, diverse structures and habitats on the forest edge and preservation of open land biotopes.
- Creation of **numerous**, **diverse and high-quality landscape features** in the frame of the BirdLife *Switzerland's Farnsberg Orchard project* is located in the Table Jura region of Basel-Landschaft (Since 2004). Various species have been detected or have reproduced in the project area for the first time in years during the course of the project, such as the honey buzzard, the cuckoo, the wryneck and the nightingale.
- Creation, preservation and promotion of small structures in *Switzerland* to enhance highquality biodiversity areas : Hedges, field and riparian woods and borders; ponds, ruderal areas, cairns and stone walls; High-stem orchards, extensive pastures and vineyards with a certain proportion of small structures; branch heaps, wet and damp places, groups of bushes, pollarded willows, ditches, wooden beams, natural stone walls, nesting aids for wild bees, open ground, cairns - litter heaps, pools / ponds, day butterfly embankment windows deadwood trees.

In addition, from 2020 to 2027, a resource project will run in the canton of **Zurich** to promote biodiversity on agricultural land in a target-oriented manner. Habitat targets are defined with the farmers, which are to be achieved on the biodiversity promotion areas. Farmers are free to choose their own measures.

Specific actions for pollinators

- Protecting Farmland Pollinators by **creating solitary bee nests on bare soil areas in farmland** in the frame of an EIP Project in *Ireland*. Newly created nest sites on farms were immediately used by a range of different below ground nesting solitary bees and above ground cavity nesting solitary bees.
- Implementation of various actions to help pollinators on *Irish farms* and Increase land area managed for biodiversity such as: bird cover, catch crop, companion crop, cover crop, clover pasture, hay meadows, hedgerows, herbal ley, mixed species sward, non-farmed area, and other field boundaries.



General studies

In the following, the projects do not refer directly to landscape features. They are mostly conducted to conserve biodiversity in specific areas or to integrate biodiversity in farmland.

Education projects for farmers:

- In *Austria*, two education projects are conducted with the aim to integrate biodiversity in production processes in big Austrian farms. Farmers learn to implement various different methods to foster biodiversity on their farms. In another program led by the organic association BIO AUSTRIA, farmers become aware of their actual contribution to enhance biodiversity.
- Irish Farmer Moth Monitoring EIP Project. Farmer led biodiversity monitoring on the farm. This project has shown the general interest and willingness of farmers in Ireland to engage in and contribute to citizen science. A total of 112 moth species was recorded across the 20 farms in 2022.
- Live landscape project initiated by NGO in *Slovakia* involving farmers to compete for ecological farming. This project improves the ecological conditions of farms and makes "live farms" more visible.

Ongoing studies :

- Conservation of natural biodiversity in agricultural land study and report in *Estonia*. The aims of this study were to bring together information on how to best conserve biodiversity in our farmland, and why it's important to do it.
- Implement of a methodology for regional or local study of territorial system of ecological stability in *Slovakia* based on elements of green infrastructure in open landscape to develop Eco stabilization measures, agro-environment-climate measures for farmers.
- In *France*, ARVALIS is conducting a project based on Indicators of hedges quality. In this internal project, they are trying to define a protocol to assess the quality of hedges with respect to predators and parasitism of cereal aphids.

Relevant actions of preservation of specific areas

- Actions of protection, restauration or creation of **blanket bog habitats** in upland areas, along the Atlantic seaboard of *Ireland*. Blanket bogs are home to many threatened species including curlew, red grouse, salmon & freshwater pearl mussel. Payments for landowners are directly related to habitat quality and ecosystem services it provides (e.g. water quality, biodiversity; climate regulation)
- Preservation of the mountain meadows of the eastern Alps in several Austrian farms. The aim
 is to manage more and more of the remaining mountain meadows in the municipality of Molln
 in Austria to preserve this valuable and endangered biotope type in the long term and to return
 areas to a manageable condition. In addition good practices of preservation of semi-arid
 grassland and Fresh lean meadow are implemented. These small fields are mowed only once
 or twice a year to preserve specific natural plants.
- Action of **sprayer optimisation** with the aim to **protect non-target areas** (including HDLF) by less drift. This **Austrian LEADER-project** based on improvements & optimisation of sprayers



and soil management (soil analyses, greening strategies, weed control without herbicides). The participants were fruit farmers and winegrowers.

- **Maintenance of biodiversity in traditional agricultural landscape** by the implement of actions with the aim of to evaluate the contribution of the rural development program to high nature value farmland dominated by traditional mosaic landscape in *Slovakia*.
- Monitoring, optimization and valorisation of natural capital in the cultivation of olive groves in integrated production in *Andalusia in Spain*.
- b. Success factors and barriers to the adoption of these practices

Success factors

Different success factors have been identified to the adoption of good practices for implementation of HDLF.

Co-design scheme

- Co-design and implement an agri-environment scheme adapted to specifics areas, which delivers favourable outcomes for the environment, farmers and local communities.
- Build support, capacity, and collaboration among local and national stakeholders.
- Involve local advisory services and supports to monitor the project to ensure compliance as well as the achievement of the outcomes of the respective components.
- Ensure the good cooperation between actors involved.
- Cooperate with local governments and the local population.
- Build capacity and support in local communities for long-term nature conservation.

Involve farmers from the beginning of the project: the success key!

- Involve farmers and landowners in the co-design of the program.
- Build an approach that puts farmers and their skills, expertise and knowledge of their land central to the development of the initiative as active engaged participants.
- Make sure that farmers will adopt or choose the measures suitable for their farms
- Keep a close contact with the farmers, have a consideration of their needs and experiences.

Relying on convinced and motivated farmers

- Farmers convinced for a long time by their good practices favour to biodiversity.
- Participants motivated to do something for biodiversity.
- Farmers that have the will to change their practices to adopt a new farming concept.
- Sense of pride of the local farmers to get in action for biodiversity farmland.

Support, training and formation all along the project

- Propose an individual monitoring and consulting to help and support farmers in their choices for biodiversity on farmland.
- Importance of formation, practical, technical and scientific approaches: which areas to restore, maintain or create value for biodiversity, where does it make sense, what management methods, what added value of the measures implemented.

Cultural and social environment



- Implement a project adapted to the environmental and social conditions of the concerned area.
- Availability of quality materials and social activity for reclamation of disturbed areas.
- Give sense to a new agricultural concept: revival of traditional agriculture, sustainable development, maintenance of cultural and historical heritage, preservation of tradition, tourism valorisation.
- Interest of many young farmers for the implementation of agricultural practices and in favour of biodiversity for the local / regional development and/or to contribute to the preservation of beautiful natural landscape.
- Development of similar actions that have already shown interests for biodiversity farmland.
- Presence of active NGOs
- Presence of preserved landscape not suitable for agricultural production: steep slopes, along small streams...

Regulation

- The obligation to create at least 7% biodiversity promotion areas has resulted in a substantial increase of the surface area covered by ECA / BPA on Swiss farmland.
- Introduction of agri-environment payments that reward farmers for delivering high-quality habitats.

Barriers

Barriers of the adoption of the good practices for implementation of HDLF have been classified as follows.

