Development of guidance document on management of farmland in Natura 2000 areas

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CASE STUDIES

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Guidance document on mangament of farmland in Natura 2000

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Case Studies

Integrated farm conservation advice based on partnership and mutual learning in Rheinland-Pfalz, Germany

"Partnerbetrieb Naturschutz"

Farmer and advisor © Partnerbetrieb Naturschutz

Agriculture and conservation in Rheinland-Pfalz

The German federal state of Rheinland-Pfalz has a long cultural history of small-scale mixed farming, including arable, permanent pasture, hay meadows, vineyards, and orchards, which now occurs on 719,400 ha of agriculturally utilised land[i1].

The main rural economic revenues are from winegrowing (on 10% of the area), tourism (including camping, walking and cycling), forestry, and some intensive arable farming. The Rhine valley is a major economic and urban centre well connected to European trade and transport networks, but the southern uplands still have important areas of semi-natural habitats shaped by traditional extensive agricultural use, with large areas of forest.

The Rheinland-Pfalz Rural Development Programme has the declared aim of integrating biodiversity conservation with agricultural use, with agri-environment schemes as the main instrument[2].

Rheinland-Pfalz currently offers agri-environment schemes dedicated to the protection of habitats and species (*Vertragsnaturschutz*) on grassland (meadows, pasture and conversion of arable), arable land (low density sowing areas or arable wild flower strips with no pesticide use), orchards (planting and maintenance), and abandoned vineyards (conversion to grazing or mowing).

Other agri-environment programmes designed to promote the protection of soil and water resources are offered for organic farming or integrated production, as well as individual measures (cover crops, buffer strips, crop rotation etc). The schemes include the possibility of adding compensation for specific measures on smaller areas, such as unmown refuge strips in hay meadows, variations in mowing regimes or delayed tilling with a period of stubble *Zusatzmodule*).

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1 http://www.mulewf.rlp.de/landwirtschaft/

2 Ministerium für Wirtschaft, Verkehr Landwirtschaft und Weinbau Rheinland-Pfalz (2007): Entwicklungs-Programm Agrarwirtschaftt, Umweltmaßnahmen, Landentwicklung. PAUL.

The premium grassland scheme for meadows and pastures requires farmers to maintain the presence of 4 or 8 indicator species instead of specifying management requirements, giving farmers greater flexibility to adapt their own management measures. Around 25% of the farmland is now under a 5 year contract in one of these schemes, with 2% (18,000 ha) in a habitats and species scheme. In these final two years of the RDP budget period, farmer applications will have to be refused if the demand for the habitats and species agri-environment schemes exceeds available funding.

Key habitats and species and agricultural management

Rheinland Pfalz has 177 Natura 2000 areas (120 SACs and 57 SPAs areas) covering 20% of the federal state. This is more than any other German federal state. Around 80% of the Natura 2000 area is woodland, principally beech and oak woodland types, but over 80% of the SACs and 65% of the SPAs[3] include areas of habitat dependent on extensive agriculture.

Priority agricultural habitat types include dry and steppe grasslands such as inland dunes with open *Corynephorus* and *Agrostis* grasslands (2330), rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi (6110), xeric sand calcareous grasslands with *Koeleria glaucae* (6120), semi-natural dry grasslands and scrubland facies on calcareous substrates (6210), species-rich *Nardus stricta* grasslands on old mining areas (6230), hay meadows (6510), dry heath (4030), and *Juniperus communis* formations on heaths or calcareous grasslands (5130).

Priority species linked to agriculture include the plants *Bromus grossus*, *Jurinea cyanoides*, *Gladiolus palustris*, and *Notothylas orbicularis*, the butterflies *Maculinea arion*, *Maculinea nausithous, Maculinea teneius*, *Euphydrias aurinia, Lycaena helle, Lycaena dispar*, the snails *Vertigo moulinisiana* and *Vertigo angustior*, the newt *Triturus cristatus*, the bats *Rhinolophum ferrumequinum* and *Myotis emarginatus,* and a number of bird species.

