LIFE Platform Meeting **NATURE RESTORATION ON INTENSIFIED FARMLAND: Innovations and best practices from the LIFE programme**

Lhee, the Netherlands, 18-19 September 2019

Final Report

The Platform Meeting is coordinated by the Neemo external monitoring team on behalf of the European Commission Directorate General Environment and the European Agency for Small and Medium Enterprises

Contents

Introduction to and aim of the platform meeting

In order to reach and maintain a favourable conservation status of habitats and species, areas need to be sufficiently large and/or connected. Connecting natural areas is being considered a more efficient approach to reaching the viability level of populations and habitats than the stepping stones approach. In regions dominated by highly intensified agriculture, connecting or enlarging the isolated habitat remnants often requires the transition of intensified farmland to nature. This involves the restoration of the hydrology, water quality and nutrient level in line with the requirements of the targeted habitats and species. Where grassland or arable land was strongly intensified, grazing is not efficient, and mowing is not enough to reduce the nutrient level within an acceptable timeframe. In such situations other measures are considered like topsoil removal through excavation or phytoextraction of phosphorus through P-mining.

This dedicated LIFE platform meeting aimed to identify and to disseminate knowledge and experience from recent LIFE projects on the various restoration techniques and measures for the transition of intensified farmland to target habitats. In this context, the most important topics were how to best set your restoration targets; how to optimise the available budgets and combine the principles of best practices and best value for money. Other issues discussed at the meeting were:

- Reducing the nutrient level on intensified agricultural land as a habitat restoration measure: new developments and how to choose the right method;
- Engaging farmers in more nature-friendly practices;
- The importance of small-scale, extensive farmland (e.g. cereal fields, fallow land) for species diversity (plants, insects, birds, reptiles...)

The two-day event included a plenary session, thematic workshops, excursions and a poster session (Chapter II.2). It provided plenty of opportunities for networking and sharing experiences.

This LIFE platform meeting, that took place in Lhee, the Netherlands, from 17 to 18 September 2019, has gathered LIFE projects working on this topic from Belgium, Bulgaria, Czech Republic, Denmark, Germany, Hungary, Latvia, Luxembourg, Slovakia, Slovenia, Spain, Sweden and the Netherlands, to share experience and knowledge gained through these projects.

The event was kindly hosted by the project Life Going up a level (LIFE13 NAT/NL/000162) that is located in the National Park Drents-Friese Wold and Leggelderveld, aiming to raise groundwater levels, in order to restore wetland habitats in these two targeted Natura 2000 sites.


Life
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Part I – Summary for Policy Makers

The recent round of reporting by the EU Member States according to the requirements of Art. 17 of the Habitats Directive confirms that **semi-natural habitats associated with agricultural practices and related species groups are still declining**[1]. The reason is both intensification and abandonment of traditional farming. In those areas where conditions were favourable for the development of agriculture, intensification has drastically altered the landscape, improving the conditions for the farmers but resulting in a serious decline of biodiversity.

The UN Decade on Ecosystem Restoration 2021-2030 aims to massively scale up the restoration of degraded and destroyed ecosystems as a proven measure to fight climate change, and enhance food security, water supply and biodiversity. Reaching its objective – restoration of 350 million hectares of degraded land between now and 2030 – could generate US$9 trillion in ecosystem services and take an additional 13 to 26 gigatons of greenhouse gases out of the atmosphere.

Numerous Natura 2000 sites[2] include not only EU protected habitat types (i.e. listed on the Annex 1 of the Habitats Directive[3]) but also countryside landscape elements, which are habitats of birds and other protected species, or have the potential to be restored into habitats with a high biodiversity value. In North-Western Europe we see that a large part of these areas is affected by intensified agricultural practices that have changed the abiotic conditions by draining, levelling and also significantly increasing the soil nutrient level (mainly Phosphorus) which impedes the restoration to species-rich habitats. In such situations, an essential question for the managers of these Natura 2000 sites is often: how to manage this farmland in order to achieve the site's conservation objectives defined following the provisions of the Habitats Directive[4]? However, in practice, the decisions on the conservation measures to apply and the conservation objectives to achieve are based on the following criteria:

- historical data on species and habitats that were present in the past but linked to data on the current abiotic and biotic conditions on the site (i.e. nutrient level in the soil, atmospheric deposition, availability of the seedbank and hydrology);
- availability of financial resources and the socio-economic sustainability of the management measures on the long-term (based on a dialogue with farmers);
- careful considerations between climate and nature objectives (carbon storage vs. biodiversity conservation) as well as other ecosystem services such as tourism, recreation and historical landscape values;

Especially in terms of reducing the nutrient level, the LIFE programme has supported the development of new techniques that were showcased during the field visits. There are several well-known and widely used techniques for reducing the nutrient level in the soil as part of a process to convert former intensified agricultural land into more natural habitat types with higher biodiversity value. The most

[1] https://www.eea.europa.eu/themes/biodiversity/state-of-nature-in-the-eu/article-17-national-summary-dashboards

[2] https://ec.europa.eu/environment/nature/natura2000/index_en.htm

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01992L0043-20130701

[4] An example of a report on this topicis: Review of Favourable Conservation Status and Birds Directive Article 2 interpretation within the European Union.

frequently used techniques are **frequent mowing with removal of the biomass**; **grazing**; **sod-cutting and topsoil removal**; and in the recent years in the Netherlands and the northern parts of Germany **Phosphate (P) mining**[5].

The LIFE Programme needs to continue to play an important role in piloting the different approaches to manage and restore semi-natural habitats associated with agricultural practises, while generating and disseminating the relevant knowledge and function as a catalyst for increased restoration efforts across the EU.

Box 1 Most commonly used restoration techniques

- ***Mowing***: *since the 70s mowing with the removal of the moved material was used to reduce the nutrient level. This can work in some cases after 10 years, but sometimes even after 15 years the situation is hardly improving. The level of nutrients in the soil (especially the Phosphorus - P) will determine how many years it will take to improve the situation by mowing. If you only remove the above ground layer, you do not change the system in the soil fast enough. Depending on the levels of P in the soil it can take more than 300 years of mowing to reach the P levels suitable for Nardus grasslands*.

- ***Topsoil removal***: *a technique mostly used in the Netherlands, but also in Belgium, Denmark, Germany and the UK. Dwingelderveld with 160 ha of topsoil removal is one of the largest such restoration projects. It is important to start with soil analysis to determine the P-levels. The results inform how much topsoil needs to be removed. If 40 cm of soil is removed there is nothing left, only sterile soil. Everything must be brought in from the outside to make a chance in restoring the target species. When you only bring in mowed material after 5 years you can get some results. If you also bring in the soil element (sod cut material) in 5 years you can already have restored heathland habitat. These are large and expensive projects with a low social acceptance. The farmers that remain in these areas cannot make a living anymore.*

- ***P mining*** *is an alternative: mowing and removal of the biomass but with an increased P-uptake. This is achieved by fertilisation with N and K, or with N-fixing vegetation (clover). An advantage of this technique is that it can be done by farmers. It is a good measure to get rid of the extreme P-amount and improve the situation but not enough to get a high biodiversity habitat.*

Some lessons learnt

One of the outcomes of the meeting is that it became clear that none of these techniques offer a universal solution for reducing the nutrient level in the soil. Each technique has its disadvantages and limitations. While frequent mowing and removal of biomass is only efficient for small excess in soil nutrients, topsoil removal is a more drastic and expensive measure that removes also the seed bank, has a high impact on fauna and the site's hydrology. P-mining on the other hand, takes longer to achieve results and is a relatively new technique which is considered still to be in experimental phase.

The host project (**LIFE going up a level**) implemented various restoration measures on intensified farmland, with the aim of combating desiccation, acidification and eutrophication over the entire project area. The hydrology of wetland habitats within the project sites was restored by raising the water levels, while the soil nutrient level was lowered by a combination of local topsoil removal followed by planting of native shrubs and P-mining across the large agricultural enclave. The site visits allowed for a comparison with the results of the project **LIFE Healthy Heath** where large scale top soil removal was combined with different measures to overcome the disadvantages of such massive excavation (i.e. applying freshly mowed biomass or cut sods from well-developed habitats combined with a chemical treatment to change the pH of the soil).

[5] Fertilisation with nitrogen (N) or a combination of N and other nutrients (mainly potassium - K), resulting in higher biomass productivity, and thus allowing a higher P export with mowing and, in the first years, resulting in a good quality hay that is appreciated by farmers

A project in Slovakia (**LIFE Ostrovne luky**) converted arable land into grassland habitats that serve as feeding areas for birds and insects. This was achieved by a combination of sowing the appropriate seed-mixes with a follow-up management in the form of mowing, grazing and mulching of the invasive species and ruderals before they flower. The project also demonstrated that grazing with different species helps both – maintaining the habitat and dispersing the seeds and also improving overall species composition.

An example from the Dummer River Valley in Lower Saxony in Germany (where three consecutive LIFE projects have been implemented since 1998: **Re-wetting of the Ochsenmoor on the Dümmer**; **Re-wetting of the Western Dümmer fen area**; and **Waterlogging and grassland extensification in Lower Saxony to improve habitats of the Corncrake *(Crex crex)* and the Black-tailed Godwit *(Limosa limosa)***) demonstrated that rewetting of the meadows and persistent mowing and grazing, in some areas for more than 30 years, resulted in a significant increase in the population of meadow birds. At the same time, a LIFE project from Wallonia in Belgium (**LIFE+ Prairies Bocageres**) demonstrated that after 15 years of consecutive mowing, the conservation status of some parcels improved by one level. However, on other parcels, even after many years of extensive management, the conservation status remained unfavourable-bad.

As it can be seen. there are no universal solutions for reducing the nutrient level in the soil. The success of the technique applied largely **depend on the site hydrology, baseline nutrient level and the presence of the seedbank needed for the return of the target species**. This was also the main message of **LIFE Pays Mosan**. The project showed that a solid preparation that includes analysing the site conditions on parcel level, in line with the above mentioned site characteristics, allows for a better selection of the restoration measures in order to reach the set conservation objectives. This approach also allows to identify new unexpected potential sites for restoring the target habitats.

Another important aspect to consider, when restoring farmland for nature, **is the ownership of the land and working with farmers**. There are two main approaches: working closely with the landowners and farmers managing the land (approach used in most of the other Member States) or purchasing the farmland to restore it (approach favoured in e.g. the Netherlands, Belgium and Northern Germany). There are fundamental differences to these two approaches. The advantage of purchasing the land allows for long lasting restoration, taking more ambitious measures, or using the land as a demonstration site. In addition, when the management is under full control of a nature organisation, the restoration is permanent and monitoring is easier to put in place.

The advantages of working with farmers and landowners are in raising the awareness about the importance of nature and improving the acceptance for the newly created more natural conditions. This approach also helps create ownership of the results, build local pride and educate the young generations. All this contributes to the long-term sustainability of the results. While these kinds of processes might take a bit longer, in the end it is possible to work on a much larger scale and restore or improve much larger areas.

In both cases, it is **essential to establish a dialogue with the farmers and a relationship based on mutual trust and to aim for a genuine win-win solution for both the farmer and nature**. This is **key for ensuring long-term sustainability of the restoration measures**. A project from Sweden (**LIFE-Goodstream**) shared some important lessons learnt on working with farmers: do not approach them with ready made plans; show interest in their problems and offer help; allow sufficient time and do not rush; use ambassadors to convey key messages; focus on families and children; use species in communication; and respond quickly to their questions.

The way forward

As mentioned previously, there are several approaches to restoring intensified farmland for nature, some of which are still in an experimental phase and require more time before a definitive judgement can be made on their effectiveness. Therefore, the participants at the meeting felt that it was too early for a decision matrix or manual on restoration measures. On the other hand, there is a lot of relevant knowledge already available out there, but the main issue is how to make it more broadly available and accessible to the nature conservation managers (practitioners). The practitioners need knowledge and experience-sharing related to the specific site(s) they are working on, from different types of operators: other practitioners, researchers, but also local non-expert people such as farmers, birdwatchers, neighbours, etc. This type of stakeholders may indeed have a long-term knowledge on what the site looked like before, how it was used, and this sort of interaction may help to increase the local ownership of the project.

Based on these considerations, we have the following recommendations on how to increase the success of the restoration work related to reducing nutrient levels in soils:

- Success lies in the preparation. Setting the conservation objectives and translating them into field restoration measures should rely on a solid site knowledge. Insufficient insight into the site's land use history, hydrology, nutrient level and current natural values is unlikely to lead to successful restoration;
- Cooperation with a research partner throughout the restoration, or at least in the preparatory phase, is considered very valuable and ensures access to scientific expertise and relevant guidance along the process;
- Cooperation with scientists and other stakeholders needs to be planned ahead and requires sufficient time and resources, so this has to be considered in advance;
- Enough resources has to be envisaged also for monitoring the process of restoration and the results; to derive lessons learnt, failures as well as key success factors; and to disseminate them;
- Dissemination is not only useful to reach the stakeholders and the local population but it also offers good potential for knowledge exchange between peers (practitioners, site managers, researchers etc).

Here are some concrete recommendations for the LIFE Programme to improve the ongoing and future LIFE projects dealing with restoration in order to facilitate the knowledge exchange and improve the transferability and replicability:

- There is a need for a more functional database or platform for information sharing at EU level, with an improved search functionality and a possibility to share guidelines, technical reports etc. (e.g. via LIFE Database or Natura 2000 Communication Platform);

- The LIFE online database could be updated with useful technical information already during the implementation of the project;

- The LIFE newsletter should announce events 6 months in advance and could shift from being a promotional tool to becoming more of a technical dissemination tool publishing pre-digested information from the results of LIFE project, grouped per topic;

- Interesting cases should be highlighted and proactively shared (this is a possible role for the Technical Monitors).

- To improve the impact, transferability and replicability of the individual projects, when developing the proposals, the beneficiaries should be encouraged to:
    - Organise an international project's final conference and possibly invite international speakers to the project's national/local level events;
    - Allocate enough time and budget for international dissemination activities such as participation in international expert platforms (possibly organised on a biogeographical level) and work on the development and implementation of concrete roadmaps (e.g. via Natura 2000 Biogeographical Process).
    - Make publications focusing on restoration techniques available in English and make sure they are shared internationally;
    - Develop more guidance documents as outputs of the projects, to influence the decision-makers at the national level.

