

EU CAP NETWORK FOCUS GROUP ENHANCING THE BIODIVERSITY ON FARMLAND THROUGH HIGH-DIVERSITY LANDSCAPE FEATURES

The social and cultural benefits of high-diversity landscape features

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Introduction

In the age of climate change and the biodiversity crisis, when extreme weather events, such as extended drought periods and flash floods, become ever more frequent, new solutions and more holistic approaches are needed in farming in order to stay resilient. Such solutions should enable natural water retention on the land, support biodiversity, enrich the soil and thus reduce farms' and farmers' dependence on external inputs, making them more resilient in the face of external shocks and disturbances. High-diversity landscape features (HDLF), when established and maintained on farmlands in the right way, can provide such long-term benefits to both farmers and the agroecosystems they depend on.

There is an increasing public awareness of environmental problems and challenges associated with the intensification of agriculture and modern agricultural practices, which are primarily focused on production efficiency. In part as a result of this increased awareness, farmers are facing higher expectations both from consumers and the general public, as well as from new agricultural policies, to deliver better outcomes for biodiversity and the environment (e.g. through increased conditionality, 'space-for-nature', etc.). These additional demands on farmers add to the already considerable socio-economic challenges they face.

At the same time, growing disconnection of (especially urban) communities from nature and food production mean that large parts of society are unaware of where their food comes from, how it is produced, or its impact on the environment. To some extent, this is changing as society's recognition of its need for nature as well as a secure supply of quality food recently increased, especially as a result of the Covid-19 pandemic and related lockdowns as well as rapid food price inflation.

High-diversity landscape features provide an opportunity for farms and farmers to bring both nature and the reality of food production closer to society. HDLF can maintain or restore people's sense of place in farming regions, given that HDLF have traditionally emerged from the landscape and the way land was used and cultivated. Different types of HDLF are anchored in traditions associated with the landscape in different ways (e.g. flower strips vs. dry stone terraces). Understanding the perceptions of what a farmed landscape should look like and how HDLF fit into this perception could play an important role in reconnecting farm(er)s with society. HDLF can furthermore provide potential for education and awareness-raising with the possibility of gaining increased public support and appreciation to both farming and farmers.

Objectives

This paper primarily targets farmers as its intended audience and aims to provide an overview of the main types of HDLF and highlight their social and cultural benefits, as well as the main threats and vulnerabilities they might face. The paper furthermore demonstrates how both farmers and wider society can benefit from HDLF through the ecosystem services they provide, focussing on their social and cultural aspects. In the paper, we highlight the cultural dimension (origin, management, exploitation, restoration) of the most common HDLF in European rural landscapes that, according to the Florence Declaration on the Links Between Biological and Cultural Diversity signed in 2014, "*is predominantly a biocultural multifunctional landscape*". According to the same declaration, "*the current state of biological and cultural diversity in Europe results from the combination of historical and on-going environmental and land use processes and cultural heritage*" and "*landscapes rich in biocultural diversity are often those managed by small-scale farmers*". Finally, the paper presents good practices and inspiring success stories when farms featuring HDLF provided tangible social and cultural benefits (e.g.



through rural tourism, education, increasing a rural community's resilience, enhancing local wildlife and natural habitat connectivity, saving public money, etc.), as well as identifying research needs and ideas for innovation.

Context and key issues

Examining the wider context of farming and rural areas, the key issues that we can identify include decreasing farmland biodiversity as a result of agricultural intensification, as well as land abandonment, lack of connectivity, and the gradual disappearance of both cultural landscapes characterised by the traditional presence of HDLF, and of the knowledge and expertise needed to establish and maintain traditional HDLF (e.g. hedge-laying and -coppicing, stone wall building, knowing when to mow grasslands and prepare hay, etc.).

