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

Managing High Diversity Landscape Features (HDLF) for pollinators

Saorla Kavanagh, Jana Špulerová, Maria Lee Kernecker, Daniel Stover, Stefan Kirchweger, José Fernando Robles

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Introduction

Biodiversity is a complex term that is difficult to conceptualise on a personal level, and, in this case, to understand how a farmer can enhance biodiversity at the individual farm level. Despite this, most **farmers** have a deep knowledge of nature, and their love of the land is tied to the birds, insects, mammals, and plants that coexist there. They have an instinctive awareness for wildlife on their farms.
Biodiversity loss and subsequent/simultaneous ecosystem collapse are two of the biggest threats facing humanity in the next decade [1]. **Pollinators** specifically can uniquely carry this complex and urgent message since most people have an affinity for bees, and understand the free services they provide [2]. Insect pollinators are just one group of organisms that have shown declines in recent years [3,4]. It is widely agreed that insect pollinator decline is due to a combination of factors, including but not limited to, habitat loss, pests and diseases, and pesticide exposure [5,6]. **Farmland** is the dominant land use in Europe and the way it is managed is important for pollinator conservation. By providing food, safety, and shelter for pollinators on the farm, halting and reversing their decline is possible. One way to do this is to **manage high diversity landscape features** (HDLF) for pollinators across farmland. Managing farmland HDLF for pollinators will result in an increase in habitats across farmed landscapes for a much wider component of biodiversity.

Figure 1 Farmland Biodiversity Kildare, Ireland © Saorla Kavanagh.

The **key message** to communicate in relation to managing HDLF is to, maintain first, enhance second and create if not already in existence. Choosing the appropriate HDLF to implement or establish will depend on context, as some HDLF may be more suited to certain landscapes, climatic conditions and the farm types therein. For example, a livestock farmer may be more likely to incorporate a tall hedgerow on their farm compared to an arable farmer, as livestock benefit from shade. In contrast, increased shade within an arable field caused by a taller hedge can lead to poor crop growth towards the field edge. Farmers' attitude will also play a role in HDLF management. Farmers know their land the best and are uniquely positioned to help inform what HDLF may suit their farm. No matter which HDLF are managed on the farm, it is vital that **evidence-based actions** are used to manage HDLF for pollinators and wider biodiversity. HDLF **management plans** can ensure their preservation.

Background

Pollinators provide a vital service to both natural ecosystems and farming, and therefore should be offered a high level of protection given the potentially far-reaching effects of their decline.

A number of **EU initiatives** are linked to **halting** and **reversing global biodiversity loss** broadly, which should benefit pollinators specifically. Decoupling economic growth from the exploitation of natural resources, protecting ecosystem services, and restoring habitats are some of the key principles of the **European Green Deal**. In parallel, the **European Biodiversity strategy for 2030** and the **EU Pollinator Initiative** aim to protect nature and reverse the degradation of ecosystems and set the commitment to reverse the decline in wild pollinators by 2030.

Figure 2 Different important pollinator groups in Europe, solitary bees, bumblebees, honey bees, hoverflies, © Saorla Kavanagh and moths © John McHugh.

1. What HDLF benefit pollinators and farmers and what are the associated costs?

The **whole farm** has the potential to provide HDLF that can help pollinators, which in turn can benefit the whole farm and its surrounding landscape. **Food**, **safety**, and **shelter** can be provided on the farm by:

a. Maintaining native flowering hedgerows or field margins.

Field boundaries offer food, safety and shelter for pollinators on the farm [8,9]. Hedgerows provide essential resources for bees [10]. Hedgerows that are managed less intensively will have more flowers and have been shown to provide a more suitable habitat for bumblebees compared to intensively managed hedgerows [11]. Extending field margins and other uncultivated areas on farmland and across landscapes could encourage pollinators by increasing wild floral resources and nesting habitats [12].

Figure 3 Flowering hedgerows, Kildare, Ireland © Saorla Kavanagh and Peter Cutler.

b. Allowing wildflowers to grow within fields and beyond.

The management of roadside vegetation or riparian areas can increase the abundance and richness of wild bees [9]. Within productive areas, farmers can ensure that flowers are available for pollinators so that field management is HDLF management. Management including fertilisation, grazing, and frequent cutting can have negative effects on biodiversity in farmland [13]. As such, intensive grasslands support fewer plant [14] and bee [15] species compared to plant and bee communities found in semi-natural grassland. This is because grasslands rich in

flowers offer many floral resources for bumble, honey and solitary bees [16]. The floral resource availability in grass-based pasture systems may be increased simply by incorporating clover. Once it is allowed to flower, clover is an excellent floral resource for bumblebees [17,18].