Part II – Session Summaries

II.1 Plenary session

Mr. **Jean-Paul Herremans** from **Neemo,** who has a long experience in monitoring LIFE projects focusing on the restoration of intensified farmland, both in the Benelux and in France welcomed the participants and introduced the purpose of the meeting. He reminded the participants that the intensification of agriculture after World War II resulted in the decline in biodiversity across the countryside, leading to the loss of even common species. In addition, to the increase in nutrients' level, intensification also resulted in hydrology disturbance, loss of the micro-relief, enlargement of parcels and loss of transition zones and hedges. In order to tackle these challenges, nature conservation has evolved into a complex science in recent years. Following his introduction, the participants were also welcomed to Lhee by the **Mayor Jager** of the **Municipality of Westerveld.**

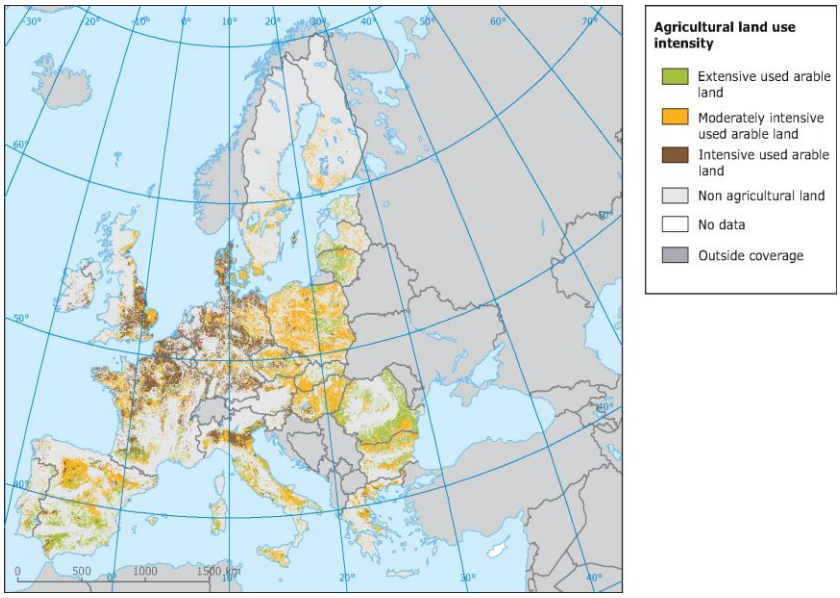
Dr. **Frank Vassen** from the **Nature Conservation Unit of the DG Environment** provided the policy context for the meeting along with the expectations of the European Commission (EC). He underlined the fact that we are in the middle of a biodiversity and climate crisis. The reports on the conservation status of habitats and species, received from the Member States (MS) every six years under the Article 17 of the Habitats Directive (the most recent results to be published soon) still show that the conservation status of a range of habitat and species is still deteriorating. Especially the habitats dependant on recurrent management – such as grasslands – are in decline. The main reasons for this are intensification of agriculture and abandonment of agricultural lands in mountain areas. Often it is not clear what needs to be done and what knowledge is needed. Therefore, he highlighted that this Platform Meeting fits nicely into the bigger picture of land restoration. Sometimes technical elements determine the success or failure of restoration projects. Large scale measures can be very drastic, but perhaps other softer approaches can work. He encouraged the participants to learn from the different approaches and to share both the success stories, as well as the failures from which valuable lessons can be learnt. He concluded by saying that this event is an ideal opportunity to share such knowledge.

For the Strategic Plan for Biodiversity (2021-2030) the MS will need to come up with very concrete commitments for habitats and species on the ground and the targets of the strategy will need to be SMART[6]. He underlined that there is a need for good planning at the network level, which is often missing. MS are now working on their Prioritised Action Frameworks (PAFs) for funding of the Nature Directives. Based on this the EC will know how much is needed from other EU funds (e.g. RDP) to – among others – improve the agriculture-related habitats. He highlighted that LIFE Integrated Projects are a good example of a tool to implement policy on a larger scale. There is no silver bullet, but we have tools that work. Finally, he concluded by saying that there is a momentum with the new EC, with the new EU Green Deal in the making and he invited participants to get on board and make sure that biodiversity gets the priority it deserves accompanied by sufficient funding to take the necessary actions.

Prof. **Rudy van Diggelen** from **Antwerp University** delivered a keynote presentation about the state of the art in restoration techniques for intensified farmland. Open habitats are decreasing very fast in Europe, in particular the low-production open landscapes with high biodiversity value. Biodiversity is declining, indicators for birds and butterflies are declining. UN has proclaimed the period 2020-2030 the UN Decade on Ecosystem Restoration with the target to restore 350 million hectares by 2030, potentially delivering 9 trillion US$ in ecosystem services and sequestrating between 13 and 26 gigatons of greenhouse gasses. In Western Europe demand for restoration is high, but how to increase

[6] SMART stands for: Specific; Measurable; Assignable; Realistic; Time-related.

the biodiversity value? In his presentation Prof. van Diggelen focused on some of the most commonly used restoration techniques: mowing; topsoil removal; and phosphate (P) mining (see box 1)



He reiterated that the knowledge that is available on the different restoration techniques has to be made available for practitioners. Improving the knowledge transfer costs money so adequate funding is needed. For example, there was already an EC contract to collect knowledge about the techniques aimed at improving the conservation status of farmland birds. In the Netherlands several reports (in Dutch) were prepared by the "OBN knowledge network"[7].

Mr. **Anne Boonstra** from **Prolander** and **Anja de Vries** from the **Province of Friesland**, both from the Netherlands, have presented the host project LIFE Going up a level (LIFE13 NAT/NL/000162). The project aims to address the threats Natura 2000 areas Drents-Friese Wold and Leggelderveld are facing, such as desiccation, acidification and eutrophication. The project aim is to raise the ground-water levels, in order to restore the wetland habitat types on the sites. The project is only a part of a larger package of restoration measures to tackle these problems in the broader area. The project is implementing concrete restoration actions in five project locations: Wapserveld, Doldersummerveld, Boschoord, Leggelderveld and Oude Willem. Oude Willem was one of the field sites the participants visited. More information about the concrete restoration actions there and the lessons learned can be found in the dedicated section below (see page 22).

Ms. **Leticia Gheysens** from **Natuurpunt**, Belgium, presented their large-scale restoration of salt meadows as part of their project 'Uitkerkse Polder: a surplus value for nature and people' (LIFE03 NAT/B/000023). The polder is situated on the Belgian coast of the North Sea and has a surface of approximately 1 200 ha. Since about the year 1000 the area was turned into a polder and the salt marshes were used as salt meadows. Between the 13th and early 20th century the land use in the polder remained the same as meadows with micro-topography used for grazing with some small-scale peat extraction. Salt meadows in the area were best developed such habitats (1310 and 1330) along the Belgian coast with the seepage of seawater and historically high concentrations of salt in the peat layer. Next to its importance for habitats, it was also an outstanding area for birds – it was one of the top breeding sites in Belgium important also for migratory and wintering birds. Since 1960 intensification of agriculture has destroyed some 55% of salt meadows through excessive fertilisation and early mowing, drainage, destruction of the characteristic micro-topography and transformation into large arable fields and intensive species-poor grassland.

In 1989 Natuurpunt launched a conservation programme for the Uitkerkse Polder focusing on the protection of the remaining high-quality habitats by purchasing land, restoring it and putting it under more nature-friendly management. The management was done in partnership with the local farmers

[7] https://www.natuurkennis.nl/publicaties/

through mowing and grazing, conversion of arable fields into grasslands with *Lollium multiflorum*, and building fences and other grazing infrastructure. In addition, there was a strong focus on restoring the hydrology and the historical micro- relief through creating a pattern of ditches on the area of some 1 km^2 (recreating some 20 km of ditches); restoration of degraded pools and creation of new pools (some 50% of all pools were destroyed); and restoration or creation of new depressions (like ancient peat-cutting holes) as these seem to be the best places for saline vegetation. The newly created habitat is maintained by mowing on the slopes and by grazing in the lower areas. As a result, 345 ha of the historical relief-rich meadows is restored, with some 180 ha of salt meadows (habitats 1310 and 1330). The challenges for the management of this area in the future include climate change, changes in hydrology, predators for birds, invasive alien species, nitrogen deposition and further changes in the agricultural systems.

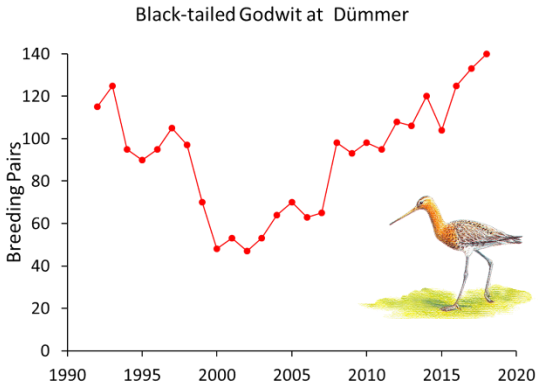
Ms. **Žofia Filagova** from **BROZ**, Slovakia, presented their work on the conservation of birds in the SPA Ostrovné lúky (LIFE 12 NAT/SK/001155), by converting arable land into grassland as a feeding habitat for insects, which are then food for birds. The starting point for the project was that out of some 8 567 ha of the SPA's surface area, less than 0,5% were grasslands, while some 83,5% was arable land. So far, the project has managed to create 65,29 ha of grasslands, out of the 100-ha objective. The key step in the restoration process is either land acquisition or cooperation with local farmers. Once the land is acquired, the actual restoration of the grassland habitat is achieved by sowing with a seed mix from existing grassland elsewhere, or by sowing with commercial seed mixtures. After the grasslands are established the follow-up management is a combination of mowing, grazing and mulching.

In short, the restoration strategy is to promote natural processes of seed dispersal wherever possible and a positive selection of target plant species, which is being achieved by grazing. In addition, there is a need to suppress invasive and ruderal species by mulching of ungrazed patches before flowering and sowing with cover plants. Cover plants (e.g. *Lillium perenne* or *Medicago sativa*) are sown on the areas with low potential for natural regeneration or to supress the invasive alien species. These species outcompete the invasives in an early stage and die out creating the gaps for target species to colonise. On the areas with a higher potential for natural regeneration no sowing is needed. These are areas with a higher soil salinity, or where the plants typical for target habitats are emerging.

When using grazing for follow-up management it is proven to work best if large grazing areas (10-40 or more ha) are used, involving both ploughed areas and areas of source habitat to enable the spreading of seeds. Also, it is important to use different animals for grazing at different times wherever possible (i.e. cows, horses, sheep, goats, water buffaloes, pigs). A longer grazing season (longer than 6 months to a year) will help promote the spreading of seeds of target species that ripe in different periods of the year.

Mr. **Heinrich Belting** from the **Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency**, Germany, presented an example from the Dummer River Valley in Lower Saxony where three consecutive LIFE projects have been implemented since 1998 (Re-wetting of the Ochsenmoor on the Dümmer LIFE98 NAT/D/005085; Re-wetting of the Western Dümmer fen area LIFE02 NAT/D/008456, and Waterlogging and grassland extensification in Lower Saxony to improve habitats of the Corncrake (Crex crex) and the Black-tailed Godwit (Limosa limosa) LIFE10 NAT/DE/000011). He demonstrated that rewetting of the meadows and persistent mowing and grazing, in some areas for more than 30 years, have resulted in a significant increase in the population of meadow birds.

Basically, the meadow birds need late mowing and a low grazing density. A successful restoration requires large open areas with low disturbance. A sufficiently high water table is also important with some temporary flooded areas and the soil trophic level should be low or intermediate. These seem to be the key factors for success. Further, mowing and grazing should be compliant with the nesting distribution. Sufficient farming intensity is needed for optimal vegetation structures and a high heterogeneity on landscape level and parcel level also helps. Finally, he concluded that a well organised guardianship and monitoring should be in place.



After more than 30 years of persistent repeated mowing and removal of biomass (2-3 times per year) and grazing with the appropriate density, it is possible to achieve results and achieve significant habitat improvement and a recovery of the population of meadow birds. The calendar for mowing and the grazing intensity vary and are adjusted every year. Some 140 farmers are taking part in the restoration process by working on the public land.

Mr. **Peer Ravn** from **Amphi Consult**, Denmark, presented the new LIFE Clima Bombina project (LIFE18NAT/DK/000732) that runs from 2019 until 2023. The project aims to create new habitats for the European fire-bellied toad (*Bombina bombina*), other amphibians, as well as birds, and to counteract problems caused by climate change in coastal areas of the Baltic Sea on three project sites (one in Denmark – Eno Penninsula, and two in northern Germany). The presentation was focused mainly on the Danish part of the project. The project hopes to restore the target habitat types and create a save heaven for the target species and will try to mirror the existing habitats on the tip of the peninsula. It will restore these habitats on some 180 ha of former farmland area on the east part of the peninsula situated on higher grounds within this Danish Natura 2000 site. The landowner of the site has been compensated. The site shows good potential for the restoration of natural hydrology. This will require the removal of pumping stations and the drainage system from the area, and the creation of ponds, lagoons and other temporary water bodies. The objective is to hereby create suitable breeding and feeding habitat for waders, sterns and amphibians. The area will be maintained with grazing by Galloway cattle and wild horses year-round without additional feeding. Part of the farmland will be converted into grasslands by sowing the seeds from local origin. Some stones and rocks will be placed in the grasslands to create micro-habitats for ants and other insects. The project was developed in cooperation with the landowners.

Mr. **Jean-Paul Herremans** presented the results of the LIFE+ project Prairies Bocagères (LIFE11NAT/BE/001059) from Wallonia in Belgium**,** on behalf of the Coordinating Beneficiary **Natagora**. The project started by undertaking flora inventories based on the official methodology of the Walloon region, to identify the conservation status of the habitats in the nature reserves managed by Natagora in Fagne-Famenne. The project demonstrated that after 15 years of consecutive late mowing and no fertilisation (also through several previous projects), the conservation status of some parcels improved with one level. However, on other parcels, even after 15 years of extensive management, the conservation status remained unfavourable-bad. In these cases levels of phosphorus were too high and the seedbank was missing. In such cases it is necessary to apply a more frequent mowing and add the seedbank by sowing seeds or distributing grass clippings.

Ms. **Armel Dausse** from the **Forum des Marais Atlantiques (FMA),** France, presented their efforts to restore wetland habitats on former drained and back-filled agricultural land. They created the Network on wetland restoration in Brittany, started in 2013 in Finistère (Western Brittany), and

extended to the whole of Brittany in 2018. The Network is coordinated by the FMA and it is a publicly funded organisation that supports projects related to wetlands and develops tools for wetland monitoring, protection, restoration and management. The Network is researching the potential of ecological restoration of wetlands in order to regain ecosystem services, while focusing on the hydrological, biogeochemical and biological functioning of restored wetlands. An important aspect of the work is getting feedback on the efficiency of different restoration techniques. The Network comprises of scientists, practitioners, conservation NGOs and landowners. There is a need to restore wetlands in Brittany because of high concentrations of nitrate in water bodies; increasing problems of summer droughts; and because of general loss of biodiversity.