Intensification is driven in part by a culture of cheap food, as the expectation of cheap food comes largely without consideration of power imbalances in the food system. Many farmers find that their incomes stagnate or deteriorate over time. As a result, farmers need to continue to invest in different technologies in order to increase production and remain competitive. This intensification is often in conflict with the conservation and maintenance of HDLF. On the other hand, biodiversity on farmland is also decreasing due to abandonment. The abandonment of agricultural lands in marginal areas due to economic unprofitability often leads to the expansion of shrublands and of secondary forests, with the consequent homogenisation of the landscape and the reduction of diverse habitats and microhabitats.

Lack of connectivity is an issue both between natural habitats, as well as between people and farms or nature. Biodiversity and food production are often portrayed as an either-or situation. Our loss of connection with natural ecosystem functioning means that people are more willing to accept a trade-off, rather than push for a win-win scenario where food production and biodiversity co-exist in a symbiotic relationship.

The social and cultural benefits of different types of HDLF

HDLF provide different benefits for farmers and for the wider society in EU rural areas. In most cases, HDLF are the result of human adaptation to different (and sometimes difficult) environmental conditions (steep slopes, strong winds, abundance of stones within fields, etc.), and nowadays they deeply characterise various cultural landscapes across the EU. These cultural landscapes, and the farmers living within them, can also take advantage from the opportunities offered by international programmes for conservation and valorisation, such as the UNESCO World Heritage List or the GIAHS (Globally Important Agricultural Heritage Systems) Programme established by the FAO. As they are intrinsically related to the local landscape, before considering the establishment of new HDLF, it is necessary to carefully evaluate the characteristics of the local landscape, as well as the value of non-intervention, since the protection, restoration and/or enhancement of existing landscape elements should be preferred to the introduction of new ones.





Caption: top row, left: traditional dry-stone terraces and walls on Pantelleria island (Italy) allow the cultivation of capers, vines and fruit trees, at the same time representing an extended ecological network built by local farmers through the centuries, middle: wrong intervention of dry-stone terrace restoration carried out using concrete blocks in a terraced olive grove in Umbria (Italy), right: mixed annual flowering set-aside incorporated into crop rotation (Saxony, Germany); bottom row, left: a sedimentation pond that collects water from 60 hectares before it flows out in a stream (Finland), middle: traditional alley lined with fruit trees through fields of herbal leys (Saxony, Germany), right: traditional dry-stone terraces in Valpolicella (Italy) are characterised by a peculiar technique and arrangement of the stones.

The presence of HDLF can have multiple recognised (direct and indirect) benefits for farmers. Agricultural benefits include potential increased conservation of soil and soil fertility; potential increased quality and market value of agricultural products; yield stability over time as their habitat value can support diverse species' activities in supporting crop health (e.g. pest control and pollination); the creation of different microclimates and microhabitats within the farm; and a reduction of hydrological risk and of soil erosion, and increased water regulation.

In addition, social benefits for farmers include potential reduction of health problems linked to the use of pesticide on farmland; better acceptance of farming by the local community and society at large; representing farmers' care for the environment; contributing to community strengthening/building (e.g. collective of local "regenerative farmers" (belonging, knowledge, relationships)); bringing additional income to holiday farms (if the farmer is interested in tourism) through rural tourism; and contribution to the maintenance of a pleasant, attractive and productive landscape.

Regarding the greater society, it is possible to identify both cultural and social benefits, which can be summarised as follows:

1. Cultural benefits:
 - › Experiencing rural spaces;
 - › Physically using nature;
 - › Spiritual benefits;
 - › Educational benefits;
 - › Aesthetic benefits and inspiration;



- › Recreational (rural tourism);
- › Conservation of traditional cultural landscapes;
- › Strengthening of the sense of place;
- › Conservation of traditional or endangered flora and fauna species that find refuge on HDLFs.