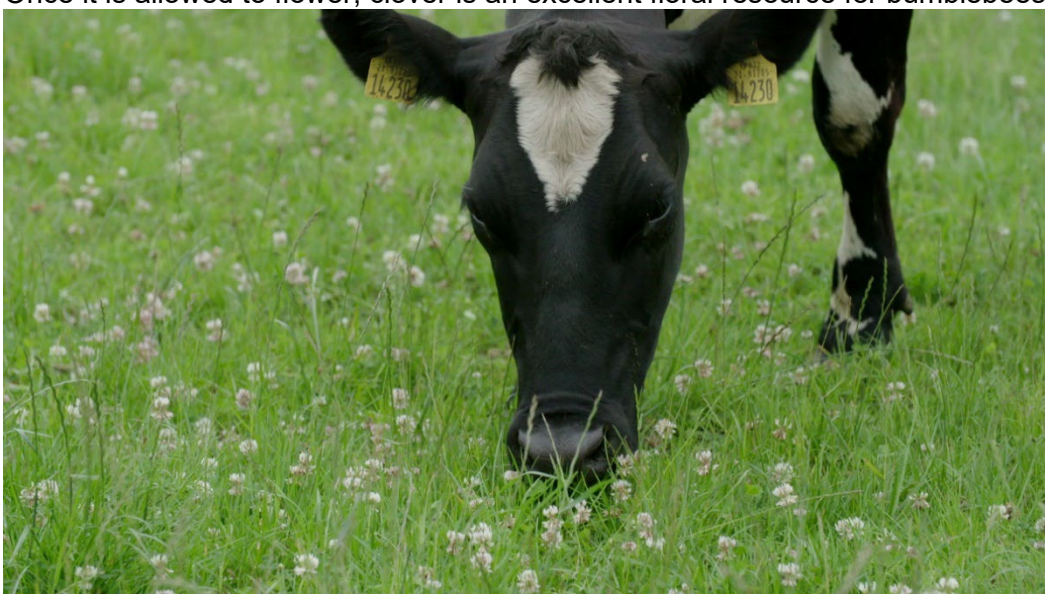

Figure 4 White clover field, Kildare, Ireland © Peter Cutler.

Mixed species swards (species diverse permanent pastures) have the potential to be even more beneficial to pollinators as they have a higher diversity of plant species that support a higher diversity of pollinator species [19].

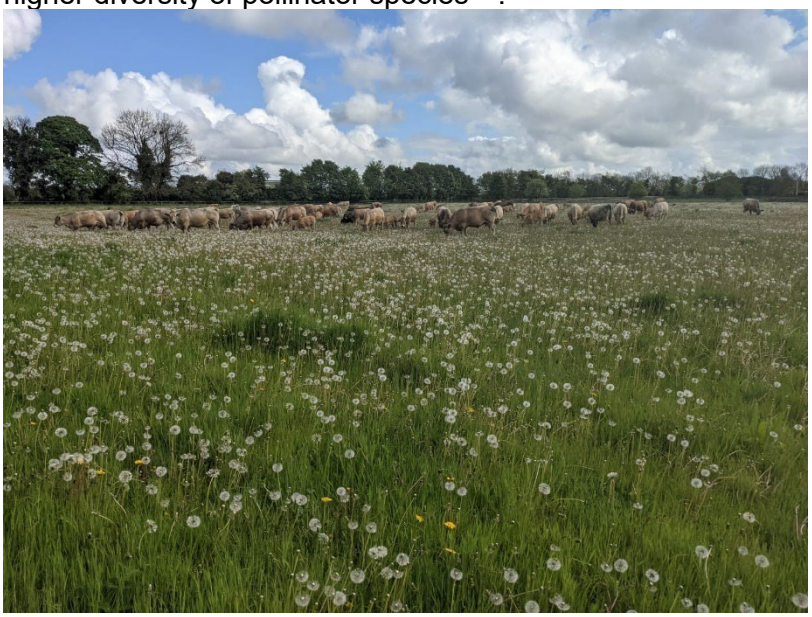

Figure 5 Mixed species sward, Kildare, Ireland, © Mireille McCall.

Herbal leys (i.e. multi species herbal leys), are a mix of grass, legume, and herb seeds. They can benefit soil fertility and provide food for pollinators while protecting the farm against drought [22].

Figure 6 Herbal leys in the UK © Dan Stover and in Ireland © John McHugh.