Technical barriers

- For the flowering strips, main barriers concern the **availability of technical specific sowing equipment**, the **provenance of the species** (they should have a locally provenance), the flowering period (e.g. plants that are flowering in late autumn/winter with the aim to control aphids).
- For the hedges, identified barriers, concern the **selection of production species** and genotyped of fruiting/flowering plants (trees and shrubs) and also the lack of an indicator reliably depicting the quality of hedges for a chosen group of biodiversity.

Economical barriers

- **Cost of the investments** (e.g. tree species) remains expensive, specifically for small farmers that could not compete with big producers. In addition, the cost requirements of ongoing maintenance can be a source of demotivation.
- **Payment amounts for farmers are often low**, not sufficient for the maintenance and creation of biodiversity-enhancing structures and can demotivate farmers.
- The economic valorisation of the LF is not easy to appreciate.

Social barriers

• The principal social barrier concerns the increase of the **work load**. For example, bare soil areas need to be maintained twice a year. Farmers need to remind to check sites at least once a year; when replacing or planting new scattered trees, the presence of animals must be interrupted in pastures, by an appropriate rotation plan.



- The second barrier concerns the **communication** with the actors involved: communication can be difficult with local the authorities, between farmers or with other land owners/managers and administration.
- The third one is related on the fact that the **ecological value of structures is not known** to many farmers. Farmers often do not know where small structures should be created and which types make sense and also how they should look so that they are ecologically valuable.
- At least, when **rural areas are affected by emigration** and the rural population is aged, it's very difficult to implement such projects.

Psychological barriers

- The principal psychological barrier is the **motivation** of farmers (mainly bigger farms) to get involved in biodiversity projects.
- Some farmers think that seed mixtures would be **detrimental to the field management** (due to weeds in seed bank) relative to the maintain/creation of fallow land or flowering strip for example.
- Image of the small structures by many farmers: often the set-aside areas are allocated to marginal and poor soils and don't need to be managed as a cultivated field.
- Not all measures which are beneficial for biodiversity are widely accepted by the population/tourists as "beautiful". Also neighbouring farmers are not necessarily happy about biodiversity measures.

Administrative barriers

- **Status of certain areas**: FFH in Germany; the farmers that cultivate in these areas are very limited on what they can do.
- **Difficult to obtain legal permissions for maintenance** (and even more so for a new implementation): managing, even properly, water points seems impossible in Italy, or at least too difficult.
- The current context (e.g. in the CAP currently implemented) does not establish sufficiently **attractive measures** that encourage farmers to adopt this good agricultural practice. Little interest from the industry and other actors in the value chain.
- Many of the HDLF elements in land are covered under the term "agroforestry systems", which in Slovenia despite several attempts, did not hit its position in legislation and mind of the decision makers.
- Unclear land ownership preventing farmers of getting agri-environment payments.
- One more tool, one more thing to document and which gets controlled

c. Ecosystem provided by HDLF: economic and social point of view

Economic benefits provided by HDLF

Attractiveness of the landscape and local economy

- Beautiful landscape can have positive spin-offs in terms of hospitality, marketing value of local products and pull factors for visitors. The Improvement quality and attractiveness of the landscape is beneficial for local agritourist and contribute to the development of the local economy.
- It also Increases botanical and landscape value and makes "live farms" more visible.



Production benefits

- By the increase of pollinator numbers and diversity, crop yield can also be increased. In addition, the development of the auxiliary fauna provides a regulation pest service to the farmer in the adjacent cultivated fields. By their presence, auxiliary fauna provide sustainable protection of cultivated crops, vineyards and orchards from pests and the cost on agrochemical products is reduced.
- Woody and grassy landscape features have direct economic benefits flow from the shelter, browsing and thermoregulation provided to livestock and the impact of that on food requirements. Also, a higher level of animal welfare can translate into better performance on the farm.
- Woody features provide economic gain from firewood thinning and ultimately harvest of good quality hardwood. The economic added-value of recent hedgerows has not been assessed everywhere, but farmers declare to have benefit in different ways: some of them sell the wood to municipalities and other use wood mulches to cover crops.
- Some grassy features (fallow, inter-row covers...) have not direct economic value but on a longer time perspective there might be benefits like higher yields by a healthier soil, good soil structure (rooting types), nutrient replenishment (leguminous varieties), better water management.
- The development of HDLF on farmland can also provide indirect production benefits through production of specific plant and fungi that can be valorised in different ways: selected plants for bath additives, restaurants...

A better income for farmers

- Direct payments (eco stabilization measures, agro-environment-climate measures, ecoschemes...) to preserve small structures such as hedgerows can generate a higher income to farmers. In certain countries, the annual payment received by the farmers, is directly related to habitat quality maintained and/or created. So, since the better areas trigger more direct payments, the farmers benefit financially.
- When farmers perceive financial support for the implementation of LF, the infrastructures costs are reduced.

Others ecosystem services provide

• Indirect benefits flow from carbon sequestration, water quality, prevention of damages caused by runoff water, soil erosion, climate regulation. For example, well-maintained dry stone walls have an excellent water drainage performance, and they can effectively minimize landslide risks and soil erosion. They are effective windbreaks and can also counteract forest fires.

Social benefits provided by HDLF

Raise awareness for farmers to the importance of HDLF

 Being interested in HDLF is an excellent opportunity for people to undertake nature conservation work under the guidance and support of an expert team and to become part of a growing network of people taking action to protect the environment. It increase education, awareness and appreciation of landscape features and associated habitats, traditional ecological knowledge, create interest and trust around farmland biodiversity and HDLF and reinforce links between a local communities. It also allows to develop new social and



professional networks, connect stakeholders (research, producers,...), ecological associations, bring new knowledge directly to its users (farmers), contribute to citizen science and improve the multi-directional long-term cooperation.

• It's also an opportunity to create relationships between farmers such as creation of a group of farmers sharing agronomic and environmental concerns in relationships with hedgerows and bocage in France. This group allows farmers to discuss and share knowledge about hedgerow planting and management. It allows bringing farmers together in a WhatsApp discussion group. Farmer led peer to peer mentoring on best practice farm management for broader biodiversity. This WhatsApp group facilitate knowledge transfer between the participanting farmers. It allows for progress and ideas to be shared such as measures implemented on farms, new needs, communication actions to implement and other relevant discussion to take place.

Increase Agritourist and cultural conservation

- HDLF are source of increasing aesthetics and attractiveness of the landscape for recreation and tourism and efficient use of natural resources. In a region suitable for hiking where fruit trees are preserved and especially in the spring, this could delight many visitors on flowering walks. In regions Where HDLF are in an Area of Outstanding Natural Beauty with public footpaths, the scenic/recreations benefits have been enhanced, scenic value has been improved and accommodation activities has been created.
- Inscribing 'Art of dry stone walling, knowledge and techniques of Croatia' into the UNESCO Representative List of the Intangible Cultural Heritage of Humanity in 2018 alongside with several other countries brought lot of attention and social recognition.
- HDLF are enabling to maintain livestock growing, in particular traditional breeds and cultural value of traditional pastoral farming. So, cultural landscape can be preserved.