2. Social benefits:

- › Provisioning of freshwater, food (farmed, game, wild collected food), timber and other wood products, biomass energy;
- › Regulating ecosystem services:
 - › Contributing to climate regulation;
 - › Contributing to water purification;
 - › Contributing to flood-, landslides- and soil erosion regulation, therefore, also contributing to the reduction of restoring costs for the society after floods and landslides;
- › Contributing to physical and mental health benefits: beautiful landscapes rich in HDLF can have a higher attractiveness, representing a valid reason for practising outdoors activities, while landscapes rich in (visible) biodiversity can make people subconsciously happier.

Overview of main types of HDLF and their socio-cultural aspects

HDLF	Social benefits	Cultural benefits	Threats / Vulnerabilities
Dry-stone terraces	<ul style="list-style-type: none"> › Reducing hydrogeological risk, erosion control and preservation of soil and soil fertility › Production of high-quality agricultural products with higher market value. 	<ul style="list-style-type: none"> › Preserving traditional cultural landscapes; › Preserving the aesthetic value; › Strengthening of the local identity and of the sense of place. 	<ul style="list-style-type: none"> › Abandonment of terraced cultivations; › Maintenance and/or restoration with inappropriate materials (use of concrete among the stones, concrete blocks, non-local stones) or non-traditional techniques. › Removal to facilitate agricultural expansion.
Linear stonewalls and other stone structures	<ul style="list-style-type: none"> › Habitat for insects including predators for pests and pollinators; › Protection of crops from the wind. 	<ul style="list-style-type: none"> › Preserving traditional cultural landscapes; › Preserving the aesthetic value; › Strengthening of the local identity and of the sense of place. 	<ul style="list-style-type: none"> › Lack of regular maintenance; › Maintenance and/or restoration with inappropriate materials (use of concrete among the stones, concrete blocks, non-local stones) or non-traditional techniques; › Removal to facilitate agricultural expansion.
Forest patches and their edges	<ul style="list-style-type: none"> › Habitat for insects, including predators for pests and pollinators; › Multitrophic 	<ul style="list-style-type: none"> › Maintaining complexity and aesthetic value of agricultural landscapes; › Maintaining the 	<ul style="list-style-type: none"> › Removal to facilitate agricultural expansion; › Presence of alien invasive species.



	<p>diversity and wildlife;</p> <ul style="list-style-type: none"> › Windbreaks in landscapes. › Water attenuation and regulation. 	<p>idea of what the landscape should look like by preserving the character of the place.</p>	
Perennial flowering and fallow set-aside land	<ul style="list-style-type: none"> › High ecological value (as habitat for birds, insects, and soil fauna); › Increasing overall diversity at landscape scale. 	<ul style="list-style-type: none"> › Aesthetic value for society, visual /symbolic communication from farmers to other citizens/society 	<ul style="list-style-type: none"> › Use of non-native/alien/invasive flowering species.
Pond/wetland/ditches	<ul style="list-style-type: none"> › Habitat for wildlife; › Unique microclimate with a cooling effect; › Water retention and flood mitigation; › Sediment ponds for catching surface runoff water. 	<ul style="list-style-type: none"> › Support native wetland species; › Contributing to landscape diversity. 	<ul style="list-style-type: none"> › Presence of invasive plants; › Pollution; › Drying out during extended periods of drought.
Hedges/wooded strips	<ul style="list-style-type: none"> › Habitat for insects including predators for pests and pollinators; › Protection of crops from the wind; › Supplementary productions (firewood, fruits, mushrooms, etc.); habitat connectivity. 	<ul style="list-style-type: none"> › Preserving traditional cultural landscapes; › Maintaining landscape complexity; › Preserving the aesthetic value; › Strengthening of the local identity and of the sense of place. 	<ul style="list-style-type: none"> › Use of non-native/alien/invasive species. › Lack of maintenance - especially in climate change conditions - during establishment can hinder their success
Trees in line/Trees in group	<ul style="list-style-type: none"> › Habitat for insects including predators for pests and pollinators; › protection of crops from the wind; › supplementary productions (firewood, fruits, mushrooms, 	<ul style="list-style-type: none"> › Preserving traditional cultural landscapes; maintaining landscape complexity; › Preserving the aesthetic value; › Strengthening of the local identity and of 	<ul style="list-style-type: none"> › Use of non-native/invasive species.