Similarly, mixtures of flowering crops (in Germany: buckwheat, sunflower, lupine) with accessible, and high quantity and quality nectar and pollen rewards can benefit pollinators [23]. Native plant species often provide better food sources for native pollinators and so maintaining or creating HDLF that support native plants is considered preferable.

c. Providing nesting places for wild bees.

Grasslands can provide nesting habitats for bumble bees and feral honey bees [24]. Managing hedgerows less intensively can also offer good nesting and floral resources, especially early in the year [25].

Figure 7 Grassland with HDLF providing suitable food resources and nesting habitat for wild bees, UK © Dan Stover.

In addition to the three points listed above for providing resources and nesting place for pollinators, reducing pesticide (fungicide, herbicide and/or insecticide) inputs in and around HDLF is essential for managing all these sites for pollinators. Bees can be exposed to pesticides in both rural and urban landscapes [26]. An exhaustive body of evidence exists that

show the harmful effects of pesticides (herbicides, fungicides, and insecticides) on bees [5,27,28]. Generally, there is sufficient toxicity data for a wide range of invertebrate taxa to warrant caution [29–32].
HDLF can be integrated into any farming system; however, it is suggested that a focus on a whole farm approach, as compared to a field-by-field approach, will more likely fit within farming systems, and gain farmer support. The whole farm approach is also consistent with the goal of creating habitat connectivity and heterogeneity across farming landscapes. Where possible, addressing HDLF across multiple farms and the wider landscape is likely to provide the best outcome for halting and reversing pollinator decline.

2. How can managing HDLF for pollinators on the farm benefit farmers?

Managing HDLF for pollinators on farmland will help to maintain a **healthy** and **sustainable farm**ing **system** and ensure the land remains in a good, or better, state keeping farming options open for future generations.

a. Maximising and stabilizing production value

Managing hedgerows less intensively can have a strong effect on pollination services to crops and non-crop areas [25]. About 75% of our food crops and nearly 90% of wild flowering plants depend at least to some extent on animal pollination [3,33,34]. Using herbal leys on the farm can increase forage production, sheep and cattle growth rates [20] and milk production [21].
Pollinators also provide biological control, with some crops having higher yields if pollinators are present [35]. Oilseed rape is a partially wind pollinated, and self-fertile crop and Stanley et al. found that flowers where pollinators were excluded produced fewer seeds (and therefore less seed weight per pod and average seed weight) than those open to pollination [36]. Higher flower visitation was reported in oilseed rape when field sizes are small and permanent green edges are long [37]. Pollination services depend on both wild and managed pollinators, with bees playing a primary role in the pollination of many agricultural crops [4], although non-bee pollinators (flies, beetles, moths, butterflies, birds and bats, among others) are also important [38].

b. Saving time and money

Mixed species swards can also help mitigate against the negative effects of drought [22] and can also have additional environmental benefits [39]. Flowering mixed species swards support improved livestock productive efficiency, reduce dependence on expensive chemical nitrogen, and can also provide a selection of needed minerals thereby potentially reducing supplement costs. Clover and other nitrogen fixing legumes are natural substitutes for nitrogen fertilizer and their use can help keep farm input costs down. A reduction in nitrogen fertilization can at least partly be compensated by increased effects of pollination on yield [40]. In this sense, managing farmland for pollinators through HDLF such as mixed species swards can simultaneously benefit farmers in many other ways.
It is well-established that beetle banks and field margin buffer strips provide beneficial habitats for insects which act as natural pest control. By managing HDLF for pollinators, habitat for natural pests, as well as broader biodiversity can be simultaneously created. A higher density of grassy field edges within 1 km has been shown to decrease aphid densities in cereals fields [41]. In intensively farmed landscapes, field margins can serve as a shelter for predators of pests of cultivated crops [42,43]. If these habitats are managed, farmers could use fewer pesticides, therefore reducing the economic burden of insecticide control.

c. Protecting water courses by creating pesticide/fertiliser buffer zones

Buffer and other protection zones, whether woodland, grassland, or a mixture, provide habitat for diverse pollinator species [44] while improving water quality

3. What farmer supports are needed to help farmers manage HDLF?

All farmers are uniquely positioned to manage HDLF for pollinators, however, support is required to help farmers to do this. **Support** can be in the form of facilitating knowledge exchange and providing training. In some cases, this support may be through providing materials or funding if management is cost and/or labour intensive.