One example of restoring an intensive cropland back into wetland habitat is the site of Fontaine Margot near Brest. The aim was to restore a functional wetland at the top of the watershed to protect water quality and to restore a species-rich grassland. The restoration activities included removal of 6800 m^2 of topsoil; filling in of the drainage ditches; creation of a peripheral hedge; and experimenting with sowing of different seed mixtures. After five years of restoration efforts there was a reduction in the level of nitrate in the soil and a decrease in the risk of runoff. Sowing with low-density ray-grass or no sowing at all seemed to be the most efficient approaches for restoring the wetland plant diversity. Further experiments are needed with transfer of hay. Depletion of phosphorus as a result of the topsoil removal, in combination with the drainage of the site caused by a road, are limiting the full restoration of the plant community. Due to its isolation, no amphibians or water voles have returned to the site even after five years of restoration efforts. On the contrary, insects and spider populations are recovering fast. Their research shows that spiders seem to be a good indicator of restored soil humidity.

II.2 Poster session

Participants were invited to display posters of their projects at the event. Six of the exhibiting projects also made a short presentation of plenary session:

LIFE for Insects LIFE16 NAT/CZ/000731, Markéta Curatolo Junova, BROZ, Slovakia.
The project objective is conservation of selected Natura 2000 insect species in a transboundary area (CZ-SK) of the Western Carpathian Mountains. The target/umbrella species for the project activities are several species of butterflies and bugs. Rare and endangered plant species of the area include many members of the orchid family (more than 40 species).
The project is restoring 440 hectares of abandoned land, by clearing overgrown vegetation, grazing and mowing meadows, creation of coppiced forests and re-introduction of traditional grazing of forests (280 ha in Czech Republic, 160 ha in Slovakia). The project uses rotation and mosaic methods for grazing and mowing, alternation of grazing and moving, creation of lines and patches of uncut vegetation and leaving unmanaged parts and fallow land for short periods of time. In time it will decrease the animal numbers to reduce grazing intensity and use mixed animal herds (sheep, goats, cows, horses) to create different grazing patterns. The pastures will be rotated yearly.
Large blocks of monoculture grasslands will be divided into patterns of smaller patches (1-3 hectares) by planting lines of at least 3,000 trees. The trees used are typical regional varieties of fruit trees to preserve the rare genetic diversity of cultural plants in the area.

Population Viability of Threatened Species, Sheila Luijten, Stichting Science4Nature, The Netherlands.
The project is looking into the cross-linkages between the restoration of habitats and related abiotic processes and restoration of species and related population processes and the correlation between these two. Deterioration of habitat quality leads to consequences for species that are not directly visible, such as a decline in genetic diversity that leads to reduced capacity to adapt to changes, inbreeding and inbreeding depression; and a decline in reproductive success. This all results in a low

population viability. The poster presented some techniques used for the restoration of species such as genetic analysis, reproduction and breeding programmes, reinforcement, translocation and reintroductions.

LIFE Olivares Vivos (Olive Alive), LIFE14 NAT/ES/001094, José Maria Sanchez, SEO Birdlife, Spain.
Agroecosystems such as olive groves have a high value for biodiversity. The project developed a strategy to connect the producers and consumers of olive oil with a common objective: to restore biodiversity while making it profitable for the olive farmers. The project developed a certification label that informs the consumers about the added value of the conservation efforts performed by farmers. This 5-year project is implemented with a lot of passion and includes several actions such as Biodiversity monitoring; different restoration actions; applying agriculture management techniques; undertaking market studies; and policy work.

Assessment of grassland restoration potential using vegetation and soil indicators: how to treat outliers?, Grass LIFE, LIFE16NAT/LV/000262, Baiba Strazdina, Latvian Fund for Nature, Latvia.
The GrassLIFE project aims to achieve active protection of five grassland habitats of EU importance on 1320 ha in Latvia. The main methods applied are soil fertility reduction by intensive mowing and grazing, seed addition by green hay, and sowing of *Rhinanthus spp*. The project tried to understand the relationship between plant available P and vegetation composition prior to restoration in GrassLIFE farms, in order to assess if it is possible to rely on vegetation indicators to select a restoration method without measuring plant available P. The results showed that the soil P content did not correlate significantly with the abundance of expansive species or semi-natural grassland indicator species, thus general guidelines for choosing of restoration method in relation to levels of soil P could only partly be used in the study area. Vegetation type seemed to be a better indicator for restoration potential than soil P levels. Still, other soil factors could be important, for instance K and N.

Long-term conservation of Pannonian grasslands and related habitats through the implementation of PAF strategic measures, GRASSLAND-HU, LIFE17 IPE/HU/000018. Matyas Prommer, HOI, Hungary.
The main objectives of this Hungarian Integrated Project are to improve the management of grasslands for nature conservation purposes, to address the fragmentation of grassland habitats, to manage the invasive alien species, to improve the sustainable use of grasslands with the active involvement of farmers and accompanied by an awareness raising campaign. The key actions of the project include: managing of the habitats – by eradication of shrubs and invasive species, building grazing infrastructure, transformation of arable land to grassland, and regulating the water regime. The project aims to develop a Strategic Paper for Hungarian Grasslands identifying more detailed conservation targets for grassland habitats, to shape policies and help to prepare or revise national and international species action plans. In addition, awareness raising is done through training agricultural advisers, outreach to farmers, working with model farms, and organizing conferences for stakeholders, while also communicating to general public. The project has also leveraged 42 additional projects funded from the Operational Programmes almost quadrupling the original budget.

Predator Control for Meadow Bird Conservation at Dümmer. Heinrich Belting**,** Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency, Germany.
This poster focused on large-scale habitat improvements and intensive predator control as best approaches for a successful conservation of meadow birds. More results were presented in the plenary session (page 12).

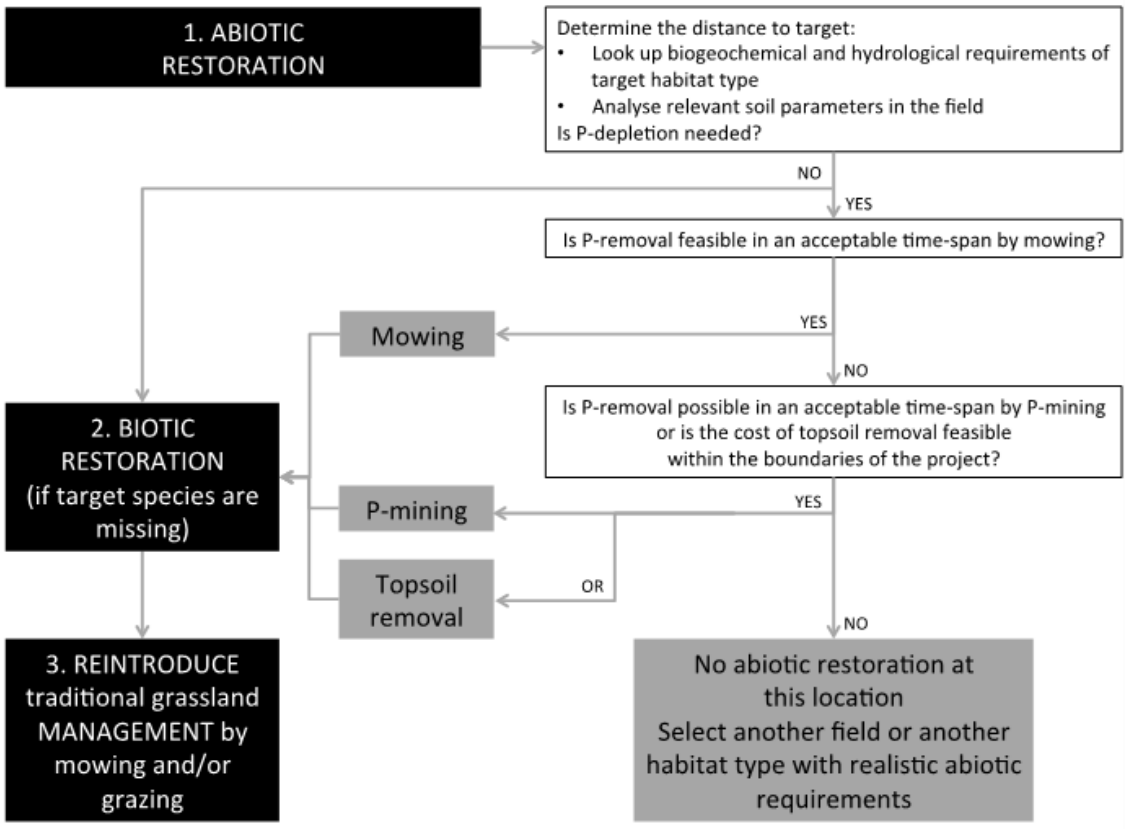
II.3 Thematic Workshops

Following the plenary session an active working session was organised where the participants took part in one of the two working groups running in parallel. The exercise was repeated so all participants were able to contribute their knowledge on both topics.

Working Group 1. Reducing the nutrient level: choosing the right method.
Session Moderator: An Bollen, Rapporteur: Kristijan Civic.

During this session the participants were asked the following questions:
-Based on which parameters do you set your conservation objectives?
-Share advantages and disadvantages of different restoration measures you have experience with.

As an introduction to the session Mr. **Joost Dewyspelaere** from **Natuurpunt** presented the lessons learnt from their project ***LIFE Pays Mosan*** (LIFE13 NAT/BE/001067), implemented in two sites in Flanders: Kanne and Altenbroek. While the areas were once top sites for the habitat types 6210 and 6230, today only remnants are remaining. Years of grassland management did not improve its conservation status until the LIFE Hélianthème project in 2014. A combination of more frequent mowing and topsoil excavation was applied after which the first signs of improvement appeared. However, excavation on a large scale was not possible (too expensive and many complaints by the municipality), therefore it was decided as part of the LIFE Pays mosan project, to implement P-mining on a larger area with targeted small-scale excavations on selected locations. On sites where P-levels were not too high the sod was too closed for the target vegetation to develop. Therefore, a machine was purchased to open up the surface ('chop') and to allow the target vegetation to develop. At this stage it is too early to say if it was a successful approach. Some general conclusions are the following: knowledge on the soil is crucial; excavation is not the best solution especially on a large scale and in hilly areas; P-mining seems to be effective but requires a lot of knowledge and experienced practitioners. In combination with excavations on selected locations and chopping of the sites where necessary seems to be a good way forward. The project has used a decision matrix to select the restoration methods based on the P levels in the soil – developed by Schelfhout et. Al. 2017, published in Restoration Ecology.



The main points discussed during the session after the introductory presentation are listed in the section below.

The feedback gotten on the key questions are described below.

Based on which elements do you decide on your restoration objectives - towards target habitats or rather towards target species?

- Historical land use and historical information about the habitat and species present on the site;
- Historical data on the abiotic conditions on the site, such as nutrient level, hydrology, atmospheric deposition;
- Consider impact of climate change;
- Finding a new interpretation for the old landscape (e.g. restoring grassland habitats on old vineyard terraces);
- Results of the baseline monitoring: what is there and what is still missing: e.g. availability of the seedbank (biotic conditions);
- Socio-economic sustainability – social acceptance and securing the management measures on the long-term (after LIFE) by
    - Reconciling the vision of nature between citizens and nature organisations
    - Negotiating and compromising with landowners/farmers to avoid conflicts
- Feasibility of the objectives and the level of ambition depending on the available financial and other resources;
- EU policy (CAP, RDP) as it is differently implemented in different MS;
- Consider national responsibilities for certain species – to be sure to cover the core areas and focus funding efficiently;
- Consider cross-border aspects in setting objectives (i.e. is the feature threatened everywhere or only in one country);
- Look at the habitats that are threatened/underrepresented at the national level (i.e. following the Art. 17 reporting results) to prioritise setting your objectives;
- Trade-off between the biodiversity and different ecosystem services: climate (e.g. storing carbon), recreation etc.
- Rewilding on a larger scale – let nature have its way;
- Prioritise restoration to increase site areas rather than having small patches;

Lessons learnt from different restoration approaches (what works and what does not):

Mowing

- A good 'soft' measure before starting to apply other techniques.
- Mowing and the removal of mowed biomass can be combined with the production of biogas, paper, isolation materials, fertiliser etc.
- Timing of mowing is a very sensitive issue – often delayed for certain species, while for the biodiversity of the grasslands earlier might be better in some cases.
- Moss in the grassland is a problem.
- Mowing is used for the reduction of nutrients; preventing of shrub encroachment and improvement of the vegetation structure (e.g. for meadow birds), and to reduce the coverage of certain species.
- In general, it is used for restoration of the following habitats: 6510, 6520, 6210, 5130.

Grazing

- A good technique for spreading the seeds of various species. However, it does not reduce the nutrient level of the grassland.
- Too much moss in the grassland is a problem for grazing.

- Grazing is often used to restore or maintain habitats for some animal species: ground squirrel (European souslik), water vole, great bustard and other meadow birds.
- It is also used for preventing overgrowth and for combating some of the invasive species.
- Improving the structure and maintenance of habitats: 2130, 6210, 6230, 5130.

Topsoil removal

- Gives quick results locally.
- It should be done spread in time and on a limited surface. Otherwise it can be a problem of where to deposit the removed soil and where to get the seedbank for target species from.
- If you coordinate the nature development with the agriculture you can exchange the soil material.
- Sprouting of species can be a problem but can be combated with grazing.
- It should be combined with the restoration of biotic conditions.
- It is regularly used for the restoration of nutrient poor heathlands (4030) and grasslands (6230).

Phosphate (P)-mining

- It should include a partnership with farmers. In this case it might require temporary conversion of a nature area to arable land to be able to produce cattle feed (grass clover mix). It delivers good initial success.
- It can take a long time. After a while efficiency drops so it is a challenge to keep the farmers motivated to cooperate.
- Hydrology should be considered. Water can be a source of P cancelling the P-mining effect.
- It can deliver conflicting messages to farmers - fertilising to reduce the nutrient levels – so needs to be well explained.
- There should be a flexibility in thresholds when deciding on the management techniques: when the Olson P <20 or 25 switching to moving/grazing should be considered.
- It is used for restoring extensive grasslands with lower nutrients' level.