	<p>etc.);</p> <ul style="list-style-type: none"> › Providing shade or additional food to livestock in hot climates to increase their productivity; › Habitat connectivity. 	<p>the sense of place.</p>	
Vegetated streams	<ul style="list-style-type: none"> › Slowing down the water runoff; › Capturing excess nutrients carried from the land; › Protecting stream banks and floodplains from erosion; › Providing food and cover to terrestrial and aquatic fauna; › Conserving soil moisture, ground water and atmospheric humidity. 	<ul style="list-style-type: none"> › Support native wetland species. 	<ul style="list-style-type: none"> › Pests and diseases; › Construction of infrastructures and other developments; › Invasive species; › Pollution.
Scattered trees	<ul style="list-style-type: none"> › “Keystone structures” for biodiversity areas and human-dominated areas (e.g. livestock grazing systems), in tropical and temperate regions; › Shelter and food sources for animals; › Enhancing landscape connectivity by acting as stepping stones; › Basis for plant regeneration in disturbed landscapes. 	<ul style="list-style-type: none"> › Enhance the provision of ecosystem services: benefit farmers and owners of rural properties (pollination of crops, shading for cattle, regulation of nitrogen dynamics and carbon sequestration, herbaceous production, and wood provision) › Preserving the aesthetic value of woody areas (e.g. grasslands). 	<ul style="list-style-type: none"> › They are still largely neglected from both a theoretical and applied perspective, being rarely considered in research programmes and in management plans to restore and conserve landscapes.
Others: › Forest garden	Forest garden:	Forest garden:	Forest garden:



<ul style="list-style-type: none"> › Earth mound (e.g. kurgan, hillfort) 	<ul style="list-style-type: none"> › Habitat for birds and insects; › A very diverse area in different layers; › Habitat for wild herbs. <p>Earth mound:</p> <ul style="list-style-type: none"> › Providing habitat for wildlife, including pollinators, birds and pest antagonists; › When native vegetation is re-established: stabilising surface, preventing soil erosion and retaining soil moisture; › Habitat connectivity. 	<ul style="list-style-type: none"> › Third cultural landscape between field and forest (landscape diversity). <p>Earth mound:</p> <ul style="list-style-type: none"> › Increasing botanical and landscape value; › Preserving cultural/historical landscape and national heritage; › Potential for rural tourism and/or educational site. 	<ul style="list-style-type: none"> › Invasive species <p>Earth mound:</p> <ul style="list-style-type: none"> › Destructive effect of ploughing; › Invasive/non-native species; › Treading damage by grazing livestock; › Infrastructure, artificial elements (e.g. drain pipe, antenna); › Irresponsible agro-chemical use.
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Existing best practices to promote HDLF

Some of the socially involved practices currently observed to promote HDLF in agricultural land include voluntary action. This involves volunteers signing up for supervised activities of their choice during which they can learn how and why HDLF are created or maintained. These volunteering programmes may be hosted by national organisations. For example, in the case of Estonia, the [Estonian Fund for Nature](#) organises volunteering days annually, sometimes related to HDLF. Volunteers might help dig ponds on farm- or grassland to benefit endangered amphibian populations (*Bufo calamita*), or learn how to mow meadows with a scythe as was done traditionally. [The Bergwald Project](#) in Germany takes volunteers on week-long practical courses to restore ecosystems, including grasslands where grazing intensity is not enough to keep the landscape open. Perhaps the most important factor of such events is the human connections formed while bonding over working towards similar goals.





Photo by Katre Liiv. Scything course in Tallinn Botanical Gardens, 2021.