Clear **communication** with farmers to ensure they understand the concepts and the science behind the benefits of HDLF which improve pollinator populations, along with proper reward structures are needed. Since farmers have different attitudes towards biodiversity, HDLF management and reward structures also need to be compatible with both socio-cultural norms and work processes [45]. Communication needs to be tailored to **fit to the norms** that different farmers associate with biodiversity. Examples on how to manage existing farmland HDLF that are not labour intensive and can be achieved though little or no cost to the farmer are required at the farm level scale. This could include cutting farmland hedges on a three-year rotation instead of cutting hedges every year. To achieve this, farmers and farm advisors need **training** to show how this can be achieved and the benefits for the farm. Additional supports could also be provided, for example information graphics.

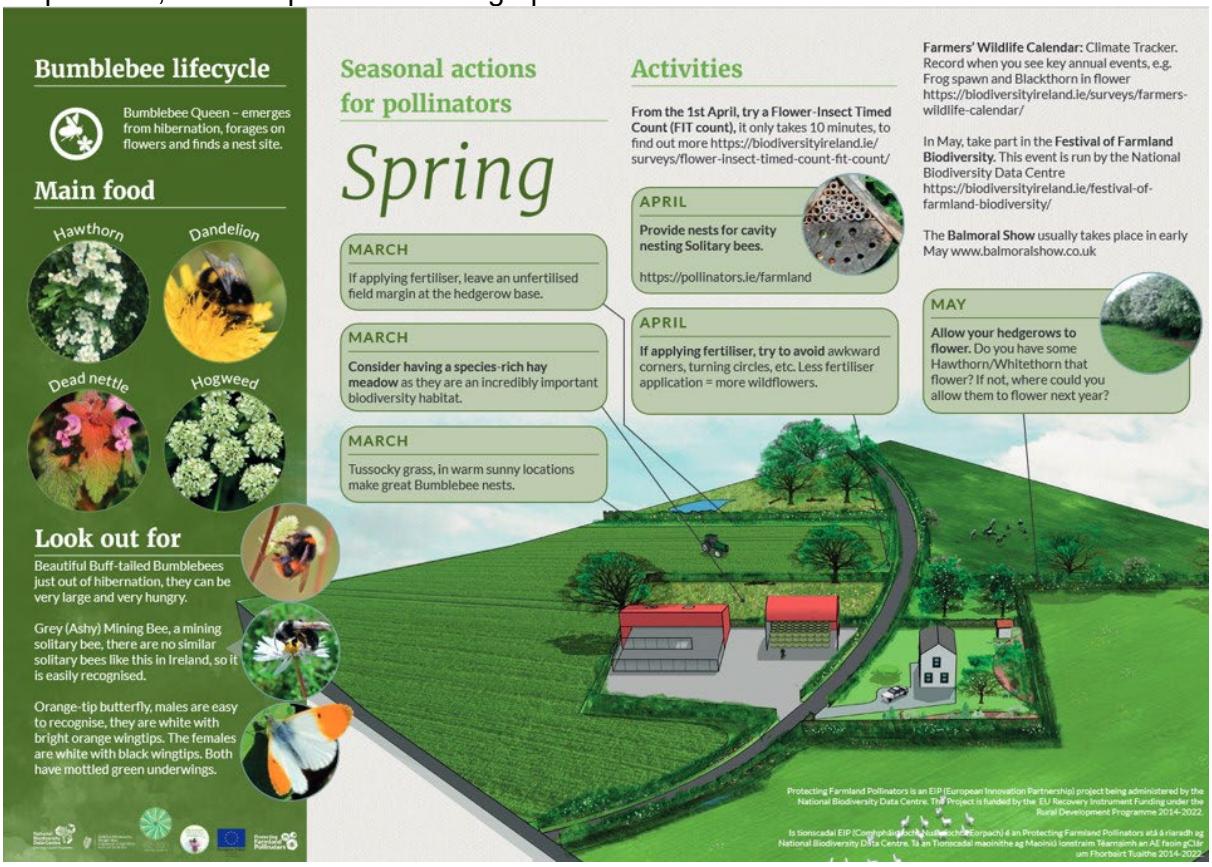

Figure 8 Spring actions for pollinators on the farm information graphic produced by the All-Ireland Pollinator Plan (AIPP) in collaboration with the Protecting Farmland Pollinators EIP © www.pollinators.ie.