General remarks about the restoration measures

- Farmers' buy-in is very important regardless of the measures applied. Rural Development schemes can help to get them on board.
- Pro's and con's of a certain measure will depend on what the restoration and conservation objective is.
- There is a lack of standards for measuring the levels of P in the soil. Standards for measuring should be recommended (e.g. P Olson is a good and cheap method).
- Distance to the source of seeds is as important as the levels of P in the soil.
- Prescribed burning is a good measure for restoring heathland, but it is controversial in terms of climate change and social acceptance. It can work well on large sites.
- Try-outs of different techniques on test plots and monitoring effects is a good way of testing what works (trial and error) – investing in measuring and monitoring is important.
- How to tackle the removal of moss from grasslands is a problem.
- It is important to determine the hydrology of the site before deciding the objectives and the restoration measures to apply.
- Lack of funds in the preparation phase may lead to wrong assumptions in the projects – soil measurements are necessary.
- There are guidelines for P levels, but guidelines for the N levels are missing (if P is not a limiting factor).
- River floods can deliver deposits and reverse the results of the restoration efforts.

Working Group 2. The importance of small scale, extensive farmland and how to engage farmers in more nature-friendly practices

Session Moderator: Kinnie De Beule, Rapporteur: Maud Latruberce

The support of and the cooperation with the farmers is crucial in securing the success of the restoration measures on intensified farmland. The discussion in this session focused mainly on the question: **How to engage farmers in nature restoration practices?** Two main approaches are common when working with farmers:

- purchasing farmland, to restore it and then have it managed by farmers: much favoured approach in Belgium, Northern Germany and the Netherlands;
- working on farmland still belonging to farmers or other landowners: approach in most other EU Member States.

There is a significant difference when working on one's own land compared to on farmers' land. On own land, nature conservation managers can implement larger-scale and more ambitious restoration measures. It can also be used as a demonstration site. During the workshop the possibility for a nature conservation organisation to get CAP subsidies when managing their own farmland was discussed. While this is a controversial matter for some nature organisations, it does happen in e.g. Denmark and participants agreed that it would be a good thing to grant nature conservation organisations access to CAP subsidies. Even if there are differences in approaching farmers, when working on their own land or land belonging to nature conservation organisations, common elements of success have been identified. In both cases, it is essential to establish a dialogue and a relationship of trust with farmers. This topic was nicely introduced by Mr. **John Strand**, project coordinator of ***LIFE Goodstream*** (LIFE14 ENV/SE/000047) in Sweden. Mr. Strand summarized common mistakes and elements of success identified through his experience as a nature conservation project manager in a rural development organisation in the following "take-home message":

- Have no plans upfront;
- Always show interest in farmers' problems;
- Allow time and do not rush;
- Listen to farmer's problems and offer help;
- Use ambassadors;
- Focus on families with children;
- Use charismatic species to relate to;
- Respond quickly when an opportunity arises.

Another key for success is to create win-win situations, that benefit both farmers and nature conservation organisations, usually linked to the ecosystem services provided by restoration and conservation actions. One of the most common examples seems to be the management of grasslands through grazing or haymaking. In addition to feed supply, the farmers can also benefit from infrastructures useful for pastoralism such as fences or water points that are installed by the LIFE projects or nature conservation managers. If the land belongs to nature conservation organisations, it can often be leased at a low cost to the farmers that want to use it.

Other examples of win-win situation as raised by the participants include:

- Restoring/planting traditional orchards, which is free for the farmers and they get the harvest - within a LIFE project in Luxembourg;
- Development of a certification scheme of high-nature value olive groves within the LIFE project Olivares vivos;
- Meadow-bird-friendly milk (in the Netherlands, outside LIFE);
- Allowing farmers to graze for free or with payments for the maintenance of the habitat (common);
- Land swapping to increase the size of both farmland and nature areas;
- Creating grasslands in water protection zones – flood areas, that can be used for hey-making or grazing when there is no flood;

- Tree planting on eroded lands (common objectives);
- Allowing children access on restored land for educational and awareness raising purposes – to show respect to farmers' land and to recognise the importance of farmers in the process.

To create such win-win situations, it is useful to have multidisciplinary teams, including socio-economists.

II.4 Final session

After returning from the field visits a final facilitated discussion session was held to discuss **how to improve the decision-making in restoration planning and how to better disseminate the lessons learnt**. The discussion was structured in the form of a World café with two main questions. Participants were split in four groups with two of the groups answering the same question. After one rotation all participants were able to contribute to both questions. The summaries of the main answers to the two questions is presented in the section below.

Question 1. What kind of tool or resource would help you make better informed decision about your restoration planning?

- Nature conservation managers working on intensified farmland restoration (also referred to as "practitioners") need knowledge and experience-sharing related to the specific site(s) they are working on, coming from different sources (other practitioners, researchers, but also local non-experts such as farmers, volunteers, birdwatchers, neighbours, etc.). These stakeholders may have a long-term knowledge/experience on what the site looked like, what it was used for, etc. This local input is not to be neglected when restoring farmlands and requires long-term investment, field visits and meeting people to share views and collect their knowledge/experience, which will also help increase local ownership of the project. → This needs to be planned ahead of every restoration action/project/programme. For LIFE projects, this means that sufficient time and budget) needs to be foreseen in the Preparatory actions. Ideally this work should take place before the conception of the project, but funding is difficult to get at this stage (as no tangible results can be shown).
- It is really helpful to include a research programme in nature area management plans to better integrate research outputs in restoration actions, as confirmed by the experience of Mr. **Hans Dekker** from the **Province of Drenthe**, the Netherlands. They included a long-term research programme in the management plan of their site(s) to get answers to their specific questions for the site management, and have now funding for that for the next 18 years. This was made possible by a good communication to policymakers/funding partners, pointing out to them how important knowledge acquisition was in the long term, and that it requires funding.
- The approach to work together with a university or research partner within a LIFE project is considered very valuable as it ensures access to scientific expertise and relevant guidance along the process.
- Nature conservation managers could benefit from increased communication within the LIFE programme on the successes and failures of farmland restoration projects. This could be done through experience-sharing meetings such as this platform meeting, or through a specific publication including feedback from farmland restoration projects ("tips and tricks").
- Projects need time, to collect ad-hoc knowledge and experience and also to monitor the results of their restoration work, derive some lessons to be learnt/key success factors and disseminate them.
- Participants said that it might be too early for a decision matrix or an actual manual on restoration measures for intensive farmland, as several approaches are still in an experimental phase and require long term follow up.

- However, participants agreed there is a lot of relevant knowledge already out there, but the problem is more about making it available in accessible/understandable way to managers and practitioners. Example. OBN manual (in Dutch)[8].
- Within the LIFE project database, it would be helpful to be able to extract projects per themes (e.g. P-mining), so to develop a more advanced search mechanisms, to make it easier for LIFE projects focusing on similar issues to exchange and share knowledge.
- Develop a guideline to assist practitioners with the decision-making process prior to starting a project to take stock of the starting situation, evaluate relevant parameters based on which to make decisions (as in a step-by-step process by highlighting key questions that need to be considered).
- More thematic meetings or platforms are necessary that bring together scientists, practitioners (NGOs or government departments) together to exchange on restoration of intensive farmland. These dynamics exist at local or national level, and even transboundary level (Netherlands-Flanders), but it should be done at wider level, and expand to more EU Member States.
- Another suggestion was to have a coordinator or contact person per habitat for each member state so that there is a structure in place that allows to bring all the information together.
- Look into the dynamics of the Society of Ecological Restoration (SER- https://www.ser.org/) that is focusing on restoration practices at international level and is also keen to develop tools and manuals.

Question 2. What could you/your project do better to disseminate the lessons learned from your actions (best practice and failure)?

For the ***LIFE projects***:

- Project final conferences should be internationally oriented as sharing of good practice and failures is important at EU level.
- When organising stakeholder meetings of the project, invite speakers with international examples.
- Participate in international expert platforms (possibly at a biogeographical level) to work on the development and implementation of concrete roadmaps (e.g. via Natura 2000 Biogeographical Process) and foresee budget for this in the LIFE proposal.
- Prepare more guidelines as outputs to influence the decision makers at the national level.
- Explore synergies with other countries and where possible to cover the knowledge gaps already in the planning phase.
- Relevant technical publications should be made available in English.
- More dissemination actions aimed directly at farmers such as
    - In cooperation with the Agriculture Advisory Services to deliver advice on nature restoration and conservation matters;
    - Provide training to farmers (e.g. like in some countries this is obligatory if they want to lease the land dedicated to nature conservation).
- Use new media for awareness raising and communication (e.g. videos instead of presentations).
- Dissemination is too often focussed on groups that are directly involved in the project (neighbours, local organisations, potential "troublemakers") and other practitioners/peers are often forgotten, mostly due to time constraints.

[8] https://www.natuurkennis.nl/publicaties/

For the ***LIFE Programme***:

- LIFE newsletter announces events too late (same month), it would be better to announce events 6 months in advance.
- Pre-digested info from LIFE project results per topic could be shared via the LIFE Newsletter on a regular basis (i.e. the newsletter should shift from a promotional tool to a technical dissemination tool).
- The online database could be updated during the project. Currently it only provides the info from the proposal. The update should contain useful technical information.
- Keywords in the online database regularly don't match (e.g. different output with scientific name/English name/German name for *Otis tarda*).
- It is difficult to find LIFE-related information in google and on the new EC website.
- Interesting cases should be highlighted and pro-actively shared, the NEEMO technical monitors could have a more active role in this.
- Better dissemination of the summaries of project results into a good library would be useful. Several platforms already exist but are underused and do not offer enough functionality (i.e. for searching): e.g. LIFE Database and the Natura 2000 Communication Platform.

Other

- Scientific publications take too long and in many cases some field tests or trials of methods could be very interesting for practitioners but do not (yet) qualify as a basis for scientific research.
- Scientific input would most likely be more relevant to combine various experiments/ experiences (e.g. review paper). This is not possible with LIFE funding and funding is a weak point for this.

Part III – Annexes

Annex 1 – Agenda of the meeting

DAY 1 – 17 September 2019		
Poster set up on 16 September between 16:00 and 17:30. REGISTRATION will be open from 08:00 on 17 September.		
Morning plenary 09:00 – 13:00		
09:00 – 09:05	Jean-Paul Herremans (NEEMO team)	Welcome and introduction to the event
09:05 – 09:15	Mayor Jager (Municipality of Westerveld)	Official opening by the host
09:15 – 09:30	Mr Frank Vassen (Nature Policy Unit, DG Environment)	The focus of the platform – what do we want to achieve
09:30 – 09:50	Prof Rudy van Diggelen, Antwerp University	Keynote presentation: Restoration of intensified agricultural land – state of the art
09:50 – 10:05	Host Project presentation LIFE Going up a level: Anne Boonstra (Prolander) & Anja de Vries (province Friesland)	How to translate the nature conservation objectives into restoration measures: example of Oude Willem at NP Drents-Friese Wold
10:05 – 10:20	Ms Leticia Gheysens (Natuurpunt, BE)	15 years of restoring polder grassland: from maize fields to inland saline habitat and breeding and wintering sites for geese and waders
10:20 – 10:40	Q and A session	
10:40 – 11:10	Coffee Break and Networking	
11:10 – 11:25	Mrs Zofia Filagova (BROZ, SK)	Conservation of birds in the SPA Ostrovne luky: converting arable land and grassland for bird protection (*Falco vespertinus*, *Anthus campestris, Lanius minor*)
11:25 – 11:40	Heinrich Belting (Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency, DE)	30 years of reducing the nutrient level of intensified farmland to transfer it back into species rich wet grassland for meadow birds on 2,500 ha at Dümmer/Germany
11:40 – 11:55	Mr Peer Ravn (Amphi Consult, DK)	Large-scale farmland restoration in Denmark: objectives and techniques used
11:55 – 12:10	Jean-Paul Herremans (on behalf of Natagora, BE)	Restoration, of species rich grasslands, by simple cheap mowing is achievable if soil P content is relatively low: evidence by monitoring in LIFE Bocage
12:10 - 12:25	Mrs Armel Dausse (Forum des Marais Atlantiques, FR)	Wetland restoration network in Brittany – Brief presentation and Focus on the effect of a restoration from cropland to wetland on vegetation and arthropods.
12:25 – 12:35	Q and A session	
12:35 – 12:55	Presentation of the Poster sessions – speed present your poster	

12:55 – 13:00	Introduction to the working groups in the afternoon.
13:00 – 14:00	Lunch and poster session
14:00 – 17:30	Breakout into two working groups – two rotations of 90 minutes each with 30 minutes for coffee break and networking in between

BREAKOUT INTO WORKING GROUPS start 14:00 – two rotations The goal is to harness the expertise of the LIFE project practitioners to help inform the LIFE Unit and nature practitioners in general, on how to choose the most practical and cost- effective ways of restoring the intensified agricultural land into more biodiverse habitats.		
Rotation one	WORKING GROUP 1 Reducing the nutrient level: choosing the right method Session Moderator: An Bollen Rapporteur: Kristijan Civic	WORKING GROUP 2 The importance of small scale, extensive farmland and how to engage farmers in more nature-friendly practices Session Moderator: Kinnie Debeule Rapporteur: Maud Latruberce
14:00 – 14:15	Intro presentation: LIFE Pays Mosan (NL-BE) Ms Stephanie Schelfhout (University of Ghent, BE) and Mr Joost Dewyspelaere (Natuurpunt): the importance of soil analyses for choosing the most effective restoration measures	Intro presentation: LIFE Good stream (SE) Mr John Strand: how to engage landowners and farmers in large-scale landscape restoration measures: methods and participatory approaches, stimulating voluntariness
14:15 – 15:30	Moderated Discussion - Rotation 1	
15:30 – 16:00	Coffee Break and Networking	
Rotation two	WORKING GROUP 1	WORKING GROUP 2
16:00 – 16:15	Intro presentation	Intro presentation
16:15 – 17:30	Moderated Discussion - Rotation 2	
17:30 – 18:00	Feedback from the Rapporteurs (10 minutes per working Group) and final remarks	
18:00 – 18:15	Closing of the day and introduction to the fieldtrips tomorrow, Hans Dekker, Province of Drenthe	
19:00 – 20:00	Joint dinner – hosted by Willem Urlings, Chairman LIFE Oude Willem Steering Committee	

DAY 2 – 18 September 2019 – FIELD VISITS 09:00 – 13:00		
Departure from the hotel at 08:30		
	FIELD VISIT 1	FIELD VISIT 2
Leader	Henk Warners and Hans Beens, Staatsbosbeheer	Hans Dekker & Rudy van Diggelen
Sites to visit	Oostervoortse diep	Natura 2000-site Dwingelderveld: restoration Noordenveld (LIFE08 NAT/NL/000192)
Link to the topic	This is a long-term restoration project of a lowland brook landscape where nature restoration and agriculture interests meet. P-mining has been implemented for 8 years in collaboration with local farmers and hydrology measures both favour habitat development and local farming sector. Presentation fundamentals of P-mining by Ms Debby van Rotterdam (senior project manager Institute of Nutriënt Management NMI-Agro)	This agricultural enclave (>150 ha) located in the middle of a heathland landscape was restored by excavation (10-50 cm) and mowing and exporting. After the excavation, an experiment was set up to stimulate heathland development by adding heath clippings or sods. Now, 6 years later, several threatened species have returned.
Transportation to NP Drents-Friese Wold: restoration Oude Willem (LIFE13 NAT/NL/000162)		
A large-scale restoration of a former agricultural enclave of 325 ha through P-mining using a participatory approach with local farmers: the objective, selection of the method, monitoring and first results will be showcased. Second presentation of P-mining techniques and conditions for implementation, Ms Stephanie Schelfhout, University of Genth Belgium and Mr Joost Dewyspelaere, LIFE Pays-Mosan, Natuurpunt & Natagora.		
lunch in the field		
14:00 – 15:00	Facilitated session about the Decision-making Matrix format, Kristijan Civic, NEEMO	
15:00 – 15:20	Conclusions Drawing together the lessons learnt from the working groups and the field visits. Outlining next steps.	
15:20 -15:30	Closing remarks, Sylvia Barova, EC's Executive Agency for Small and Medium-sized Enterprises (EASME)	

Annex 2 – Field visits

The field visits were organised in three different locations allowing the participants to choose between visiting a long-term restoration project at **Oostervoortse diep** where P-mining has been implemented for eight years in combination with hydrological restoration to restore a lowland brook landscape; or to visit the restoration project at **Noordenveld in Dwingelderveld** (LIFE08 NAT/NL/000192) where topsoil removal and mowing were used to restore heathland habitats. Afterwards, both groups met together in the **Oude Willem**, situated in the National Park Drents-Friese Wold, to see the large-scale restoration of a former agricultural enclave of 325 ha through P-mining using a participatory approach with local farmers (LIFE13 NAT/NL/000162).