Better image of farming practices

- A beautiful landscape, the protection of species and measures implemented to enhance biodiversity enhance the attractively of the landscape. Farmers have reported that hedgerow planting has improved landscape aesthetic on farm. Fallows and flower strips are considered aesthetically pleasing by farmers and tourists, particularly when they were blooming.
- A global improvement in hedges quality, flowering strips bordering fields improve the currently negative view associated with farming practices and may improve the dialog between farmers and rural inhabitants.

4 Challenges and needed changes for enhancing the biodiversity on farmland through HDLF

a. Challenges and needed changes

Currently, as Maria (Germany) says, the challenges and also the needed changes for enhancing biodiversity on farmland include accessible information, training, compatibility of HDLF to farm context and values, time spans of financial support, and the appropriate advice accompanying the process of deciding on and implementing HDLF.



Training and informing activities

- Generally, more training and informing activities for farmers and stakeholders regarding the importance of preserving/restoring HDLF and facilitated knowledge transfer are required by Antonio (Italy) and Gary (Ireland).
- For Xavier (France), Jose (Spain), Maria (Germany), Orsolya (Hungary), Jana (Slovakia) and Tine (Slovenia), a significant challenge is:
 - To improve our communication about the multiple services provided by HDLF,
 - To improve visibility of the importance of HDLF for human and ecosystems benefits,
 - To raise awareness of HDLF's potential ecological and economic benefits, benefits to yield, chemical and water-use, resilience but also about the importance of conserving natural capital with the aim of develop measures that really help to improve the economy of farms in the short and medium term.
- In addition, our above experts and Corinne (Switzerland) pointed out:
 - The importance of shared learning among farmers and extension workers on consistent and motivating communication on HDLF,
 - The importance of networking projects adapted to the local/regional agricultural strategies,
 - The lack of up-to-date advisory services to farmers,
 - The lack of basic information on HDLF and ecosystem services in general at higher education levels,
 - The lack of education for maintaining adequate management of HFLD (e.g. forest edges) for supporting desired production and optimal biodiversity levels.

Farm profitability and economic support

- For Jacopo (Italy), Daniel (United Kingdom), Stephan (Austria) and Sonja (Croatia), the biggest challenge is related to farm profitability: economic margins are getting lower due to increasing fixed expenses, making it difficult to make long-term investments such as HDLFs, which increase system resilience in a way that is difficult to quantify economically. Many farms are under severe economic pressures both from inadequate prices for produce and expanded requirements of regulations. Subsidiary to that, manpower is fully utilised on basic farm activities. In some cases, farmers will not have adequate knowledge to recognise the opportunities and deliver on HDLF and don't have time to invest time/money in "unproductive features". They do not see the economic benefit of enhancing the biodiversity on their farms. On the contrary, they perceive HDLF as a threat to their productivity, because it is taking a certain proportion of land out of production, requires time and additional money for maintenance.
- Antonio (Italy), Orsolya (Hungary), Saorla (Ireland), Nina (Finland) and Stephan (Austria) propose more economic support for farmers to preserve and restore HDLF, based on different payments mechanisms (that are still existed or to be invented). Some farmers or landowners are ready for action but are afraid of the costs and more economic compensation is required to reduce the costs. For Estonia, the challenge is to convince farmers that it's not too difficult or too expensive to implement something as easy as a 6m wide buffer and how small changes towards more HDLF don't drastically cut yield and plummet farmers into poverty.



For Stephan (Austria), Gary (Ireland) and Corinne (Switzerland), a needed change is that HDLF become cost-effective for farmers. For example, farmers should be rewarded for delivering enhanced biodiversity, essentially creating a market for ecosystem services. If farmers are already delivering high levels of biodiversity, this should be recognised and rewarded.

New farming concept

- The first challenge, for Petar (Bulgaria), Simona (Germany) and Sabrina (Austria), is to be awarded on the negative effects of the Intensification of agricultural production, the increase of mechanisation, "tidy" landscape and land abandonment, that somehow, reduces or completely destroys structural features of the landscape such as stands, single and group trees, scrub and uncultivated places that are habitats for many species of animals and plants.
- Another challenge, for Nina (Finland) and Simona (Germany) is the change of mind-set: having a reflexion about what do we have to change to be more aware of nature and the value of HDLF and biodiversity. Change of mind in the population, not only farmers, because the village is watching and judging you as well. These new challenges could be:
 - To introduce HDLF in places they never existed (e.g. Beauce region in France where the oldest aerial photographs -e.g. ~ 1920- show no hedge at all)
 - To maintain a sufficient amount and diversity of HDLF in the landscape, to integrate spatial issues in the restoration or introduction of HDLF and maintain a traditional farming system as proposal of Xavier and Stephanie (France) and Jana (Slovakia).

Regulation

- Increase the motivation of farmers for eco-schemes through CAP (Slovakia)
- Inclusion of a minimum percentage of biodiversity-promoting structures in the proof of ecological performance (Switzerland)
- Better aligning sectoral policies (e.g. on biodiversity and agriculture), removing conflicting measures or harmful subsidies (Hungary)

b. Relevant innovating actions

Adapted funding system

- For Gary (Ireland) and Petar (Bulgaria), funding for farmers tied to maintaining high biodiversity in the areas they cultivate or the implement of funded results-based payment approaches, would stimulate the creating, protecting and maintaining in good shape HDLF.
- Stephan (Austria) proposes a marketing approach of the benefits provide by HDLF to consumers through different mechanisms like co-benefits of products.
- Farmers themselves could propose events and advice through practical farm examples to advance others farmers with a bottom up strategy pioneer farmers in this case must get a refund for the additional effort, as Simona (Germany) suggest it. The implement of competitions relative to HDLF with attractive prices could also be a nice incentive to develop HDLF on farms.
- In addition, Jacopo (Italy) suggest that a subsidy policy would be focused not only on remunerating the constitution of new HDLFs, but also promotes with 10-years commitments their maintenance, both from new creation and for the maintenance of existing HDLFs.



- For Sabrina (Austria), we should understand the different motivations for farmers to implement HDLF and address these motives her impression is that regulations/laws have effects, but are not motivating and therefore the effect is limited to the necessary. How targeted are incentives by funding? What about the creation of new system of returns for HDLF?
- •

Need of training and support system for farmers

- For Jacopo and Antonio (Italy) and Sonja (Croatia), there is the need to train stakeholders and farmers about the importance of HDLF, advisors and students in practical skills related to maintenance, protection and creation of HDLF (e.g. construction techniques and materials for drystone walls, use and management of local vegetal species for hedgerows, management of scattered trees,...) and to actively support them. In addition, Nina (Finland) and Tine (Slovenia) propose concrete actions of education and information, preferably through examples of good practice on farms: "good examples that you can see, touch and feel" as Nina says.
- Maria (Germany) would propose mainly social innovations, including integration of an actor group who works between farmers and government and has both agricultural and biodiversity training to understand outcomes better, and to alleviate farmers of the extra workload, if desired. In the same way, Jana (Slovakia) proposes to create clusters including researchers, innovative technicians, farmers, representatives of NGOs, able to discuss of HDLF interest and effects.
- For Daniel (United Kingdom), Rufus (Estonia) and Orsolya (Hungary) a first step would be proper quantification of the economic value of the ecosystem services provided with the aim to motivate farmers to develop HDLF on their farms.