Smaller farms may have smaller plots and therefore more permanent field edges. However, in the absence of nature conservation **payments**, small farms must first use their entire area for food production and in some cases, increase intensity to be profitable. Rewarding farmers for the wide range of values they deliver to society, like protecting pollinators, has the potential to stimulate farmer action in managing farmlands for biodiversity [46] and is an efficient use of public funding. Every farm has some value for biodiversity, but some farms offer more value than others.
There is great potential for commercial operators to **reward** farmers for the additional efforts involved in maintaining, enhancing, and managing HDLF on their farms. It would be beneficial if the agri-food industry facilitated consumer visibility, showing the added values to biodiversity, in this case, the use of good practices that help to protect the pollinators, in the production of their food. In the absence of industry and consumer recognition, there is a need for farmer supports through Common Agricultural Policy (CAP) incentives.

4. What are the farmers' concerns with managing HDLF?

Farmers are concerned that by managing part of the farm for HDLF, productive land may be lost, additional time and money will be required that is not available, and there may be additional management costs. Annually, farmers across Europe receive a basic payment for the area of farmed land they hold (own or rent). There is a perception with some farmers that if they manage their farm in a more biodiversity friendly way that they may lose too much farmed area, leading to a reduction of their basic farm payment, and losing a source of income they rely on to make payments on machinery and other investments. When accounting for HDLF management, farmers want to know they are doing the right thing by observing the relative advantage in comparison to not having managed HDLF, via agroecological benefits. They also want there to be continuity in what they are being asked to do.

5. Where should HDLF be?

Landscape structural complexity has been shown to be a global indicator for pollination services [35], highlighting the importance of abundant and connected HDLF for pollinators in landscapes. Considering this in planning HDLF **management** is important, since in landscapes where large, homogenous block fields predominate, it is difficult for pollinators to find food. Honey bees, for example, can fly anywhere between 1 metre to 9.5 km from the hive [47] with an average flight path of 5.5 km [47]; bumblebees only 1 kilometre [48]; and smaller solitary bee species only hundreds of metres away [49]. Thus, the distance between the nesting environment and the food source cannot be greater than their respective ranges, which need to be accounted for in planning for HDLF across a landscape [50]. More specifically, **connectivity** between HDLF can be increased by a network of bio corridors. This can be achieved by increasing edge density in agricultural landscapes, particularly in landscapes with low (<5%) or high (>20%) semi-natural habitat [50]. New HDLF may also connect two landscape features and act as a bio corridor, enhancing overall habitat quantity and quality in landscapes.
Enhancing structural complexity may have positive feedbacks on the success of HDLF in and across farmland. The increased amount and density of HDLF within a certain area can cool overall temperature, with implications for diverse insect species [51] – among them pollinators. Previous work has shown that simpler landscapes are warmer and with greater temperature variation. Moreover, aphids in more complex landscapes were found to be more tolerant to the cold than aphids from simpler landscapes [51]. Such patterns may also be found in different plant and pollinator species, such that overall cooler and more stable temperatures in complex

landscapes benefit the establishment of HDLF across landscapes. Therefore, it is also important to have coordination of collective efforts across a landscape to maintain, increase, or establish greater degrees of structural complexity necessary to reach this goal.

6. What to avoid when managing HDLF for pollinators?

a. Sowing non-native seeds from an unknown origin

Wildflower seed mixes often contain non-native species [52] and there is a risk of accidentally bringing in invasive species onto the farm [53]. Importing non-local genetic strains and placing them in proximity to natural populations of the same species risks contaminating the genetic integrity of the established populations and it distorts biogeographic patterns. By simply reducing cutting or grazing or allowing natural regeneration, important flowers like Dandelion, Clovers, Self-heal, and Bird's-foot-trefoil naturally pop-up year after year at no cost. Stimulation of dormant or supressed seed banks by appropriate management, e.g. cutting bracken, of both small (hare's corner) and larger (field margins) areas, or annual ploughing on the farm is a much more appropriate way to manage wildflowers for pollinators.

Figure 9 Natural regeneration experiment on an arable farm, Kildare, Ireland © Saorla Kavanagh.

b. Thinking short-term

Extensive management of HDLF that invests in long-term success is essential to the habitat potential of HDLF. Annual cutting of all farm hedges is not good for pollinators as no flowers will be able to bloom. Cutting or trimming in rotation will give hedges more flowering potential. Likewise, natural meadows need some management and patience. It can take up to seven years for areas of grass to develop into a stable flower-rich meadow. An annual cut or graze in September or October is essential to reduce soil fertility and allow the wildflower seeds in the soil to compete with the grass.

Small areas of non-farmed land can act as biodiversity hotspots on the farm. Managing these areas for pollinators can ensure their continuity. This can be achieved by allowing these areas to flower and not using pesticides.