Oostervoortse diep

Next to the ongoing P-mining in close cooperation with the farmers, a significant hydrological restoration was implemented on this site. The water level on the site was kept artificially low for agricultural purpose resulting in a slow desiccation of the area. The creek was causing flooding in the rainy periods while in dry periods it would dry out almost completely. Therefore, a more natural creek valley was created with a meandering water course more resilient to changes in the water level. On some places the embankments of the creek were removed and the topsoil layer was removed creating a more natural landscape and better conditions for the development of wetland habitats. Next to the increase in natural values, the area can now also serve as a Natural Climate Buffer for temporary storage of excess water.

Noordenveld, Dwingelderveld

The former agricultural enclave 'Noordenveld' (about 220 hectares) located in the heart of the Natura 2000 area Dwingelderveld was a serious threat to the existence of habitat types *H7110, H7150, H4010, H3160 and H7120. The Noordenveld had a draining effect on the Natura 2000 Area Dwingelderveld and caused dehydration, eutrophication and acidification of the heath system. Finally, after 40 years Natuurmonumenten (Dutch Society for the Preservation of Nature) and Staatsbosbeheer (Dutch Forestry Service) succeeded in procuring the last agricultural plots in the Noordenveld. The core of the LIFE project was the restoration of the natural water balance of Dwingelderveld and the transformation of the Noordenveld into dry heath (H4030), moist heath (H4010) and depression vegetation (H7150). This transformation was essential for the existence of the wet heath system and active raised bogs (*H7110) in the Dwingelderveld. Implemented measures helped create a robust, sustainable and continuous water system that has a positive influence on the quality and quantity of the acid fens, moist heaths and raised bogs over an area of more than 1100 hectares. In addition, around 360 hectares of new moist heath (H4010), acid fens (H3160), dry heath (H4030), depression vegetation (H7150) and species-rich grasslands (*H6230) were developed. Next to its important habitat types, the area is also very important for birds and other species. More than 90 species of nesting birds can be found in Dwingelderveld, both in fens and marshes and in open and semi-open heathland. The area is designated for bird species such as Woodlark, Bewick's swan and Black woodpecker, Little grebe, Black necked grebe, Whinchat, Common stonechat, Shoveler, Wheatear and Teal. The area has also been designated for the rare Northern-crested newt.

The groundwater levels at the Noordenveld were kept artificially low for the benefit of agriculture by a system of drainage channels and ditches. This has resulted in dehydration and acidification of the heathland in the area. Based on the soil analysis to determine the phosphate levels it was decided how much of the topsoil had to be removed in order to create the right conditions for the development of dry and moist heathland on the Noordenveld. Along with the removal of the topsoil, the original depression structure of the area had to be restored. Ditches, gullies and channels had to be filled. This has allowed for the old depression landscape to appear again, creating the right conditions for habitat types H4010, H4030, H3160, *H6230 and H7150 to develop.

The topsoil removed from the area was used to build an acoustic fencing along the A28 highway. This measure alone resulted in a substantial increase in suitable nesting and resting biotope of about 135 hectares for several nesting bird species in the area.

Oude Willem, National Park Drents-Friese Wold

The Drents-Friese Wold National Park, situated on the border of the Dutch provinces of Friesland and Drenthe, covers approx. 6,100 hectares of varied landscape, including shifting sands, heathlands, nutrient-poor grasslands and forests with dozens of fens. The area is part of the European Natura 2000 network. Located in the centre of the area is the former agricultural enclave of Oude Willem – almost 450 hectares - which is being transformed into nature. The drainage systems for cultivation and tillage cause unfavourable hydrological effects for the wet habitats in the Drents-Friese Wold. Excessive fertilization in the past is also an issue. This is reflected in the high concentrations of mobile phosphate in the topsoil at Oude Willem. Removing the topsoil was a possible solution to lower the phosphorus (P) levels in the soil, but this would cause more drought in the neighbouring nature areas on higher grounds. The high costs for these measures were also an issue. Thus, it was decided to choose for the measure of phosphorus-mining (phytoextraction of phosphorus-enriched grassland soils by targeted fertilization of K and/or N)) as the best option over an area of approximately 300 hectares.

Aim of the project was, on the one hand, to develop a method for the removal of phosphate on a practical level, with the involvement of farmers, and on the other hand to increase knowledge about P-mining and share this with nature management organizations, farmers and other stakeholders. Field study in the area revealed that Oude Willem is lower than the surrounding landscape and there are clear height variations - between 8.5 and 11 meters above NAP (Amsterdam's Sea Level Measurement). The most common soil types are mainly sandy soil, usually loamy and sometimes peaty. The annual groundwater level varies from shallower than 50 cm in wet parts to deeper than 140 cm in drier sections. These levels will provide more water for wet habitat types.

Additional analysis in 2015 showed a great differentiation in phosphate availability in the topsoil of the 70 land parcels in the area. On several fields that had not been cultivated for a while the P levels are lower than the target value of 10 for flowery meadowland (P-AL<10 mg P2O5/100 g). Furthermore, there are some fields that have a high P status, even from an agricultural perspective (P-AL>40 mg P2O5/100 g).

For the purpose of P-mining on a practical level three types of grassland were distinguished, namely natural grassland (uncultivated for several years), former arable land (sown with a grass-clover mixture) and grasslands in use. In the period 2016 – 2019 most of this area was leased to a group of about 10 (farm) tenants. Some of these tenants wanted to participate in this experiment because they were interested in P-mining and more natural farm management. Most participated because the removed biomass could be used as roughage for cattle. The leased fields were mainly grass-clover (these were the most popular, particularly with organic farmers) and grasslands for production. Agreements were made with the farm tenants regarding the way in which P-mining should be carried out. Based on the results of soil analyses, a guiding advice was given per field in terms of the required fertilization with nitrogen (N) and potassium (K).

Moreover, the crop had to be mowed and removed at least three times a year. The farmers had to keep a logbook registering the fertilizers used and yield from the leased fields. By combining with the analysis of the crop composition, the P- removal could be calculated. P-mining was evaluated with the farmers annually. As a result, the lease prices and the advised fertilization were adapted in 2016 and from 2017 there was an allowance of 50% towards the costs of potassium. The yield and quality of the hay was an important factor when finding and keeping tenant farmers. In most cases the cut grass was used as rough feed for calves, non-lactating cows and horses. Some farmers used the crop for their own animals, others traded it. Some others also used it as stable litter. Natural grassland sometimes

contained a lot of rush and these fields were not popular amongst tenants. Fertilizers were not used, and the grass was only mowed and then removed. The same applies for fields where there was an increase of ragwort (*Senecio jacobaea*) over time. The mowed grass is no longer suitable for use as course fodder.

For the purpose of monitoring, ten representative test plots were selected. The plots differed in terms of soil, groundwater levels, the phosphate conditions and the type of grassland. This also resulted in a great variation in the combinations of vegetation, the production of biomass and the extraction of phosphate through the crop. Measurements taken in the spring of 2016 and autumn of 2018, at three depths (0-10, 10-30 and 30-50cm), showed that the P-levels fluctuated from low to very high. At locations where the P-conditions were high the P-levels were 30-50 cm deep. As a result of P-mining between 2016 – 2018, the P-availability was lowered in the 0-10 cm layer. In places where the P-conditions need to be lowered to 30 – 50 cm, more time is needed. The necessary time required to lower the phosphate levels to the aspired values of flowery grassland varies greatly between fields in the area. For locations with the highest P-conditions at the initial phase it is estimated to take 18 – 22 years, while other locations with a lower P-rating only need one or two years.

At some spots within and outside the pilot area, an interesting development of vegetation has been noted, while the phosphate levels in the soil are (still) relatively high. It must be said that the nitrogen and potassium levels are mostly low. Apparently low phosphate values are not always a requisite for the development of sparse, nutrient-poor vegetation. This can also be a result of low potassium and/or nitrogen levels.

Main conclusions

- Involving farmers in the removal of phosphate from former agricultural areas makes sense and offers opportunities if there are good possibilities for selling the crop (course fodder, stable litter, etc.). In some cases, farmers are keen to participate simply out of interest.
- Individual agreements between landlord and farm tenant are necessary, for example with organic farmers who are limited in their choice of fertilizers.
- The effectiveness of P-mining can vary strongly, depending on the conditions (soil composition, moisture levels, vegetation). P-mining does reduce the phosphate levels in the soil and is also a good way to speed up the improvement of ground quality when making it suitable for the development of a nature area. The process is not as effective on natural grassland where the vegetation and ground quality are often already in the desired condition. These are also usually the higher, dryer grounds (poor and less cultivated) or the lower laying wet grounds (less suitable for farming, harder to till and graze). Fertilization and active mowing have a more negative effect on ecological values. The natural grasslands are less popular with farmers because both the yield and quality of the produce is less. P-mining is also less effective on fields that have been farmed intensively for years; it takes decades to reach the desired phosphate situation.
- The necessary removal period to ultimately achieve the phosphate levels of flowery grassland varied within the area from 0 – 44 years.

Recommendations

- When taking measures to support the development of nature on former agricultural land, it is very important to have a good picture of the initial situation, by doing soil analysis. In this way the information regarding the phosphate conditions at various depths in the soil provide insights into the achievability of nature goals and the measures required (e.g. P-mining, excavation) to lower the phosphate status to the desired level. Soil analysis is also necessary in order to set up a suitable advice for fertilization in combination with P-mining.

- Fields have also been sown with clover, as an alternative for fertilizing with nitrogen. This would have worked even better (more clover) if the soil composition had been optimized (e.g. if the correct pH value had been set).
- There are more parts of Oude Willem which would profit from continuing phosphate removal, with the cooperation of the farmers, and thereby monitoring the phosphate status in the soil. This applies particularly to those fields where the added value for tenant farmers (good off-take possibilities for mowed crop) look promising for the long term and where lowering phosphate content in the topsoil is expected to show good results at the short term.
- Attention should be paid to the composition of vegetation during P-mining (e.g. maintaining the amount of clover content and handling plants that could influence the process, like common ragwort).
- Other secondary conditions are also needed for the development of nutrient-poor vegetation (e.g. low nitrogen and potassium levels), even if the phosphate content in the soil is high. In areas transitioning from agricultural production to nature development it is therefore important to investigate alternatives for the realization of a nutrient-poor vegetation with a rich diversity.








Annex 3 – Participating projects' overview

LIFE Going up a level	LIFE13 NAT/NL/000162	**Contact:** Anne Boonstra a.boonstra@prolander.nl
Project: More water for wet habitat types in Drents-Friese Wold & Leggelderveld		
About: The aim of the project was to raise groundwater levels, in order to restore wetland habitats in the targeted Natura 2000 site (National Park Drents-Friese Wold & Leggelderveld). More specific objectives included (i) purchasing agricultural fields, (ii) developing former agricultural land into two nature reserves, and (iii) improving water management to enable habitat types to better resist the effects of atmospheric deposition. The project is part of a total package of restoration measures aimed at combating desiccation, acidification and eutrophication over the entire site.		
Website: https://www.nationaalpark-drents-friese-wold.nl/life-n2000/		

LIFE-IP GRASSLAND-HU	LIFE17 IPE/HU/000018	**Contact:** Matyas Prommer prommer.matyas@hoi.hu
Project: Long term conservation of Pannonian grasslands and related habitats through the implementation of PAF strategic measures		
About: The long-term aim of LIFE-IP GRASSLAND-HU is the implementation of the Hungarian Prioritised Action Framework for Natura 2000 (PAF). The project targets 10 habitat types protected under the Habitats Directive, with the main focus on semi-natural grassland habitats of significant conservation value that require active habitat management to achieve favourable conservation status. Specific objectives include for instance land purchase, the management of grasslands for nature conservation, the conversion of arable land into grasslands, raising farmers' awareness to support nature conservation, addressing issues relating to water levels, etc.		
Website: http://lifepalyazatok.eu/life-integralt-projektek-2018.html		

LAND for LIFE	LIFE14 NAT/BG/001119	**Contact:** Svetoslav Spasov svetoslav.spasov@bspb.org
Project: Restoration and sustainable management of Imperial Eagles foraging habitats in key Natura 2000 sites in Bulgaria		
About: The project targets all SPAs that are crucial for the imperial eagle in Bulgaria where 19 out of the 26 known breeding pairs are located. Amongst other objectives, it aims to (i) develop and test models for restoration and sustainable management of open-grassland habitats involving key stakeholders and fostering ownership on project results, (ii) strengthen the national legal framework to secure the species long-term protection and (iii) weigh on the strategic planning framework of the national and EU agri-environmental policy to minimise the detrimental effect of land-use changes in the project area.		
Website: http://www.landforlife.org/		