HDLF public policies

• For Antonio (Italy), regarding the HDLF-related policies and research it would be useful to develop standard definitions and methodologies for inventory and monitoring of HDLF. For example, Simona (Germany) proposes more flexibility to remove HDLF if necessary and establish new ones.

In the same way, Jose (Spain) argues that Common Agricultural Policy GIS (which is the base of CAP farmers' applications) does not recognize sufficiently HDLF. Thus, elements that are "de facto" HDLF are considered from an administrative perspective as unproductive uses (watercourses, pastures, unproductive). An in-depth review of the methodology used by the national authorities in the yearly publication of the GIS is necessary, so that farmers can benefit from HDLF, since, up to now; in many cases these elements are considered unproductive uses for the purposes of the CAP application.

- According to Maria (Germany), shifting from agriculture focused largely on producing animal feed or energy to mostly producing food for humans would allow agriculture to extensity and provide space for HDLF.
- More generally, Stephanie (France) thinks there is a need to integrate issues regarding:
 - The promotion of the ecological quality of HDLF in relationships with their management by farmers (not only the maintenance or creation of HDLF)
 - The maintenance of some HDLF over several years (to account for possible time lags in biodiversity response)
 - The landscape context of HDLF and the question of spatial networking of HDLF.



- $\circ~$ The multiple functions and services potentially provided by HDLF (related to biodiversity, but not only)
- \circ $\,$ The possible complementarity between regulatory and incentive measures in favour of HDLF.

Conclusion

Creation, preservation or restoration of landscape features are particularly beneficial to biodiversity farmland, provide ecosystem services such as biological regulation but also raise specific issues at the landscape level. In particular, it requires coordination between different categories of actors in the territories, and requires information, motivation, training and spatialized public incentive policies that are complex to design and implement.

Based on practical examples, during the first FG meeting, there will be discussions on both opportunities and barriers of how to develop, create, maintain or restore HDLF in farmland that impact positively farmland biodiversity.

The focus could be on some issues raised in chapter 4, challenges and needed changes for enhancing the biodiversity on farmland through HDLF:

- How to encourage introduction of HDLF in intensively managed agricultural land?
- How to introduce approaches "small changes large gains for biodiversity"?
- How can HDLF best contribute to pollinators preservation?



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AUSTRIA - Sabrina

LEADER project based on improvements & optimisation of sprayers and soil management in Austria <u>https://obstwein-technik.eu/937/Uebersicht</u>

Education project in Austria

https://www.vielfalt-am-betrieb.at/

Biodiversity stripes in vineyards in the frame of a Life project "VineAdapt" in Austria

https://www.life-vineadapt.eu/aktuelles

Implementation of a biodiversity in the framework of a project led by the organic association BIO AUSTRIA

https://www.bio-austria.at/biodiversitaet-2/

https://www.bio-austria.at/app/uploads/2021/12/biodiversitat-broschure-2022landschaftselemente-klein.pdf

AUSTRIA - Stefan

Preservation of the remaining mountain meadows in the municipality of Molln in Austria http://bergwiesn.at/

https://www.bluehendesoesterreich.at/naturerfolge/flora-region-steyrtal-kalkalpen-oberoesterreich

BULGARIA - Petar

Complete restoration of landfill in Bulgaria in three areas (3 cases): <u>https://www.moew.government.bg/bg/na-32-narasna-broyat-na-uskoreno-rekultiviranite-depa-ot-procedurata-za-narushenie-na-pravoto-na-es/</u>

https://bnr.bg/starazagora/post/101532579/napalno-rekoltivirano-e-depoto-za-otpadaci-v-chirpan https://www.btv.bg/shows/predi-obed/videos/vazmozhno-li-e-edno-smetishte-da-se-prevarne-vzelena-gradska-zona.html?fbclid=IwAR2KHgncXbe86jVyI1-K1CmaoS2anzgNSMjixUsNiZw2NhmMVInSa2JN9zI

CROATIA - Sonja

Maintaining, protecting, reconstructing and creating dry stone walls in Croatia: <u>http://www.dragodid.org/</u> <u>https://suhozid.giscloud.com/</u> Maintaining of ponds in Croatia <u>https://www.facebook.com/groups/kal.udruga</u>

ESTONIA - Rufus

"Conservation of natural biodiversity in agricultural land" study and report in Estonia: <u>https://landscape.ut.ee/what-we-do/projects/conservation-of-natural-biodiversity-in-agricultural-land/?lang=en</u>

LIFE Integrated Project "ForEst&FarmLand" in Estonia: <u>https://loodusrikaseesti.ee/en/biodiversity-agricultural-landscapes</u>

FRANCE - Stéphanie

Agroforestry hedgerows planted in Brittany, France, by the "Association Terres et Bocage" https://terresetbocages.org/

https://afac-agroforesteries.fr/wp-

content/uploads/2019/03/AGFORWARD_LEAFLET_France_Bocage.pdf

Biodiversity promotion areas (formerly ecological compensation areas = ECA) in Switzerland (by France)



https://link.ira.agroscope.ch/fr-CH/publication/24462 https://link.ira.agroscope.ch/fr-CH/publication/17655

FRANCE - Xavier

France project: Using flower strips in autumn/winter to host aphids natural enemies and limit the risks associated with BYDV:

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GERMANY - Maria

ECO²SCAPE project in Germany (creation of Set-aside field - fallows and flower strips): <u>https://tu-dresden.de/bu/umwelt/geo/geographie/landoeko/forschung/forschungsprojekte/eco2</u>

HUNGARY - Orsolya

Species-rich inter-row covering in vineyards and orchards in Hungary:

https://www.life-vineadapt.eu/en/aktuelles

https://www.biokutatas.hu/en/page/show/inter row covering

https://youtu.be/gmdQt28izz0

https://www.biokutatas.hu/en/page/show/floral-ground-cover-for-biodiversity-variety-not-just-forbeautys-sake

Rehabilitation of kurgans on arable land in Hungary

http://regi.bnpi.hu/oldal/kunhalmok-foldvarak-rehabilitacioja-a-bnpi-heves-es-borsod-megyeiteruletein-keop-3-1-2-2f-09-11-2013-0041-462.html

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http://www.termeszetvedelem.hu/ user/browser/File/Taj/Ertekorzo%20kunhalom%20leporello_v.p df

http://real-d.mtak.hu/1142/7/dc 1573 18 doktori mu.pdf

IRELAND - Gary

Wild Atlantic Nature Results-Based agri-environment Payment Scheme (RBPS) pilot from Ireland: https://www.wildatlanticnature.ie/rbps-materials/

Hare's Corner is a biodiversity initiative conceived in the Burren in Co in Ireland: <u>https://burrenbeo.com/thc/</u>