Figure 10 Examples of pollinator friendly non-farmed areas, Ireland © Saorla Kavanagh.

c. Thinking it is possible without some central coordination

More recently there have been initiatives to coordinate farmers across landscapes to enhance connectivity and structural complexity. Some of these initiatives are inspired by the Dutch farmer collective model, where a level of intermediaries intercepts a lot of the bureaucracy and communication [54,55]. Another example is the AIPPs Helping the Large Carder Bee in your local community initiative [56].

Discussion

1. What is needed to maintain, enhance, and create HDLF?

a. Identify what is already there

Map existing HDLF on farmland. The quality and quantity of these features are important. This information can be used to identify locations with no HDLF or HDLF with limited quality. Mapping land use change at a fine scale resolution can also help identify approximate ages of HDLF, and which spatial characteristics they may be associated with, and provide important information for their maintenance and enhancement.

b. Maintain, enhance, diversify and connect existing habitat

To help manage HDLF for pollinators and wider biodiversity on farmland, more resources are needed to help facilitate the transfer of biodiversity knowledge within the farming community. Farmers receive little direction and training relating to biodiversity, so understandably, biodiversity is a concept unfamiliar to many. There is a need to increase farmer understanding of biodiversity friendly management practices and their benefits as well as the removal and dissolution of barriers and constraints preventing more biodiversity friendly management on the farm [46,57]. Specific actions that can be undertaken include:

- Including HDLF when calculating eligible land area that can be included in CAP direct payments should be considered and/or improved. Mechanisms in national geographic information systems supporting CAP applications should also be explored to simplify the methodology for conversion of marginal and unproductive agricultural areas into HDLF.
- Promote locally led community engagement through citizen science. Encourage the local community to participate in monitoring and mapping activities. Examples include: Biodiversity Monitoring by farmers in Austria [58], the BIMAG (Boeren Insecten Monitoring Agrarische Gebieden) project in the Netherlands[59] and the Farmer Moth Monitoring Project in Ireland [60].

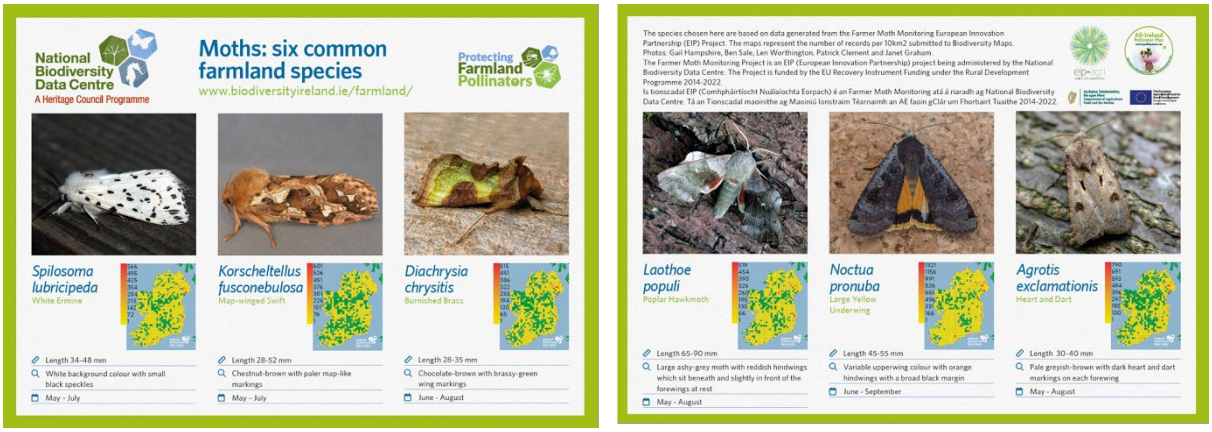

Figure 11 Farmland Moths, identification flyer produced by the Farmer Moth Monitoring EIP Project Team © https://biodiversityireland.ie/.

- Providing biodiversity training to advisors and integrating more functional biodiversity information into farmer training.
- Facilitating peer to peer learning with trials where benefits can be observed and recounted.
- Facilitating collaborative landscape management to maintain and enhance structural heterogeneity of HDLF.