LIFE IP NATUREMAN	LIFE16 IPE/DK/000006	**Contact:** Bendt Egede Andersen bea@nst.dk
Project: The Farmer as a Manager of Nature: aiming at a favourable conservation status for Natura 2000 sites by making nature management a sound branch of farming		
About: The overall objective of LIFE IP NATUREMAN is to create and test incentives for nature management to become a branch of farming. The aim is to make it financially attractive for farmers to include natural areas with grazing or harvesting of biomass in their farming activities, through the		

development of high-value specialty products. The project focuses on 11 Natura 2000 network sites in Denmark and targets the following habitat types of the Habitats Directive: petrifying springs (7220*), alkaline fens (7230) and grasslands (6120*, 6210 and 6230). The project aims at a better integration of initiatives under the Habitats Directive and the Water Framework Directive, while contributing to a more holistic approach to nature and water management.
Website: https://life-natureman.dk/

LIFE ORCHIS	**LIFE13 NAT/LU/000782**	**Contact:** Georges Moes g.moes@naturemwelt.lu
Project: Restoration of calcareous grassland in eastern Luxembourg		
About: The project's main objective focuses on securing and restoring all calcareous grasslands that have been known to exist in the southeast of Luxembourg. This will be achieved by (i) improving the conservation status of grassland habitats through removal of moss and dead biomass; (ii) expanding the surface area of target habitats by clearing of scrubs and removing non-native forestation, (iii) cross-linking habitat patches through the extensification of adjacent farmland; and (iv) providing long-term protection through land purchase and appropriate management.		
Website: http://www.life-orchis.eu/		

LIFE Ostrovné lúky	**LIFE12 NAT/SK/001155**	**Contact:** Pavol Surovec surovec@broz.sk
Project: Conservation of birds in the SPA Ostrovné lúky		
About: The project aims to contribute to habitat restoration for three Annex I species of the Birds Directive – the lesser grey shrike, the tawny pipit and the red-footed falcon – in 'Ostrovné lúky' by establishing a suitable management model for agricultural land and restoring feeding and nesting habitats. Specific objectives of the project include for instance (i) the reintroduction of traditional land management, such as grazing or haymaking, (ii) the restoration of wetlands, pollard willows stands, herbaceous and flower fallows with high diversity of insects and (iii) land lease or land purchase to create land use patterns of feeding and nesting habitats and introduce appropriate management for the target species.		
Website: https://broz.sk/projekty/ochrana-vtakov-v-chvu-ostrovne-luky-life12-natsk001155/?lang=en		

LIFE for insects	**LIFE16 NAT/CZ/000731**	**Contact:** Markéta Curatolo Jůnová marketa.junova@nature.cz
Project: Conservation of selected Natura 2000 insect species in transboundary area (CZ-SK) of Western Carpathian Mts.		
About: The project overall objectives are to conserve selected target insect species and enhance their populations through the restoration of wet grasslands, pastures, coppiced and open-canopy forest habitats in the transboundary area of the Western Carpathians; and to interconnect the species' metapopulations in this area, thus contributing to the requirements of EU nature directives and Biodiversity Strategy to 2020. More specific objectives include for instance the development of of small-scale, extensive farming practices instead of intensive farming.		
Website: http://www.ochranaprirody.cz/en/programmelife/life-for-insects/		

LIFEraisedbogs	LIFE 14 NAT/DK/000012	**Contact:** Ottosen Ole oot@toender.dk
Project: Raised bogs in Denmark		
About: The main objective of the project is to reach a favourable conservation status for active raised bogs in the project areas, by enhancing the peat accumulating sites characteristic of the active raised bogs. The project seeks to implement appropriate management practices on existing active raised bogs (7110*), and also on degraded raised bog (7120), transition mires (7140), bog woodland (91D0*) and other habitats. It includes compensation measures for private landowners and land consolidation procedures.		
Website: https://www.raisedbogsindenmark.dk/		

GrassLIFE	LIFE16 NAT/LV/000262	**Contact:** Baiba STRAZDINA ldf@ldf.lv
Project: Restoring EU priority grasslands and promoting their multiple use		
About: The project aims at developing, optimising and improving the conservation status of five EU priority grasslands in Latvia (6120*, 6210*, 6230*, 6270* and 6530*) over 14 Natura 2000 sites. Specific project objectives are to (i) restore priority grassland habitats by applying best-practice and pilot methods, (ii) establish a long-term sustainable management (grazing) system on the restored grassland areas, (iii) prepare recommendations for improving their conservation status and grassland connectivity, (iv) improve the economic aspect of sustainable grassland use; and (v) improve knowledge and public awareness about the importance of priority grasslands in Latvia and in the EU.		
Website: https://grasslife.lv/		

LIFE to GRASSLANDS	LIFE14 NAT/SI/000005	**Contact:** Nika Debeljak Šabec nika.debeljak@zrsvn.si
Project: LIFE conservation and management of dry grasslands in eastern Slovenia		
About: The project aims to improve the conservation status of species-rich grasslands in Slovenia, by (i) restoring areas of habitat types 6210 and 6230 through overgrowth removal, (ii) reintroducing grazing/mowing management on patches of 6230 in the forest, (iii) establishing a long-term sustainable use of target areas, (iv) revitalising traditional orchards, (v) incorporating sustainable dry grassland management into agricultural and environmental policy in Slovenia, (vi) establishing a network of landowners and potential land users to reduce land use fragmentation, (vii) identifying alternative activities and increasing public awareness of the importance of dry grasslands.		
Website: www.lifetograsslands.si		

LIFE Olivares Vivos - Olive Alive	LIFE14 NAT/ES/001094	**Contact:** José Maria Sanchez gestion@seo.org
Project: Towards the design and certification of biodiversity friendly olive groves.		
About: The project aims to define an innovative model of olive growing with high demonstration value. The model will be agriculturally, economically and socially viable, while contributing to the halt in the loss of biodiversity in the EU by 2020. More specific objectives include (i) the development of profitability formulas based on an added value for consumers (biodiversity) to help curb the abandonment of traditional olive farming, (ii) the creation of a science-based agrifood certification system, (iii) the promotion of farmers' key role in the EU strategy on biodiversity and their participation in such a strategy, (iv) the implementation of restoration actions and the creation of green infrastructure in demonstration olive grove, amongst other objectives.		

Website: https://olivaresvivos.com/en/

LIFE grassland Luxembourg	**LIFE13 NAT/LU/000068**	**Contact:** Yves Schaack yves.schaack@sicona.lu
Project: Conservation and management of species-rich grasslands by local authorities		
About: This project's main objective focuses on protecting and restoring endangered grassland habitats as well as a number of animal species that depend on these habitats within 15 Natura 2000 sites in the western part of the 'Gutland' of Luxembourg. These goals will be achieved by strengthening the Natura 2000 network using land purchase and restoration actions.		
Website: http://www.life-grassland.info/en/the-project/		

LIFE+ "Healthy Heath"	**LIFE08 NAT/NL/000192**	**Contact:** Jaap Van Roon j.van.roon@dlg.nl
Project: Propagation and development of dry, moist and wet heath in the Dwingelderveld SPA and pSCI		
About: The project objective was to restore the natural water balance over 1 100 ha of Dwingelderveld National Park, and to transform the former agricultural enclave Noordenveld back into heathland habitats. Specific project aims were to (i) combat dehydration, eutrophication and acidification, (ii) enlarge the area of moist heath within the Natura 2000 network area, (iii) improve the quality of acid fens, active and recovering raised bogs, depression vegetation, and species-rich grasslands, and (iv) reduce disruption to the animals and birds characteristic of the area.		
Website: https://www.nationaalpark-dwingelderveld.nl/inrichting/summary/		

LIFE DRY GRASSLAND OVERDREV II	**LIFE08 NAT/DK/000464**	**Contact:** Annette Strøm Jacobsen ansja@nst.dk
Project: Dry Grassland in Denmark - Restoration and Conservation		
About: The project aimed to follow on from a previous grassland project and continue with the restoration and conservation of dry grasslands in Denmark. The main objective was to improve the conservation status and increase the areas of several grassland habitat types, partly through the restoration of arable land. Furthermore, the project aimed to evaluate the feasibility of different methods for controlling the invasive alien species *Rosa rugosa*. Finally, the project sought to create and improve habitats for a number of targeted amphibian species in order to achieve and maintain their favourable conservation status in Denmark.		
Website: https://eng.naturstyrelsen.dk/nature-protection/nature-projects/life-overdrev-ii/		

LIFE-GOODSTREAM	**LIFE14 ENV/SE/000047**	**Contact:** John Strand goodstream@wetlands.se
Project: Good ecological status of an agricultural stream - introducing Integrated Buffer Zones in a holistic approach		
About: The project is implementing and documenting a holistic approach to agricultural management on a catchment level that includes new and innovative cleaning methods of drainage water to demonstrate the potential of drainage filters as cost-efficient measures for (i) Reducing nutrient losses to the aquatic and marine environment, (ii) Reducing peak flow events from agricultural drainage systems; and (iii) Viewing the leaching nutrients as a resource instead of waste by increasing the possibility of re-circulation of retained nutrients.		
Website: http://goodstream.se		

LIFE Pays Mosan	LIFE13 NAT/BE/001067	**Contact:** Joelle Huysecom joelle.huysecom@natagora.be
Project: Connectivity of the Natura 2000 network across the Belgian-Dutch borders in the Meuse basin		
About: The project's overall objective is to restore a mosaic of five threatened habitats listed in Annex I of the Habitats Directive (6210*, 6110*, 6230*, 6130 and 6510) in order to improve their conservation status and connectivity. Main actions entail land purchase, habitat restoration work, installation of infrastructures required for grassland management, knowledge and experience sharing with researchers. The project also aims at improving the conservation status of four bat species, by restoring hedgerows, planting fruit trees, creating ponds, and nursery roosts.		
Website: https://www.lifepaysmosan.eu/		

LIFE Clima Bombina	LIFE18 NAT/DK/000732	**Contact:** Peer Ravn pr@amphi.dk
Project: New habitats for *Bombina bombina*, other amphibians and birds to counteract problems from climate change in coastal areas		
About: The aim of the project is to obtain favourable conservation status for *B. bombina* and to contribute to a favourable conservation status of the other 8 animal species, 9 natural habitat types and 4 bird species targeted. Concrete conservation actions will include, among others, the restoration and creation of a large number of ponds B. bombina, a breeding and restocking programme, and a comprehensive extensification of agricultural areas to restore/enhance habitat connectivity. Restored habitats will develop towards several habitat types such as 6210*, 6120, etc.		
Website: Not online yet.		

LIFE Bats & Birds	LIFE18 NAT/LU/000136	**Contact:** Nathalie Grotz n.grotz@naturemwelt.lu
Project: LIFE Bats & Birds - providing Bed and Breakfast for Bats & Birds		
About: Main objectives of this project are to enhance the ecology of agricultural landscape and to improve the connectivity between existing and potential habitats, in order to halt the decline of six bat and bird species. The project will both restore habitats and maintain existing structures and develop new ecological structures in desolate landscapes. The targeted habitats will be interconnected through hedges, trees and fallow strips. Concrete actions will include land purchase, tree planting, the restoration of abandoned grasslands and orchards, the creation of stone and deadwood piles, etc.		
Website: Not online yet.		

Annex 4 – List of participants

First name	Last name	Organisation	Function	Project
Achter de Molen	Ruben	Staatsbosbeheer	Project Manager	LIFE Going Up a Level
Barova	Sylvia	EASME	Project Advisor	
Belting	Heinrich	NLWKN	Project Aanager	
Bidstrup	Jørgen	Danish Nature Agency	Project Manager	LIFE IP NATUREMAN
Bollen	An	NEEMO	Technical Monitor	
Bonneau	Elise	Ligue pour la Protection des Oiseaux (LPO)	European Projects Engineer	
Boonstra	Anne	Prolander	Project Manager	LIFE going up a level
Borren	Wiebe	Natuurmonumenten	Hydrologist	
Bosman	Judith	Staatsbosbeheer	Advisor In Ecology	
Bot	Jeroen	Agency for Nature and Forest	Expert Vegetations	Life Belgian Nature Integrated Project (BNIP)
Civic	Kristijan	NEEMO	Technical Monitor	
Dahlem	Richard	natur&emwelt Fondation Hellef fir d'Natur	Project Manager	LIFE Bats & Birds
Dausse	Armel	Forum des Marais Atlantiques	Project Manager	
De Beule	Kinnie	NEEMO	Technical Monitor	
De Block	Mario	Natuur en Bos, Flemish Government	Expert	
de Lange	Rienk	Antea Group	Project Manager Water Management	restoration Oude Willem
de Vries	Anja	Provincie Fryslân	Project Officer	LIFE going up a level
Dekker	Hans	Provincie Drenthe	Nature Management Policy Officer	Drents-Friese Wold, Dwingelderveld, Drentsche AA
Dekker	Pina	gemeente Ooststellingwerf	Policy Officer	LIFE Healthy Heath
Dewyspelaere	Joost	Natuurpunt	Staff - Nature Quality	Life Pays Mosan
Doeven	Henk	municipality Westerveld	Alderman	
Filagová	Žofia	BROZ - Regional Association for Nature Conservation and Sustainable Development	Project Manager	Conservation of birds in SPA Ostrovné lúky
Gheysens	Leticia	Natuurpunt	Project Manager	Oostkustpolders
Granda Alonso	Elena	natur&ëmwelt Fondation Hëllef fir d'Natur	Project Team Member	LIFE ORCHIS - Restoration of calcareous

First name	Last name	Organisation	Function	Project
				grassland in eastern Luxembourg
Grotz	Nathalie	natur&emwelt Fondation Hellef fir d'Natur	Projectmanager	LIFE Bats & Birds
Gutiérrez	José Eugenio	Sociedad Española de Ornitología, SEO/BirdLife	Andalusian Regional Delegate	Olive Alive. Towards the design and certification of biodiversity friendly olive groves
Herremans	Jean-Paul	NEEMO	Technical Monitor	
Horup	Carsten	Vordingborg Municipality	Project Leader - Nature Conservation	LIFE Clima-Bombina
Jenster	Bernie	Staatsbosbeheer	Account Manager	
Klok	Willem	Natuurmonumenten	Project Manager	LIFE Going Up a Level
Latruberce	Maud	NEEMO	Technical Monitor	
Luijten	Sheila	Stichting Science4Nature	Project Management Restoration Threatened Species	
Meijer	Jan	Provincie Friesland	Ecologist	
Moes	Georges	natur&ëmwelt Fondation Hëllef fir d'Natur	Project Manager	LIFE ORCHIS
Nicolaisen	Jørgen	Tønder Kommune	Team Member	Raised bogs in Denmark
Paludan	Claus	Bangsgaard og Paludan ApS Consult	Biologist	
Pas	Monique	IVN	Project Manager	LIFE Going Up a Level
Postma	Romke	NMI	Project Manager / Researcher Soil Science	
Prak	Bart-Jan	Prolander	Project Manager	LIFE 'Going up a level'
Probst	Maurice	SICONA Naturschutzsyndikat	Advisor Agriculture	LIFE grassland Luxembourg
Prommer	Mátyás	Herman Ottó Institute Nonprofit Ltd.	Project Coordinator (Conservation)	GRASSLAND-HU
Raab	Rainer	Technisches Büro für Biologie Mag. Dr. Rainer Raab	Owner	
Ravn	Peer	Amphi Consult Zealand	Consultant	Partner/Clima-Bombina
Rossenaar	Arnout-Jan	Staatsbosbeheer	Ecologist	