IRELAND - Saorla

Protecting Farmland Pollinators by creating solitary bee nests on farmland in Ireland:



https://biodiversityireland.ie/how-to-create-solitary-bee-nest-sites-on-your-farm/ https://biodiversityireland.ie/app/uploads/2022/05/ActionSheet_Solitary-Bees-WEB-2.pdf Implement actions to help pollinators on farms in Ireland https://biodiversityireland.ie/protecting-farmland-pollinators-midterm-report/ https://biodiversityireland.ie/app/uploads/2022/10/Protecting-Farmland-Pollinators-Midterm-Report-2022-WEB.pdf

ITALY - Antonio

Drystone terraces in Chianti (Tuscany) in Italy: https://www.wechianti.com/2018/01/17/paesaggio-leterrazze-lamole-diventano-un-patrimonio-storico-tutta-italia/?lang=en Trees Outside Forests (TOF) in Italy : <u>https://whc.unesco.org/en/list/1571</u>

SLOVAKIA - Jana

Territorial System of Ecological Stability in Slovakia Miklós, L., Diviaková, A., Izakovičová, Z., 2019. Ecological Networks and Territorial Systems of Ecological Stability. Springer International Publishing, Cham. <u>https://doi.org/10.1007/978-3-319-94018-2</u> Live landscape in Slovakia https://krajinaziva.sk/

SLOVENIA - Tine

Leader of an EIP-AGRI project on hedges in Slovenia https://ec.europa.eu/eip/agriculture/en/find-connect/projects/mejice-kot-podpora-biotskiraznolikosti-ohranjanju

SPAIN – Jose-Fernando

Operational Group "BIOLIVAR: Monitoring, optimization and valorisation of natural capital in the cultivation of olive groves in integrated production in Andalusia" - Spain

www.biolivar.es

Operational Group "SOWING BIODIVERSITY IN ANDALUSIA: Bases for the implementation and monitoring of multifunctional field margins within the framework of the new eco-schemes. Spain good Multi-functional field margins: agricultural practice: а https://www.youtube.com/watch?v=UWV4-I7L5Qw

SWIRZERLAND - Corinne

Swiss Direct payment system- Biodiversity contributions (In German): https://www.agrinatur.ch/bff/ruderalflaechen-steinhaufen-waelle Project Target-oriented biodiversity promotion in the canton of Zurich (in German): https://zielorientierte-biodiversitaet.ch/home BirdLife Switzerland's Farnsberg Orchard project (in German): https://obstgarten-farnsberg.ch/

Website – further information

AUSTRIA – Sabrina

https://www.bio-austria.at/biodiversitaet-2/ https://www.bio-austria.at/app/uploads/2021/12/biodiversitat-broschure-2022landschaftselemente-klein.pdf

AUSTRIA - Stefan



https://conbio.onlinelibrary.wiley.com/doi/10.1111/conl.12752

BULGARIA - Petar

Strategy for biological diversity in the Republic of Bulgaria: https://www.moew.government.bg/bg/proekt-na-strategiya-za-biologichnoto-raznoobrazie-vrepublika-bulgariya/

The strategic plan for the development of agriculture and rural areas in Bulgaria for the period 2023-2027:

https://www.mzh.government.bg/bg/obsha-selskostopanska-politika-2021-2027-g/tematichna-rabotna-grupa/

National program for protection, sustainable use and restoration of soil functions 2020-2030 https://www.moew.government.bg/static/media/ups/tiny/%D0%A3%D0%9E%D0%9E%D0%9F/%D0% 9F%D0%9E%D0%A7%D0%92%D0%98/%D0%9D%D0%90%D0%A6%D0%98%D0%9E%D0%9D%D0%90 %D0%9B%D0%9D%D0%90%20%D0%9F%D0%A0%D0%9E%D0%93%D0%A0%D0%90%D0%9C%D0%90. pdf?fbclid=IwAR01mSNv5IowA1y3srSkcnfa8xLIrAANDOtBXrpY9VqU8wa4AmRX7DTRAUU

Guide to organic farming in Natura 2000 areas in Bulgaria https://wwfeu.awsassets.panda.org/downloads/manual_n_2000_last_2.pdf?fbclid=lwAR1BAdgpxCfs aNVCk1en3fMdwCoAQKB9Y7qVK2K-5hDoVoySUOnlys0-eYA

Handbookgreenandblueinfrastructurehttps://www.biogeaproject.eu/sites/default/files/biogea_handbook_gbi_bg.pdf?fbclid=IwAR01mSNv5IowA1y3srSkcnfa8xLIrAANDOtBXrpY9VqU8wa4AmRX7DTRAUU

Handbook How to develop sustainable agriculture supported by the CAP 2014-2020 http://archive.zazemiata.org/v1/uploads/media/ZZ_Narachnik_web.pdf?fbclid=IwAR0nCIE1dQAaa0f kUYd47DJxTOfZIySYdw6kjZOTgPPHuad7MWsF6VcGqP0

Handbook for practical application of the conditions to maintain the land in good agricultural and ecological status

https://www.mzh.government.bg/media/filer_public/2018/02/13/narachnik_gaec_final_07_07_20_ 16izpraten1_1.pdf

Guidelines for the protection of biological diversity in tobacco growing areas http://uni-sz.bg/truni11/wp-

content/uploads/biblioteka/file/TUNI10044018.pdf?fbclid=IwAR3ofbFRH8COuknsoHvytRcZJMZfb7F9 5VvFcRSO3swKtHjFeHUAAMIW5is

CROATIA – Sonja

https://feal-future.org/eatlas/en/node/45 https://suhozid.giscloud.com/

ESTONIA – Rufus

List of HDLF-s and practices farmers can implement (in Estonian for now) https://heapold.ee/tegevused/

PDF guide how to declare the features in your farmland to our national farmland registry https://www.pria.ee/sites/default/files/2020-

01/Maastikuelementide%20deklareerimine%20%28tr%C3%BCkis%29.pdf

FRANCE – Xavier

Montgomery, I., Caruso, T., & Reid, N. (2020). Hedgerows as Ecosystems: Service Delivery, Management, and Restoration. Annual Review of Ecology, Evolution, and Systematics, 51(1), 81–102. https://doi.org/10.1146/annurev-ecolsys-012120-100346



Baudry, J., Rolland, D., Biet, M., Bonneville, R., Boussard, H., Defourneaux, M., Gonnet, G., Mercier, A., Meurice, P., Moret, C., Roger, J.-L., & Scherer, T. (2022). Les infrastructures bocagères pour la biodiversité. Sciences Eaux & Territoires, 40, Article 40. <u>https://doi.org/10.20870/Revue-SET.2022.40.7083</u>

Wolton, R., Pollard, K., Goodwin, A., & Norton, L. (2014). Regulatory services delivered by hedges: The evidence base (LM0106 Report for Defra and Natural England; Issue LM0106 Report for Defra and Natural England, p. 99). <u>https://randd.defra.gov.uk/ProjectDetails?ProjectId=19237</u>

GERMANY – Maria

There are several projects in Germany that use a co-design and multi-actor approach with farms that are addressing several types of HDLF with different perspectives: https://www.franz-projekt.de https://tu-dresden.de/bu/umwelt/geo/geographie/landoeko/forschung/forschungsprojekte/eco2 https://www.uni-goettingen.de/en/628701.html https://www.final-projekt.de/en/partners/thuenen-institute