c. Creating new habitat

It is vital that evidence-based actions are used when creating new HDLF for pollinators. It is also important that farmers perceive the creation of new HDLFs as an opportunity to enhance the long-term sustainability of agricultural activity.
In France and elsewhere across Europe there is huge promotion to plant hedgerows on farmland. Hedgerows are one example of HDLF that provide food, safety, and shelter for pollinators on the farm. Despite the promotion to plant these hedgerows, little information is provided to farmers on how to manage these hedgerows once they are planted. In Slovakia, new agri-environment schemes are promoting reducing the maximum size of arable fields to 50 ha (20 ha in protected areas) and setting aside non-productive areas.
Incorporating **pollinator friendly fields** with higher plant diversity, for example, **clover** pasture, **cover crops**, **companion crops**, **herbal leys** and/or mixed species sward and allowing flowers to grow within these fields. Presently, there is little attention paid to the spatial restoration of landscapes for pollinators. Creating new HDLF should also integrate such issues.
Climate-related factors may limit the success of new HDLF, such that heat, and drought may impede the creation of new HDLF, which is especially relevant in landscapes with large-block fields and a low proportion of HDLF. When designing new HDLF, it is important to apply the whole farm approach that takes the landscape into account in order to enhance HDLF's eco-stabilising effects and regulatory services. In addition to taking local climatic and abiotic conditions of a landscape into consideration, it is also recommended to account for constraints arising from land use in the surrounding areas, such as sources of air, water or soil pollution, as well as the use of chemicals, and proximity to roads where there may be conflicts with transport [61].

2. Research needs from practice.

1. Research into **co-benefits** of **pollinator conservation** actions. The **challenge** for farmers is a perceived risk to manage a part of their farm for High-Diversity Landscape Features (HDLF) due to concerns of losing productive land, requiring additional time and money, and incurring additional management costs. Despite these **concerns**, managing farmland for pollinators through HDLF can provide numerous co-benefits to **farmers**.
To overcome these challenges, **evidence-based research** results are necessary to support farmers through **knowledge exchange** and **training** to demonstrate the co-benefits of pollinator conservation actions, which will help farmers make informed decisions about managing their land. Furthermore, the research should also consider under which circumstances the co-benefits do not exceed the costs and which type of compensations measures or contract solutions can be applied. This research must be conducted at a **Europe-wide level** and is **relevant** to all farms.

2. Research into effects of **tillage management** practices and **regenerative** and/or **conservation agriculture** on **pollinators** (direct drilling, min-tilling, and ploughing). The benefits to soils, e.g. structure, organic matter content, of direct drilling or min-tilling, where conditions allow, has become relatively common. However, the **challenge** is the impacts on pollinators and broader biodiversity are less known therefore another lever for adoption may be uncovered through research. This could include looking into the advantages and disadvantages associated with of the use of **herbicides** and **catch, companion, cover crops** in place of traditional ploughing.
To overcome this challenge, evidence-based research is needed to document the **scientific linkage** between tilling practices and pollinators to potentially provide another **driver for**

farmer adoption. This research must be conducted at a **Europe-wide level** and is **relevant** to mainly crop and mixed production farms.

Figure 12 Flower companion, catch and cover crops, Kildare, Ireland © Saorla Kavanagh.

3. Research into the **advantages or disadvantages** of allowing **wildflowers to naturally regenerate** instead of **seed sowing** on plant and pollinator diversity. Seed sowing is cost intensive but can provide resources for pollinators. Despite sowing a diversity of seeds, over time, a dominance of certain species over others occurs. The opposite can be said for natural regeneration. Initially, there can be a dominance of some species over others, but over time diversity increases.

Figure 13 Natural regeneration of a field in Waterford, Ireland. The picture on the left was taken in year one and the picture on the right was taken in year 4-5 © Úna Fitzpatrick.

The results of a recent study indicate that tolerating the injurious weed species within the agricultural environment may be of greater benefit to flower-visiting insects, than the sowing of 'wildflower mixes' [62]. The **challenge** is to maintain flowering resources for pollinators and other groups of species with cost effective measures. To overcome this challenge, a combination of **on-farm research** and **monitoring of plant communities, specifically floral resources,** and **pollinator diversity** is needed. This research must be conducted at a **Europe-wide level** and is **relevant** to all farms.

3. Ideas for innovation.

a. Whole Farm Pollinator Scorecards

Development of an **innovative whole farm scoring system** to **quantity how pollinator-friendly** the entire farm is as a land parcel. Developing a farm-scale pollinator scoring system

can enable any farmer, regardless of type, intensity level or geographic location, to consider their entire farm and work out how pollinator-friendly it currently is. The score would be easily calculated, easily understood, and easily improved. Success can be reliably measured by improvements in overall score. This tool could be used universally, as it would enable all farmers to understand how pollinator-friendly or not their farm currently is, what simple, low-cost actions they can take to change this, and to work towards improving their whole farm for pollinators and other biodiversity in a measurable way that does not impact on productivity. Having a range of different measures on the scorecard offers each farmer the flexibility to improve the score in their own way over time.
Using a results-based payment method in addition to the scorecard, where farmers would receive an annual payment based on their overall whole farm pollinator score which is calculated depending on the amount and quality of habitat created. This has a lower administrative burden than more traditional results-based payment methods which are linked to a series of individual actions.
Developing pragmatic but evidence-based biodiversity measures that can be carried out in intensive farmland; that can be measured, and that can be rolled out in a cost-effective way on a wide-scale is a huge **challenge**. This is suggested as a consideration in that sphere. Again, this project would require multi actor collaboration between farmers, researchers, industry, advisors, and others.

b. Combining high diversity landscape features with production - Create a network of flower-rich meadows across farmland.