Tradition and community involvement tend to go together – traditions get lost when knowledge and know-how stop being passed on between people. Where Estonian traditions include managing semi-natural meadows or producing silage using a scythe, different traditions define the culture of agriculture in other places. In Italy and Spain, drystone walls and terraced landscapes are being preserved with the help of a [LIFE programme](#) (STONEWALLSFORLIFE) that brings together scientists, policymakers, farmers and other stakeholders. Indeed, projects can act as a bridge to efficiently generate scientific understanding and pass it on to governmental bodies and workers. The aforementioned programme brings together drystone maintenance workers and farmers with stone walls on their land, acting as a nexus for symbiosis between expertise and need. In Ireland, [The Hare's Corner Project](#) offers numerous solutions to farmers and gardeners on its website. The project supports creating mini woodlands, orchards, and small ponds. Financial and technical support and training are provided for those who commit a part of their land to HDLF detailed in the project. Plenty of such projects exist in all European Union member states.

Free and easy to access knowledge can serve to promote HDLF as the reach of projects is often limited to pilot study areas or constricted by time or financial limits. Science-based advice written as easy-to-understand guidelines allows for anyone with the resources and will to transform their own farmland. The Estonian website [Heapõld](#) has synthesised evidence-based research into easy-to-follow articles on various activities that promote biodiversity on farmland. Those include actions like creating or preserving HDLF: groves of trees, ditches, flowering meadow strips, flowering trees and bushes, and ponds.

It should be noted that all of the mentioned projects have an online presence, often involving social media. In today's context, social platforms are key drivers of engagement with stakeholders and all other interested parties. Attention should be given to how success of a project drives engagement, but also how engagement drives the success of projects. Presentation matters, and besides spreading information and ideas, online images and stories of HDLF projects help document and preserve the landscapes involved in those projects. They can also add to and help shape our collective understanding of what constitutes a (sustainably) farmed landscape in different regions and contexts.



Conclusions

There are numerous issues threatening HDLF in their role as important components of European cultural landscapes, and so their maintenance, restoration and enhancement continue to be instrumental to the conservation of biodiversity. Intensification and abandonment of agriculture and landscapes both pose a risk for HDLF, which may be amplified through a general lack of connectivity between people, farms, and nature. That undermines social and ecological resilience of these landscapes: in particular, the disappearance of the knowledge necessary to care for HDLF can pose a challenge to ensuring their contribution to the manifold, integrated benefits. HDLF comprise a range of traditional and more modern, functional features that - in all forms - provide multiple social and cultural benefits. Social benefits include physical and mental health, and diverse regulating and provisioning ecosystem services. Cultural and emotional benefits include spiritual, emotional, aesthetic aspects that contribute to a sense of place for many. Given the importance of HDLF in the way they contribute to the foundation of agriculture, rural areas and society, their conservation is of utmost importance and should be supported at all levels of funding and decision-making in a way that benefits farmers, local communities and the environment.



Research needs

The research on social and cultural benefits of HDLF is abundant but fragmented, and has a bias towards agro-ecological benefits. There is a growing awareness in conservation science that there are knowledge gaps related to the social dimensions of HDLF conservation. Recognising the **challenge** that stems from an existing **disconnect between large parts of society, nature and rural areas**, as well as a **lack of knowledge about HDLF** among professionals, agricultural advisors, ag-science students, and people in general, it is pertinent to consider finding and testing ways to reach sections of society often excluded from **co-design processes** in order to stimulate a broader reconnection to the non-human world.

Research can cover some of these knowledge gaps by conducting:

- › Research into the **perception of different HDLF** by various stakeholder groups (farmers, tourists, citizens, ag-science students etc.) and understanding **how** diverse groups of **society can contribute** to their maintenance and restoration, for example through place-based actions.