GERMANY – Simona

https://www.dvl.org/fileadmin/user_upload/Publikationen/Fachpublikationen/DVL-Publikation-Fachpublikation_Steckbriefe_fuer_die_Massnahmen_der_Gemeinwohlpraemie.pdf https://www.bioaktuell.ch/grundlagen/nachhaltigkeit/biodiversitaet

HONGARY - Orsolya

https://www.nature.com/articles/s41559-017-0272-x https://doi.org/10.1007/s42977-020-00015-7 https://conbio.onlinelibrary.wiley.com/doi/10.1111/conl.12752 https://doi.org/10.1016/j.agee.2021.107519

IRELAND – Saorla

https://www.farmingfornature.ie/resources/best-practice-guides/hedgerow-management/ https://www.farmingfornature.ie/resources/best-practice-guides/plan-for-nature/ https://www.farmingfornature.ie/resources/best-practice-guides/watercourse-management/ https://www.farmingfornature.ie/resources/best-practice-guides/managing-species-rich-grasslands/ https://pollinators.ie/farmland/

ITALY - Antonio

https://iale.uk/biodiversity-dry-stone-wall http://www.parconazionale5terre.it/page.php?id=423 https://ich.unesco.org/en/RL/art-of-dry-stone-walling-knowledge-and-techniques-01393 https://www.teagasc.ie/environment/biodiversity--countryside/farmland-habitats/value-ofhedgerows/ https://www.openaccessgovernment.org/crop-pollination-restoring-biodiversity/131707/

SLOVAKIA - Jana

Špulerová, J., Dobrovodská, M., Lieskovský, J., Bača, A., Halabuk, A., Kohút, F., Mojses, M., Kenderessy, P., Piscová, V., Barančok, P., Gerhátová, K., Krajčí, J., Boltižiar, M., 2011. Inventory and Classification of



Historical Structures of the Agricultural Landscape in Slovakia. Ekológia (Bratislava) 157–170. https://doi.org/10.4149/ekol_2011_02_157

Špulerová, J., Dobrovodská, M., Štefunková, D., Šatalová, B., Kenderessy, P., 2016. The Culturalhistorical value of Traditional Agricultural Landscape in Slovakia, in: Corniello, L. (Ed.), World Heritage and Degradation: Smart Design, Planning and Technologies. Scuola Pitagora Editrice, Napoli, pp. 306– 315.

Špulerová, J., Petrovič, F., Mederly, P., Mojses, M., Izakovičová, Z., 2018. Contribution of Traditional Farming to Ecosystem Services Provision: Case Studies from Slovakia. Land 7, 74. https://doi.org/10.3390/land7020074

Kozelova, I., Špulerová, J., Miklosova, V., Gerhatova, K., Izakovičová, Z., Kalivoda, H., Kalivodova, M., Kanka, R., 2020. The role of artificial ditches and their buffer zones in intensively utilized agricultural landscape. Environ. Monit. Assess. 192, 656–656.

Melicher, J., Špulerová, J., 2022. Application of Landscape-Ecological Approach for Greenways Planning in Rural Agricultural Landscape. Environments 9, 30. <u>https://doi.org/10.3390/environments9020030</u> Miklós, L., Diviaková, A., Izakovičová, Z., 2019. Ecological Networks and Territorial Systems of Ecological Stability. Springer International Publishing, Cham. <u>https://doi.org/10.1007/978-3-319-94018-2</u>

SWIRZERLAND – Corinne

https://scnat.ch/de/uuid/i/f278cef9-b02b-51e1-8962-554847c00423-

Biodiversit%C3%A4tsf%C3%B6rdernde_Strukturen_im_Landwirtschaftsgebiet

Agridea's publications on small structures and requirements for quality levels (publications are available in German and French):

ttps://agridea.abacuscity.ch/de/3~410420~Shop/Publications/Plant-Cultivation-Environment-Nature-Landscape/Beitr%C3%A4ge-and-Conditions-in-%C3%96co-equalization



Annex 1: Support system to develop HDLF

Experts Awreness Support system		
Gary There is mixed levels of awareness on Ireland has a very well developed adv	isory	
(Ireland) benefits of HDLF. Some people are system in general, and we are in the pro-	ocess	
very well informed while others are of developing an advisory system for	this	
poorly informed. There is also lots of purpose. The new CAP SP for Ire	eland	
misinformation, in what is still includes a results-based approach	for	
essentially a productivity approach to 20,000 HNV farmers, and the farm adv	isors	
agriculture, where perennial rye- in these areas are receiving training	g for	
grass is seen as the most desirable improving ecological condition. LIFE IP	Wild	
vegetation. There is a lot more Atlantic Nature have trained more that	in 50	
discussion around HDLF in the past farm advisors in 2022.		
five years, but using different terms,		
etc. HDLF would not be a commonly		
used term in public discourse.		
Antonio Based on my experience, None		
(Italy) researchers involved in agronomy		
and forestry are well aware of the		
benefits related to HDLF. Planners		
and/or architects usually perceive		
the benefits of HDLF, but do not		
consider the importance of the		
intrinsic characteristics; for most of		
them it is important to have		
hedgerows or drystone walls		
because they are part of the local		
landscape, no matter about the		
material, construction techniques,		
vegetal species,		
management/pruning of		
hedgerows,		
Maria The benefits of HDLF are not widely It really depends on the province and t	ne	
(Germany) recognized among all farmers, it region. In my study region, the land car	e	
really depends on context of the association is active and advises farmer	's on	
farm conservation measures (all different ty	pes)	
and has a good working relationship w	th	
farmers in the region (Saxony).		
Xavier In "Bocage" region where livestock An example: one company specialized	on . –	
(France) (mostly dairy cows) is still abundant agroforestry that is also working on HD	L⊦	
farmers are completely aware of the such as hedges: Agroof can provide adv	lces	
major service provided by nedges to farmers, build projects with them.		
through the provision of shade and		
Nine Come advisors are well informed by Veethare is advisors and the second by		
INITIA Some advisers are well informed. I Yes there is advisory system ready to		
i trinanu) — i shoulu say that teachers also, — i support and help farmers to develop H		