By identifying farms with fields that can be used as native hay meadow donor sites for wildflower seed collection, additional income can be generated for the farmer on the sale of the seed. Seed can be sustainably harvested using a brush harvester and the seed can be used to restore meadows on other farms. Selected sites could be used as a seed zone whereby local seed can be harvested and can then be used in habitat restoration at other local sites. Native species and local provenance seed being used in habitat restoration, on a local scale, is a very positive step towards maintaining, enhancing, and protecting local biodiversity. This would require multi actor collaboration between farmers, researchers, and others.
This project, with good design and farmer reward could address the challenges of farmers' perceived risks of HDLF implementation and collaboration to increase connectivity across a wider landscape.

Figure 14 Flower rich meadow, Kildare, Ireland © Saorla Kavanagh.

c. Pollinator monitoring

Multi actor monitoring for **long-term observation of pollinators** in areas with HDLF. Pilot studies and ground truthing of novel non-lethal monitoring technology, compatible with European Pollinator Monitoring Scheme would be required. Such a project could address the challenge of provision of data upon which to determine priority actions for HDLF maintenance and creation at farm and landscape levels. This project would need to be state sponsored and collaboration between farmers and researchers is required.

Conclusion

Up until the 1980s, agriculture in Europe was much less intensive and was, mainly due to widespread hay meadows, particularly biodiversity friendly. It is not about returning to that, but it is about trying to achieve a better balance between productivity and the coexistence with nature, and its benefits on a farm. We are at risk of squeezing nature out entirely from intensive farmland, and in doing this we jeopardise the important free services nature provides and that we take for granted, like pollination. Pollinators can be returned to all farmland without negatively impacting productivity, but it requires many farmers to take small actions. It also requires farmer buy-in at a whole-farm and landscape scale. Pollinators need food and shelter on farmland from early spring to late autumn. Individual measures in isolation will have minimal impact and are not cost-effective. The important role of measures under the Common Agricultural Policy in encouraging the management of HDLF and adequately rewarding farmers for their conservation cannot be underestimated. Success will be maximised if farmers can be encouraged to adopt a whole-farm approach and see their entire land parcel as a place where bees and other beneficial insects can survive and thrive.

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Appendix- Good practices examples

Experience of successful pollinator habitat management, from different countries.

Good Practice Example 1: Protecting Farmland Pollinators Scorecard.
The Protecting Farmland Pollinators project aims to test pollinator conservation actions in the Irish context, and to demonstrate a workable and cost-effective model by which farmers can be encouraged to take actions in a pilot area, using a mechanism that is readily scalable to European level. We hope to trial a novel mechanism by which all farms can become more pollinator-friendly in their own individual way under a system that allows clear tracking towards this goal and that is farmer-led. For more information visit www.biodiversityireland.ie/farmland/.

Figure 15 The Protecting Farmland Pollinators Scorecard is based on these five criteria.

Good Practice Example 2: Protecting Farmland Pollinators solitary bee nest sites.
When farmers are incentivised to take action to protect wildlife, they want to see that these actions work. The creation and occupancy of solitary bee nests in the Protecting Farmland Pollinators EIP project in Ireland is a clear example of where farmers can instantly see the results of their labour. Creating a solitary bee nest site is a positive easy action that can be taken to help pollinators on the farm. Since the onset of the project over 300 nest sites for mining solitary bees and 130 sites for cavity nesting solitary bees were created across 40 farms. Within the first four months, the exposed areas of bare soil were already successfully colonised by mining bees, and one-third of nest sites were occupied. For more information the How to create solitary bee nest sites on the farm action sheet can be accessed at https://biodiversityireland.ie/app/uploads/2022/05/ActionSheet_Solitary-Bees-WEB-2.pdf.

Figure 16 Occupied bare soil area created for below ground mining solitary bees © Saorla Kavanagh and a bee box created for cavity nesting bees © Mireille McCall.

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