First name	Last name	Organisation	Function	Project
Ruiz	Carlos	Sociedad Española de Ornitología, SEO/BirdLife	Conservation Officer	Olive Alive. Towards the design and certification of biodiversity friendly olive groves
Rūsiņa	Solvita	University of Latvia	Chair Of Physical Geography Department, Docent	GrassLIFE
Schuiling	Alex	Prolander	Project Manager	LIFE 'Going up a level'
Spasov	Svetoslav	Bulgarian Society for the Protection of Birds / BirdLife Bulgaria	Project Manager	LAND for LIFE / Restoration and sustainable management of Imperial Eagle's foraging habitats in key Natura 2000 sites in Bulgaria
Strand	John	Hushållningssällskapet Halland (Rural Economy and Agricultural Society, County of Halland), Sweden	Researcher, Senior Project Leader	LIFE-Goodstream
Strazdiņa	Baiba	Latvian Fund for Nature	Habitat Expert	GrassLIFE
Strøm Jacobsen	Annette	Danish Nature Agency	Project Manger, Biologist	Dry grassland
Surovec	Pavol	BROZ - Regional Association for Nature Conservation and Sustainable Development	Executive Director	Conservation of Selected Natura 2000 Insect Species in Transboundary area (CZ-SK) of Western Carpathian Mts.
Taylor	Clare	NEEMO	Communication Coordinator	
Toebat	Johan	Agentschap voor natuur en bos	Regional Coordinator	BNIP
van der Vegt	Gerrie	Provincie Drenthe	Project Manager Rural Development	
van Diggelen	Rudy	University of Antwerp	Professor	
van Rotterdam	Debby	Nutrient Management Institute	Sr. Project Manager	
Vassen	Frank	European Commission, DG.ENV, UnitD3 Nature	Team Leader - Financing; Policy Officer	

First name	Last name	Organisation	Function	Project
Vegter	Uko	Het Drentse landschap	Head Nature And Landschape Unit	LIFE Going Up a Level
Velghe	Darline	NEEMO	Thematic Coordinator Nature	
Wolff	Claire	SICONA Naturschutzsyndikat	Ecologist	LIFE grassland Luxembourg
Zeinstra	Yep	provincie Fryslân	Advisor	LIFE Going Up a Level
Žvikart	Mateja	Institute of the Republic of Slovenia for Nature Conservation	Nature Conservation Consultant	LIFE TO GRASSLANDS

Annex 5 – Background Document

The Natura 2000 network and the restoration of a favourable conservation status for habitats and species

Context

From the start of the industrial revolution, increasing availability of fossil energy, chemicals and technology, progress in scientific knowledge and know-how, growing need for workers in cities, mines and industrial establishments led to a first wave of agricultural intensification and abandonment of the less productive and most workforce demanding open habitats.

After WWII the Common Agricultural Policy (CAP) was adopted by the European Economic Community (EEC) in 1957 to increase and secure food production, stabilize food markets and protect the incomes and welfare of farmers. This launched a second wave of systematic intensification of agricultural practices; the fast diminishing number of farmers and correlated increasing size of farms and parcels; strong rural land consolidation policies supported by specific administrations; watercourse rectification; higher specialisation; simplification of the landscape and, by the way, accelerated destruction or degradation of the remnants of species rich open semi-natural habitats.

This resulted in the loss of vast areas of semi-natural habitats and the collapse of numerous plant and animal species. The land use became progressively more specialized whilst the landscape became more and more fragmented and partitioned ([9]). Some people started to care about this evolution as early as the beginning of the XXth Century.

Almost a century later the large nature conservation movement resulted in the creation of the European Natura 2000 network (1992), the largest and most consistent network of protected areas in the World, while nature conservation and biodiversity management evolved into science.

The identification of the Natura 2000 network in the EU is nearly completed. Unfortunately, this does not mean that the target species and habitats are all in favourable conservation status. After decades of landscape and urban mismanagement, agricultural intensification and abandonment of open habitats, clear management effort and in many cases restoration effort is needed to achieve the objective. Especially in regions with dense population and intensified agriculture, restoration measures are indispensable.

There are several key issues we are faced with when it comes to restoring nature (RICHARD F. and al, 2002.; JANSSENS, F., 1998.):

- Habitat fragmentation has resulted in reduced connectivity and is an important bottleneck for species mobility and potential recolonisation.
- Nature areas are often too small to host sustainable populations of characteristic species resulting in a considerable extinction debt.
- Agricultural land often used in LIFE projects for the enlargement of protected areas, is in most cases intensified and has a high level of nutrients that is incompatible with the ecological requirements of the target habitats and species. The most problematic nutrient is phosphorus

[9] This partitioning, reducing ecotones and edges effects, culminates with the establishment of land use plans in most of the member states, reducing de facto the opportunities for multipurpose use of land parcels.

because there are fixed forms of it, it is accumulated in the soil and it is difficult to mobilize and export.
- The absence of a seed bank and seed rain make it impossible to restore very specific target habitats with high level of ecological requirements in a good conservation status.
- Wet areas are often drained.
- Relief-rich parcels were often leveled for easier ploughing and implementation of agricultural practices, eliminating gradients and their associated species richness.
- Structure-rich landscapes and mosaics of various land uses including fallow land, copses, Holloways and hedgerows were erased for creation of vast parcels.

Numerous Natura 2000 sites include not only specialized habitats (mostly in relation with the Habitat Directive) but also farmland and countryside landscapes (often in relation with the Birds Directive).

Therefore, an essential question, for the managers of Natura 2000 sites and the more strictly protected areas inside these Natura 2000 sites, is often: what to do with and on farmland and for which conservation objectives? First of all, the conservation objectives should be determined in line with the local potential, the conservation needs and what is reasonably achievable.

<u>The platform meeting</u>

The extinction debt, the lack of seed bank and seed rain could be remediated through species translocations/reintroductions as highlighted by the LIFE platform meeting "Reintroduction of species: a tool for the restoration of habitats" (Meise, Belgium, October 2017). One of the important conclusions of this LIFE platform meeting was that the size, of the remnants of habitats that are in a sufficient or good conservation status, is often not large enough to ensure the survival of several of their characteristic species and a good sample of the variation of the habitats. Therefore, increasing the size of these remnants of habitats is more efficient than the multiplication of small protected areas, even well managed. Increasing the size of the core areas reduces also the negative impact of surrounding armful activities and inputs.

To reach this objective the restoration on adjacent land is necessary and this will often happen on more or less intensified farmland. The first step should therefore be the restoration of the abiotic conditions (hydrology, water quality, correct nutrient level, landscape structure, micro-relief, gradients) corresponding to the habitats to be restored.

To further identify and disseminate the state of the art of the various techniques to be implemented on intensified farmland, we propose this dedicated platform meeting: **Nature restoration on intensified farmland: objectives, possibilities, innovations and best practices.**

This event may set the first steps in developing a decision-making matrix LIFE projects could use when deciding on the most cost-efficient and the most appropriate restoration techniques for the intensified agricultural land being converted to nature purposes.

Among the valuable habitats for biodiversity strong attention has been paid to semi-natural open habitats (grasslands, calcareous grasslands, heath and associated vegetation types). This is logical especially in north-west Europe where, for historical reasons shortly described above, these habitats are among the richest ones and the first ones to suffer from farmland intensification and urbanization.

A study demonstrated that 47% of studied semi-natural grasslands sites in England were lost between 1960 and 2013, among them 45% were converted into intensified grassland and 43% into arable land (Fig 1). This confirms that intensification of farming is the main driver in loss of diversity.

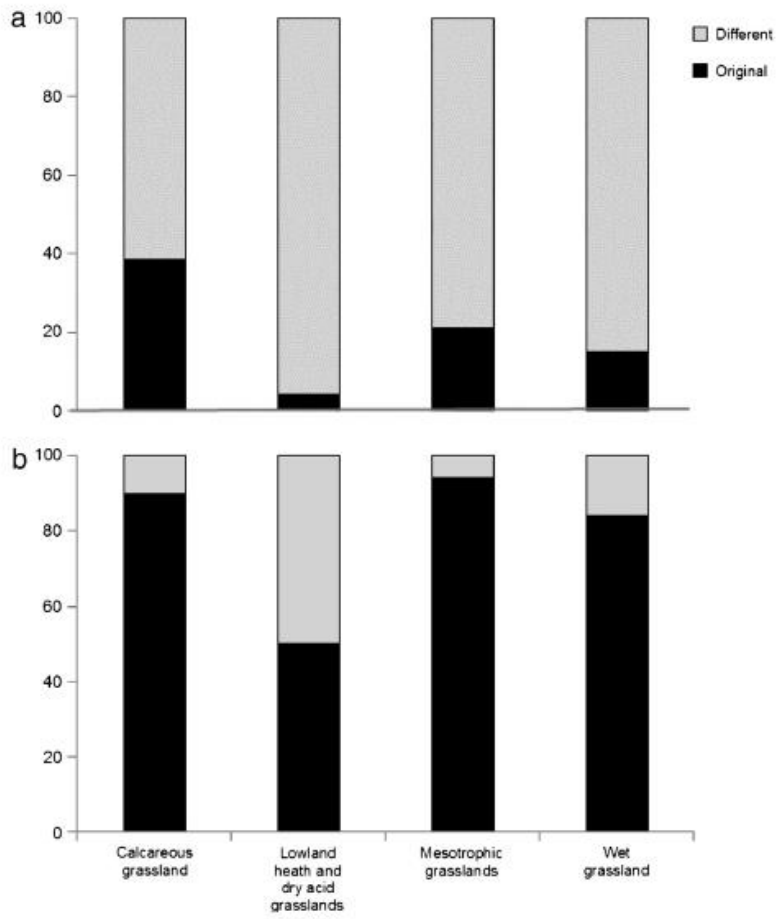


Fig 1. The percentage of sites in England which have remained as grassland (original; 4 main groups) habitat in (a) non-protected and (b) protected sites, across each of the four grasslands types in England between 1960 and 2013. Source: Lucy E. Ridding, John W. Redhead, Richard F. Pywell.

Another aspect has long been overlooked, despite a continuously worsening situation: the simplification of the rural landscape and the decline of the "common" biodiversity on farmland. The loss of structure of the rural landscape and the intensification of practices, including the use of pesticides, seem to be the major driver for the decline of farmland birds (http://indicateurs-biodiversite.naturefrance.fr/fr/indicateurs/artificialisation-du-territoire-metropolitain. Redlich S, & al. 2018; Bretagnolle V., Balent G., Thenail C., Berthet E, 2012.) and segetal flora (J. Storkey, & al. 2012; H. Albrecht, & al. 2016).

Farmland birds are especially studied and documented; they are often used as indicator species (Fig 2). However, numerous components of the agricultural systems have been modified in parallel, towards intensification. Therefore, it is difficult to identify exactly the impact of each of them. Intensification, use of pesticides, structure of the landscape, increase of yield and other parameters like the use of chemical fertilisers instead of organic manure may all have different impacts. The loss of segetal flora may reduce the availability of seeds for birds but also the availability of invertebrates.

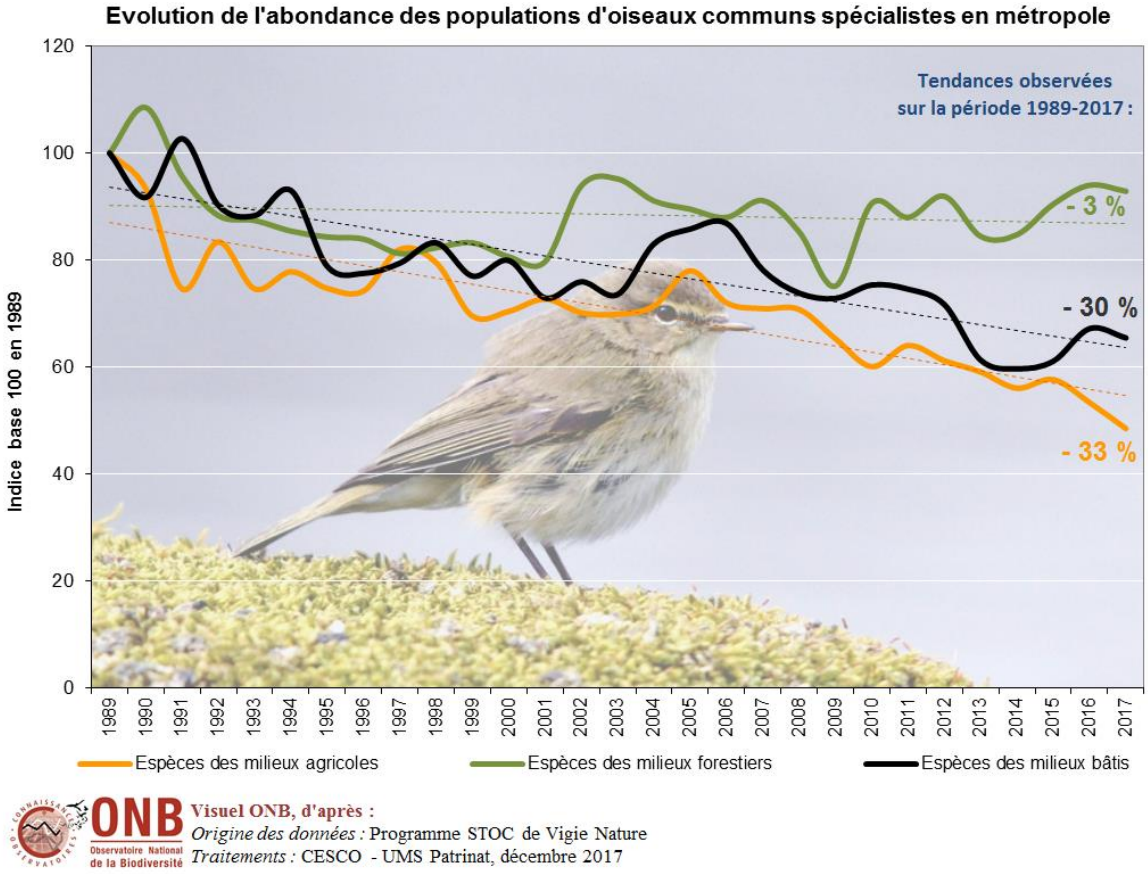


Fig 2: Evolution (1989-2017) of the abundance of specialized birds per habitat category in France. Orange line: farmland species; black line: urbanised areas; green line: forests.