	the teachers in farming education		
	are still very influenced by "big ag"		
	and big ag companies and the		
	central unions for agriculture. This is		
	my opinion after talking to some		
	people who just had there exam		
	from farming schools.		
Simona	A lot of farmers in my private	Very good advisory system for interested	
(Germany)	environment in Germany are not or	farmers through local land-care	
	don`t see any benefits of	associations in south west Germany with	
	establishing HDLF. Also a lot of	funding opportunities. Very good advisory	
	farmers in our areas are willing to	system and information material for	
	establish HDLF if they get funding	organic farmers in Switzerland.	
	(see local land-care associations),		
	but that doesn`t necessarily mean,		
	that they are well informed. Single		
	interested farmers have a lot of		
	knowledge and test things out of		
	their own interest.		
Daniel (UK)	Awareness is increasing; however,	Farming and Wildlife Advisory Group	
	too much of dialogue is dominated	(FWAG) provides some knowledge. The	
	by uninformed media or	wildlife trusts do the same, but tend to be	
	extreme/narrow view organisations.	extreme. Defra (Department for	
	Credibility is lost and farmers are in	Environment, Food and Rural Affairs) would	
	the main alienated rather than	say they do, but they lack both credibility	
	engaged.	and practical knowledge.	
Rufus	Scientists are generally very well	Farmers can contact many different places	
(Estonia)	informed and objective. People	where they can get support, or be directed	
	working in the ministries are as well.	towards support. However, this	
	In teachers, I feel knowledge varies a	opportunity might not be known to	
	lot - if it is the teacher's own	everyone. There are also projects farmers	
	interest, biodiversity topics will	can join to become involved in creating	
	reach schoolchildren, otherwise not.	HDLF-s like LIFE-IP ForEst&FarmLand. Some	
	It also varies a lot in farmers - some	projects involve educating new advisors -	
	have previously participated in	we have a lack of niche advisors, for	
	projects that support farmland	example on the topic of semi-natural	
	biodiversity and HDLF-s. or have	meadows.	
	higher education in a field that		
	supports this knowledge. However		
	some farmers are entirely indifferent		
	to HDLF-s or regard them as a		
	nuisance, though it seems healthy		
	scenticism stemming from lack of		
	knowledge is most widespread		
Corinne	Scientists are aware of the value of	The advisors are well acquainted with	
(Switzerland)	small-scale structures. There are high	structures that receive contributions via	
	differences among extension	direct navments such as hedges Other	
	workers and farmers. Consultants	structures such as branch pilos, cairns	
	workers and farmers. Consultants	structures such as pranch plies, calms,	



	with a biological background are	open ground are rarely advised, most likely	
	aware of the value, many people	in the networking projects when structures	
	with an agronomic background	are specified as measures. The advisors	
	rather less so. Farmers mostly still	often know the value of structures, but are	
	need to be sensitized. In agricultural	unsure where it makes sense to plant them	
	education, the topic of small	and where to choose which elements, or	
	structures is hardly dealt with.	even how to ecologically enhance existing	
		structures. The small structures are often	
		forgotten in consultations.	
Orsolva	not equally (organic farmers seem to	with the coming of the new CAP advisory	
(Hungary)	he better informed) HDLE are often	services have published some new undated	
(mangary)	considered a burden or 'sacrificed'	guidance on HDLE (earlier guidance was	
	land often mistaken for a risk factor	guita basis too gonoral or outdated)	
	to food coourity officional or	Cimilarly to formary, advisors that are	
	to rood security, efficiency of	Similarly to farmers, auvisors that are	
	productivity (even in ministerial	specified on organic agriculture seem to be	
	communication), HDLF are often	better informed on the benefits of HDLF	
	made up of invasive species	There is a historic tension and conflict	
	historically used in Hungary	between farmers/landowners and those	
	(Robinia), advisors don't generally	advocating for 'more space for nature',	
	have an up-to-date knowledge on	increased non-productive, biodiverse areas	
	HDLF benefits	on farmlands	
Petar	The good agricultural and ecological	According to Measure 12 - "Payments for	
(Bulgaria)	conditions (GAEC) that are	Natura 2000 and the Water Framework	
	introduced by the Ministry of	Directive" support is provided to farmers	
	agriculture with the help of National	who manage agricultural land, including	
	Standards. These standards are	meadows and pastures from forest areas,	
	specially developed for the	within the scope of protected areas	
	conditions of Bulgaria and one group	declared under the Law on Biological	
	of standards is related to a minimum	Diversity and for which orders have been	
	level of maintenance of habitats to	issued for their declaration.	
	avoid their deterioration.		
	There are also Guides and		
	Handbooks some of which were		
	developed on projects related to the		
	protoction of biological diversity		
	The protection and maintenance of		
	The protection and maintenance of		
	HDLFS is indicated in various other		
	documents related to the		
	management of Bulgaria's ecological		
	network. It includes protected areas		
	declared under the Protected Areas		
	Act and protected sites from the		
	Natura 2000 network, declared		
	under the Biological Diversity Act.		
Јасоро	Different subsides are known by	Carry out detailed training of advisors on	
(Italy)	many farmers subsides such as areas	agroecological issues so that they can	
	subject to natural or other specific	incentivize the adoption of such practices	
	constraints, support non-productive	by farmers. Subsidies should also be spread	



Saorla	investments, related to agro- climatic-environmental objectives, aimed at upgrading the rural landscape (in particular green or wet areas also with the function of ecological corridors), promoting a wildlife presence compatible with productive activities, safeguarding hydraulic-agricultural systems, decreasing water runoff, protecting agrarian soils from erosion	over longer time frames, so that they accompany HDLF implementation and maintenance activities for 10 to 20 years, thereby making them effective and increasing farmer (and advisors) awareness of their effect on the welfare of the entire agricultural system.
(Ireland)	this area for both farmers and farm	there is capacity in Ireland to do this.
	advisors.	
Stephan (Austria)	No, farmers are not well informed about HDLF benefits	Not much but it is getting better
Stephanie (France)	Farmers are overall informed about the global environmental added- value of hedgerows, in relationships with the incentive programme "Breizh Bocage" (hedgerow planting) in Brittany. Regarding farmers perception, some farmers (often organic ones) perceive HDLF as important to sustain biodiversity (with an interest on natural enemies or soil fauna) and also expect to take advantage from HDLF for other functions (shelter for livestock, wood from trees, windbreak, cultural value). Other farmers perceive more the potential disservices of HDLF (source of pests, impact of hedges on the adjacent crop yield). Researchers, advisors (technical institutes, agricultural chamber) and teachers (particularly in agricultural schools) are aware of ecological issues regarding HDLF,	Farmers can receive support and advices from the Agricultural Chambers, professional groups and technical institutes, as well as from advisors involved the Breizh Bocage programme.
Austria	farmers: not very well informed.	there are some advisors which can provide
(Sabrina)	they are aware of the importance	information, but there is a lack of
(20.01.10)	for some species, but not so much of	knowledge and capacity
	the overall importance of	
	hindiversity for the stability of	
	acoustams / long torm honofit for	
	their farm / effects on erosion,	



	water holding capacity, There are	
	individual farmers doing a lot, but	
	the majority is not focussing on	
	HDLF. Advisors and researchers: I	
	would estimate a smaller part is well	
	informed, but many people are not	
	aware of the benefits on the higher	
	level. For teachers I am not sure, I	
	think, they are less informed.	
Jana	General information of benefits of	Weak support
(Slovakia)	trees in the landscape	
Jose (Spain)	At an academic/theoretical level	There is not.
	there is probably enough	
	information. The question is that	
	this information is often not relevant	
	enough to arouse the interest of	
	farmers and advisors and to involve	
	them in measures that have a	
	positive impact on biodiversity.	
Tine	With an exception of some	Yes, either directly through research
(Slovenia)	progressive farmers, mainly not. The	institutions (mainly on an individual basis)
	Chamber of Agriculture and Forestry	and partially through the Chamber of
	of Slovenia is progressing in these	Agriculture and Forestry of Slovenia
	terms, yet the awareness and also a	(limited to knowledge and experiences of
	number of specialised advices is still	an individual consultants).
	low. Among researchers this topic is	
	well accepted and implemented in	
	science and policy, but with general	
	shortage of the dissemination of	
	these principles towards "end-users"	
Sonja	In general, farmers, advisors and	National Farm Advisory Service (part of the
(Croatia)	researches are not very well	Ministry of Agriculture) is providing
	informed and aware of HDLF	obligatory trainings for farmers
	benefits. There is a growing interest	participating in agri-environment schemes.
	in the subject as a result of	No specific support for developing HDLF on
	introduction of agri-environment	farmland. Several NGOs giving occasional
	payments (stone walls, hedges, field	trainings on dry stone wall building and
	strips), but it is still very limited	ponds maintenance.