This research could explore how to develop and implement **place-based actions** aimed at maintaining, restoring, or enhancing HDLF which can deliver socio-cultural benefits at the community level (e.g. social cohesion, integration of different groups). Also of interest is assessing how different types of HDLF fit into **perceptions of landscapes** and if these different types of HDLF provide social and cultural benefits. This research can be **European-wide** or at the **regional level** and is important for **all farm types**.

- › Research on the **development of theoretical and practical tools** aimed at promoting, protecting and enhancing social and cultural benefits of HDLF.

This research should shift the focus from individual farmers to focus on shared practices and routinised activities that farmers engage in. The research should target the social and institutional context that gives rise to **social norms**, shared **meanings and understandings** and **material conditions** that facilitate and encourage certain types of practices (i.e. related to creation and maintenance of HDLF). The research should aim to understand how certain conventions are established, how they evolve, what are the opportunities for change and what practical tools can support this shift. This implies a focus on the societal-level system characteristics and the practices which that system promotes or facilitates. A key inquiry could explore the **social and cultural norms** that shape which HDLF are preferred by farmers and/or by society and if these norms are related to how HDLF are maintained, enhanced, or created. This research can include **all of Europe** but also **smaller regions**.

- › Research on the creation of **indicators for measuring and monitoring the social and cultural benefits** of HDLF.

The indicators should relate to a wide range of common HDLF such as those identified in this paper and be **applicable across different contexts**. This research and related outputs can also be used to inform the development of **educational and experiential materials to communicate** the many social benefits (e.g. related to their habitat value, functions and roles in microclimate provisioning) of HDLF to different groups of people through different venues, like for farmer training, primary and secondary schooling, and continuing education opportunities for different professions that may be involved in HDLF maintenance, restoration or enhancement (including community involvement). This research is relevant at a **Europe-**



wide level and for all farm types to better capture a **wide range of HDLF and socio-cultural contexts**.

Ideas for innovation and potential EIP operational groups

Several innovations for HDLF exist, and may be implemented on their own or integrated into research.

1. Identifying and monitoring farmland HDLF using GIS data:

Detailed mapping of HDLF at regional or national level through a common GIS-based methodology can create updated and reliable **databases for future monitoring** and evaluation of the effectiveness of HDLF conservation/restoration. In addition, this will help to **plan new linear HDLF** such as hedgerows of dry-stone walls to reduce fragmentation and **connect different ecological networks**. Using spatial data and data about HDLF and creating **GIS-based applications** will let people virtually “test” how HDLF would fit on their land and what ecosystem services they would provide. HDLF can be linked to the socio-cultural context using GIS layers and related software.

2. Creating model farms and living labs related to HDLF:

Model farms with HDLF can be created that can be visited and used for **educational purposes**, for practitioners or for the wider public. Creating **scenarios** or conducting **visioning exercises** with **different stakeholder groups** will provide ideas and perceptions of **which HDLF fit into their idea of farmed landscapes** to better know which values are symbolised. This will help avoid conflicts between stakeholder groups. Moreover, creating campaigns for various age brackets among youths will let them express their ideas and **connections to HDLF through art or other media**. This would help account for **future generations’ needs and values**.

3. Developing and testing tools for public engagement and education related to HDLF:

Co-design of tools with citizens and farmers within regions could increase their overall acceptance. This could be put into practice by creating both **local and international forums and groups** for exchanging ideas. For example, farmers or researchers interested in HDLF should be able to easily find each other and access expert knowledge. Co-design is furthermore a simpler way to **enhance awareness** of and express opinions on HDLF-related policy making on both local and EU levels. Local communities could contribute to a **catalogue of local culturally significant HDLF**, and any **local folklore, stories, art** or other forms of cultural and social value attached to them. This could increase feelings of the HDLF belonging to the community and landscape, and increase acceptance of HDLF. New materials relating to **ecosystem services** (including social, cultural; and their interactions with provisioning and regulating services), HDLF, and **biodiversity** could be developed and included in **national educational curricula** and university degrees (e.g. Ag Science) to create a **robust baseline of knowledge** for future generations.



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