Conservation and restoration objectives?

Facing this complex situation, the managers of Natura 2000 sites and LIFE-Nature projects should consider a range of possible conservation objectives and management options.

In several LIFE projects, and other nature conservation/restoration projects, the objectives set in core areas of the Natura 2000 sites are most often linked to the restoration of nutrient- poor but species-rich habitats. This is logical because those habitats are the most damaged and endangered by the intensification. This is the case for semi-natural grasslands (6410; 6430; 6510; 6520), calcareous grasslands (6210*), or complexes of acidic grasslands and heath (6230*; 2330; 2310; 4010). This in order to reach the minimum area necessary for hosting viable populations of species (both plants and animals, including bird species covered by the Birds Directive) specific to a given habitat and reach a representative range of variation inside each of the habitat types. This approach has been applied in many LIFE projects working on semi-natural open habitats so far ([10]).

Besides these core areas, also the surrounding farmland landscape may be managed more in a way that provides more optimal habitats for the farmland birds' populations and other groups like bats and invertebrates (often butterflies). Meanwhile this farmland managed for biodiversity may act as a buffer around a core area by less or none leaching of nutrients and pollutants; providing good quality water for wetlands; food resource for animals, especially birds, hosted by the core area; facilities for visitors established in less sensitive parts of a site;…

The combination of the strict "nature" with the "countryside" approach may become a standard in the future (Vincent Bretagnolle, et al. 2018). This is already an approach implemented for Natura 2000 sites including various types of landscapes and where the different parts of a given site don't have the same priorities and don't need the same kind of management (difference between the parts designated on the basis of the Habitat Directive for given habitats and the parts designated on the basis of the Birds Directive). While this may already be evident in other parts of Europe, it has proven to be more difficult in areas with a high level of intensification and urbanization. The development of Green Infrastructure may help its implementation but also the new Common Agricultural Policy (2021-2027) will play a crucial role.

Financial and sustainability aspects should also be taken into consideration. The restoration and maintenance of very specific habitats is often very expensive (Török P & al. 2011). Besides, a management with less constraints may be cheaper and more sustainable on a long term as it will also receive more social acceptance and provide ecosystem services such as food and wood production, improved water quality, carbon sequestration and flood protection whilst supporting the conservation objectives for some species groups. This approach should not replace the protection and careful restoration, on sufficient surfaces, of endangered habitats with very specific ecological requirements, but rather complement it on larger areas acting also as buffer areas around the most precious, sensitive and fragile habitats. This is by no means an invitation to lower the level of ambition of nature restoration but an opportunity to do more in a complementary way.

[10] LIFE13 NAT/BE/000074, HELVEX-LIFE; LIFE09 NAT/BE/000411, LIFE Kleine Nete; LIFE04 NAT/BE/000010, Liereman; LIFE11 NAT/NL/000771, Floodplain development; LIFE11 NAT/BE/001060, Herbages; LIFE 10 NAT/PL/000655, Active KPN.

Countryside landscapes, farmland and the endangered "common" nature

LIFE projects that are focusing ([11]) on this approach are targeting mostly birds, bats or butterflies populations, not or less depending on very specific habitats, rather than the restoration of very specific habitats as they are described in the Habitat Directive (specific grassland types, heath,…). They are then working mostly on the restoration of a structure-rich landscape and a mosaic of agricultural practices and in this way improving the habitats of species listed on the annexes of the Habitat Directive.

The management and restoration of intensified farmland may include various techniques and measures: planting of hedgerows and orchards, establishment of a regime with fallow land,…

In some cases, the management is done by organic farmers. It seems that organic farms are able to support more abundant and diversified bird populations (Ailsa J. McKenzie and Mark J. Whittingham, 2009). According to this paper, the diversity of birds is increased on organic farms and the abundance is increased by 50%. According to the authors, the main drivers for this are the absence of pesticides and the existence of more uncropped habitats, whilst they did not identify a significant impact of the use of organic fertilisers nor of a more diversified mix of crops.
Indeed, different studies show various and contrasted results. Some found that the abundance and diversity of birds on farmland is more related to landscape diversity and complex structure. Redlich S, & al. (2018) and Geiger F, & al. (2010) highlighted the fact that the structure of the landscape and the scale and mosaic of crops are parameters at least as important as the agricultural practices and crops themselves for the diversity and richness of bird populations. This may explain partially the fact that the organic farms host more birds: they often offer a more structured landscape. The scale of farms may have an indirect effect. Small farms have often smaller parcels and therefore more edges and fallows, offering more opportunities for plant species and are supporting a higher diversity in invertebrates that also function as a food source for birds.

Nevertheless, in a review (Martina Bavec & Franc Bavec, 2015) a significantly added value of organic farming for biodiversity versus conventional farming is mentioned in 80% of cases; in 16%, differences were unclear and less biodiversity was found in 4% of comparisons. These authors mention also that butterfly species richness was up to 20% higher on organic farms and butterfly abundance about 60%. Overall, higher bird diversity and richness are observed on organic farms than on conventional farms (Chamberlain, D.E., & al. 2010).

The use of agri-environmental schemes is also potentially interesting. However, they show limitations due to regularly changing legislation, short term contracts and priority left to conventional farming approaches resulting in conflict between the objectives. They seem also less efficient for the conservation of segetal plant species (H. Albrecht, & al. 2016) for which specific protection areas (Arable Plants Reserves) are recommended especially for the rarest and most sensitive species.

There are also those cases where land purchase, implemented for the protection and management of core areas, lead to the purchase of larger land sections, due to various reasons and constraints. Part of them, less suitable for the restoration of very specific habitats may be dedicated to the, cheaper, restoration of structure rich elements of landscape. In other cases, more fertile grasslands are purchased to provide better foraging places for the livestock in order to compensate the very poor forage on the core areas – these are also opportunities for a "countryside" approach. These examples may be considered as first steps toward a larger integrated approach. Public green spaces may be combined with core areas.

[11] LIFE16 NAT/CZ/000731, LIFE for Insects; LIFE12 NAT/SK/001155, Ostrovne Luky; LIFE13 NAT/BE/001067, LIFE Pays-Mosan; LIFE11 NAT/BE/001059, bocages

The strict “nature” approach; restoration of habitats with strong ecological requirements

According to the initial situation different techniques and restoration itineraries are possible. Therefore, the preparatory studies are the first important step.

After intensification by fertilization the main problem for plant species richness and diversity in open habitats is the phosphorus in the soil: high level of available P results in high productivity and high standing biomass leading to severe interspecific concurrence and drastic reduction of species richness and diversity (Janssens, F. 1998.; Boeye, D., et al. 1999; Herremans, 2003).

Actually, when starting the restoration of target habitats (in the sense of the Habitat Directive) towards a better or a satisfactory conservation status the managers of projects may face very different start situations.

In certain cases, where intensification was not high, the simple fact of stopping the fertilization combined with an adequate mowing management (adapted to the target habitat and with exportation of the biomass) may be sufficient. Examples show that after approximately 15 years grasslands have upgraded by one point in the conservation status. This is a relatively cheap measure, but time and consistent effort are needed to achieve significant results. The experience has taught that this is only effective when:

- sufficient individuals of key characteristic species are able to benefit from the dedicated management and/or
- a seed bank is present and/or
- similar habitats in good conservation status are sufficiently close to provide a seed rain.

Where these requirements were not met the conservation status did not improve despite favourable nutrient status (Thibaut Goret, 2015).

The time needed to come back to a satisfactory level of P depends on the start situation and the type of soil.

This kind of management is sometimes (in some German Länder) supported by agri-environmental measures that promote “restoration mowing” i.e. mowing that is more frequent than the agronomic optimum and that is aimed to export nutrients faster.

In the cases where the nutrient level is acceptable but there is a lack of seed–bank or seed rain regular mowing may be successfully combined with reintroduction or translocation of plant material.

Where grassland or arable land was severely intensified, mowing is not sufficient to reduce the phosphorus (P) level within an acceptable timeframe. It would require centuries in the worst cases (Vangansbeke, P., et al. 2017). In such circumstances topsoil removal is applied. However, this is an expensive and radical measure. The excursion to Dwingelderveld will show the results of a large-scale restoration through such approach.

A third, and intermediate, measure that is recently gaining interest for intermediate start situations, in LIFE projects ([12]), is P-mining or phytoextraction. This method requires the input of (fertilisation)

[12] LIFE13 NAT/NL/000162, LIFE going up a level; LIFE13 NAT/BE/001067, LIFE Pays Mosan.

pure nitrogen (N) or a combination of N and other nutrients (mainly potassium - K) ([13]), resulting in higher biomass productivity, and thus allowing a higher P export when mowed (R.J. Dodd, R.W. McDowell and L.M. Condron, 2012; Vangansbeke, P., et al. 2017; Caroline van der Salm, et al. 2009). The seeding of legumes (*Fabaceae*) is often a good solution to make use of their capacity to fixate atmospheric N in the soil and to mobilise P. This will be illustrated during the platform meeting and in the excursion to the Oostervoordse diep and the Oude Willem.

Therefore, a good and in depth analysis of the start situation enables the managers to choose the best value for money option in all the cases: simple mowing, intensive mowing, P-mining or top-soil removal (Vangansbeke, P., et al. 2017; Gilbert, Joanne; Gowing, David and Wallace, Hilary, 2009).

Other specific restoration measures on intensified farmland concern the restoration of gradients (humidity, salt) where the land was levered to obtain big parcels of arable land or the restoration of the site's hydrology (LIFE12 NAT/BE/000252, LIFE Oostkustpolders).

Restoration of the abiotic conditions is a necessary condition but often not a sufficient condition for the restoration of a given habitat. Transfer/reintroduction of plant material (seeds, propagules) is often necessary to reach the goal. This is now largely documented and implemented (LIFE11 NAT/BE/001060, Herbages). However, in the case of very drastic intensification, even the soil communities can be totally destroyed. In such cases, topsoil removal is compulsory to restore the abiotic conditions, in which case there is surely nothing left from the soil ecosystem of the target habitat. Soil inoculation is then helpful and the relation between the soil ecosystem and the habitat (in the sense of the phytoceonosis) is so strong that the source of the soil used for inoculation may determine the resulting habitat (E. R. Jasper Wubs, Wim H. van der Putten, Machiel Bosch and T. Martijn Bezemer, 2016).

[13] Because in heavily intensified farmland P is so abundant that it is not the limiting nutrient for plant growth, the principle is to reduce the limitation of the productivity by other nutrients.

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Annex 6 – Evaluation of the meeting

LIFE Platform Meeting
NATURE RESTORATION ON INTENSIFIED FARMLAND: innovations and best practices from the LIFE programme
Lhee, the Netherlands, 17-18 September 2019

Feedback survey - Results

What is your general appraisal of the LIFE Platform Meeting on Nature Restoration on Intensified Farmland (Lhee, 17-18 September 2019)?

- ☐ Very well done 4
- ☐ Well done 2
- ☐ Could do better 0

Comments:

Programme Day 1

Please score the sessions from 0 (not relevant) to 5 (very useful):

- Day 1 - Morning Plenary Session (17 September) AVER: 4.14
- Day 1 - Afternoon Working groups AVER: 3.42

- Working Group 1, "Reducing the nutrient level: choosing the right method" AVER: 2
- Working Group 2, "The importance of small scale, extensive farmland and how to engage farmers in more nature-friendly practices" AVER: 3.57

Comments:

- Don't visit the working groups
- Morning session: interesting presentations with a variety of actors (incl. Prof. and NGOs etc.); very valuable info and networking sessions
- WG 2: a very useful workshop which enabled us to exchange information and interact about successful and not so successful actions to involve farmers. A little bit more time would have been great!
- The presentations and discussions were very helpful and one had the impression that all the participants gave their best to achieve common targets.

Programme Day 2

If you joined the excursions, did you find them enjoyable, interesting and useful?

Please indicate your score from 0 (disappointing) to 5 (excellent) for each one of them below.

- Group 1: visit to "Oostervoortse diep" followed by visit to the P-mining in Oude Willem (site where we had the lunch) AVER:4.6

- Group 2 to “Natura 2000-site Dwingelderveld: restoration Noordenveld” followed by visit to the P-mining in Oude Willem (site where we had the lunch) AVER: 4.5
- I did not participate

Comments:

- well organized and we got a lot of useful information about the project and the involved stakeholders

General Questions, logistics and remarks

Are there speaker presentations that you particularly liked from the session(s) you have attended? If so, please let us know which one(s), and why.

Comments:

- Rudy van Diggelen, very clear explanation of the subject.
- All the speaker presentations were very interesting. The presentation of Prof Rudy van Diggelen which explains the basis was really helpful for non-expert, and really appreciated, it is not always the case that someone gives knowledges and information as an "introduction" to all the other projects.

Was the overall programme well balanced and the duration not too long / too short? Please indicate your score from 0 (poor) to 5 (excellent). AVER: 3.85

Comments:

- too long
- bit too long/many presentations in the morning

Was there sufficient time for networking, sharing experiences and discussion during the two days?

- ☐ Too much time foreseen 0
- ☐ Sufficient time foreseen 5
- ☐ More time would have been better 1

Your feedback on the venue and organisational aspects will also be appreciated.

Please score the following from 0 (disappointing) to 5 (excellent):

a. Accessibility of the venue in terms of transport AVER: 3.5
b. Adequate and reasonably priced accommodation AVER: 3.28
c. Meeting venue and facilities AVER:4.42
d. Joint Dinner AVER: 4
e. Catering AVER: 4
f. Consideration of dietary preferences if you indicated certain allergies / intolerance AVER: 2.57

Comments:

- Reaching the venue by transport was very complicated (total around 8-9 hours from Paris to come) however, the hosts were really helpful and offered a free shuttle (easier for the return). The meeting facilities and hotel were adequate, however the price of the room was a bit expensive (80€/night).
- the catering and lunch packets were ok, but not as good as breakfast and lunch

Was your participation in the meeting worth your time, effort and resources in terms of:
Please score a. and b. from 0 (not at all worth it) to 5 (very much worth it).

a. Important insights and good practices that you became familiar with, which are of relevance to your project / work AVER: 3.57
b. Networking with other relevant projects and speakers AVER: 4.42

Comments:
- great to meet all other EU citizens and exchange experiences

Recommendations: We value your suggestions for improvement for future such meetings.

- There could be some networking workshops or thematic configurations that enables to talk to even more people, because of the high number of participants it's hard to meet everyone in such a short period of time. Thank you!
- Keep on like this. The LIFE PLATTFORM MEETINGS are a central institution for networking and cross border exchange. Many thanks to the NEEMO Team for the work they did.