Annex 2 : Data relative on areas occupied by HDLF at different scales

Ireland: 63,000 ha of blanket bog and associated habitat in the northwest Ireland

Italy:

Agnoletti, M., Conti, L., Frezza, L., Monti, M., & Santoro, A. (2015). Features analysis of dry stone walls of Tuscany (Italy). Sustainability, 7(10), 13887-13903.

Alessandro, P., & Marta, C. (2012). Heterogeneity of linear forest formations: differing potential for biodiversity conservation. A case study in Italy. Agroforestry systems, 86(1), 83-93.

Manenti, R. (2014). Dry stone walls favour biodiversity: a case-study from the Appennines. Biodiversity and conservation, 23(8), 1879-1893.

Sallustio, L., Di Cristofaro, M., Hashmi, M. M., Vizzarri, M., Sitzia, T., Lasserre, B., & Marchetti, M. (2018). Evaluating the contribution of Trees Outside Forests and Small Open Areas to the Italian landscape diversification during the last decades. Forests, 9(11), 701.

Sarti, M., Ciolfi, M., Lauteri, M., Paris, P., & Chiocchini, F. (2021). Trees outside forest in Italian agroforestry landscapes: detection and mapping using sentinel-2 imagery. European Journal of Remote Sensing, 54(1), 610-624.

Schnell, S., Kleinn, C., & Ståhl, G. (2015). Monitoring trees outside forests: a review. Environmental monitoring and assessment, 187(9), 1-17.

Tucci, G., Parisi, E. I., Castelli, G., Errico, A., Corongiu, M., Sona, G., ... & Preti, F. (2019). Multi-sensor UAV application for thermal analysis on a dry-stone terraced vineyard in rural tuscany landscape. ISPRS International Journal of Geo-Information, 8(2), 87.

France:

For France, the "BD TOPO" is a free database referencing a lot of landscape features, including hedges, both as areas or as lines: <u>https://geoservices.ign.fr/bdtopo</u>

Used with the "RPG" referencing agricultural plots used for the CAP (<u>https://geoservices.ign.fr/rpg</u>), an R script could do the job of computing the area covered by hedges per ha of crops.

Pointereau, P., & Coulon, F. (2007). Atlas cartographique des infrastructures agroécologiques en France. Solagro. <u>https://solagro.org/images/imagesCK/files/publications/f18_atlasiae.pdf</u>

France : 5 662 700 Ha ; 20,3 % of the UAA (ref : Solagro) Bretagne : 182 500 km of hedgerows (data : 2010)

Germany:

a lot of HDLF are listet as "Biotop" or "Naturdenkmal" beneath FFH areas : <u>https://udo.lubw.baden-wuerttemberg.de/public/pages/map/default/index.xhtml?mapId=68ded7ea-74a0-4edc-9ecd-24467ab00d01&mapSrs=EPSG%3A25832&mapExtent=251171.75633669196%2C5256081.57531615 35%2C746327.1371616405%2C5500048.757743446 https://rp.baden-wuerttemberg.de/rpf/abt5/ref56/natura2000/ https://www.envidat.ch/#/metadata/habitat-map-of-switzerland</u>

Estonia: All registered landscape features in Estonia make up approximately 7600 ha. These features include trenches, strips/islands of trees. (Oja et al., 2016). Relevant synthesis/study (in Estonian) here: https://dspace.emu.ee//handle/10492/5839



Switzerland: In the agricultural report, the proportions of biodiversity-promoting areas can be found in the various altitudinal zones in Switzerland (19% on average). This includes standard fruit trees and hedges. The other small structures make up only a very small part. Unfortunately, the report is only available in German, French and Italian.

https://agrarbericht.ch/de/politik/direktzahlungen/biodiversitaetsbeitraege

Slovakia:

High Nature Value Farmland: Šatalová, B., Špulerová, J., Štefunková, D., Dobrovodská, M., Vlachovičová, M., Kozelová, I., 2021. Monitoring and evaluating the contribution of the rural development program to high nature value farmland dominated by traditional mosaic landscape in Slovakia. Ecol. Indic. 126, 107661. <u>https://doi.org/10.1016/j.ecolind.2021.107661</u>

Regional system of ecological stability (Sources: RUSES - https://www.sazp.sk/projekty-eu/rusesii.html; https://download.sazp.sk/RUSES_II/, <u>https://www.sazp.sk/zivotne-prostredie/starostlivost-o-krajinu/zelena-infrastruktura/dokumenty-uses-v-sr.html</u>

Land Parcel Information System (LPIS - including High Nature Value Farmland, Ecological Focus Area, Terraces, Green Infrastructure in LPIS):

https://portal.vupop.sk/portal/apps/webappviewer/index.html?id=818d652513e5488d98577bb59ea 339b7;

https://portal.vupop.sk/portal/apps/webappviewer/index.html?id=32beed691b01498d9ebe11bf8f9 b7b04

Slovenia: Data can be assessed through features of the Slovenia Forestry Service database: <u>https://prostor.zgs.gov.si/pregledovalnik/</u>

Croatia: There are partly data related to dry stone walls: www.suhozid.hr



Annex 3: FG 47 members working list

				Professional
No	First name	Family name	Country	background
1	Orsolya	Nyárai	Hungary	Working at NGO
2	Stéphanie	Aviron	France	Researcher
3	Stefan	Kirchweger	Austria	Researcher
4	Corinne	Zurbrügg	Switzerland	Other
5	Xavier	Mesmin	France	Other
6	Antonio	Santoro	Italy	Researcher
7	Simona	Moosmann	Germany	Farmer
8	Maria	Kernecker	Germany	Researcher
9	Јасоро	Goracci	Italy	Farmer
			United	
10	Daniel	Stover	Kingdom	Farmer
11	Saorla	Kavanagh	Ireland	Researcher
12	Sabrina	Dreisiebner-Lanz	Austria	Adviser
13	Jana	Špulerová	Slovakia	Researcher
14	Gary	Goggins	Ireland	Civil servant
15	José Fernando	Robles del Salto	Spain	Adviser
16	Nina	Långstedt	Finland	Farmer
17	Tine	Grebenc	Slovenia	Researcher
18	Rufus	Тгерр	Estonia	Civil servant
				Working at an
19	Sonja	Karoglan Todorovic	Croatia	NGO
20	Petar	Petrov	Bulgaria	Researcher