Species-rich meadow © Partnerbetrieb Naturschutz

[3] Landesverordnung zur Änderung der Anlagen 1 und 2 zu § 25 Abs. 2 des Landesnaturschutzgesetzes (LNatSchG) vom 22.06.2010 in Verbindung mit der Ersten Landesverordnung zur Änderung der Landesverordnung über die Erhaltungsziele in den NATURA 2000 Gebieten vom 22. Dezember 2008

The region's marked regional variations in climate, with both atlantic/sub-mediterranean and continental influences, give a unique mix of Atlantic and Continental species, and the dry grassland habitats form important stepping-stones to similar habitats in France and neighbouring German federal states.

Despite this protection, the conservation status of many habitats and protected species is unfavourable and declining. The dry grasslands are particularly threatened by eutrophication through air and water-borne nitrogen, scrub invasion after abandonment, and pressures from tourism and recreation, and most of the traditional hay meadows are threatened with abandonment.

Most of the dry grassland areas require restoration (principally scrub removal and measures to reduce eutrophication and over-dominant species, such as grass cover scarring or turf removal), followed by reinstatement of extensive grazing or mowing.

Eight of the 177 Natura 2000 areas have management plans published online[4]. In addition 50 management plans are in development, and will be made public in 2012. EU-LIFE funded projects have reinstated extensive agricultural management in some Natura 2000 areas: eg a LIFE project removed scrub and reinstated extensive shepherded sheep grazing on 355ha of xeric grasslands (including habitats 6120, 6210, 6230), and another LIFE project[5] restored species-rich *Nardus stricta* grassland (6230) for extensive cattle grazing and mowing.

The "Partnerbetrieb Naturschutz" programme

Scheme objectives

The "Partnerbetrieb Naturschutz" initiative offers farmers integrated agricultural and conservation advice for the whole farm; partnership and dialogue-based planning; and flexible and comprehensive conservation management that goes beyond the existing agri-environment programme.
The scheme tackles some of the key challenges to biodiversity conservation on farmland: the scheme aims to have farmers and advisors communicating on an equal footing, gain understanding and acceptance, increase management flexibility and farm-specific measures, and integrate economic realities and conservation priorities to find win-win solutions[6].

The advisory teams include both the consultants who administer the agri-environment schemes under contract to the Rheinland-Pfalz Ministry of Environment, Farming, Food, Winegrowing and Forestry (MULEWF), and the agronomic advisors of the six regional Agricultural Public Service Centers (*Dienstleistungszentren für den ländlichen Raum DLR*).

Farmer & advisory team in discussions. © Partnerbetrieb Naturschutz

How the scheme works

The farmer and the advisory team carry out a dialogue and situation analysis of the whole farm and its surrounding landscape.

One of the principal differences from established agri-environment practice is that a conservation plan is developed for the whole farm rather than just certain areas selected by the farmer. This includes an analysis of the farm's conservation potential and farm-specific conservation objectives, using maps and aerial photos[7], and land designations, with a special focus on Natura 2000 habitats and species and conservation objectives under the Water Framework Directive. The farmer and advisory team then develop and agree on a farm-specific conservation plan.

Some farms sign up to a farm-specific adaptation of the most appropriate agri-environment scheme, whilst others may convert to organic production or undertake other production changes. The team offers an ongoing one-to-one advisory service, evaluation and feedback.

4 http://www.naturschutz.rlp.de/

5 http://www.life-arnika.eu/en/site.html

6 For more details see Section 5.1 Recommendations for the design of agri-environment schemes for Natura 2000 farmland management in the report

7 The newly developed Rheinland-Pfalz GIS service (FLOrlp) offers all farmers downloadable plans and aerial photographs of their fields.

Results are jointly measured and evaluated by the farmer and team annually.

Farmer & advisors discussing the farm plan
© Partnerbetrieb Naturschutz

Farm selection and pilot scheme

The scheme was piloted on 18 selected farms for 3 years with finance from federal state nature conservation funds. In 2010 the scheme was opened up to all 27,400 farmers in Rheinland-Pfalz, and 60 of the current 85 applicants entered the scheme then. The farms were selected on the basis of equitable geographic distribution and date of receipt of application, not on the basis of conservation value or previous conservation actions. The rationale behind this is that by giving every farmer the same chance to participate and to improve his or her ecological performance the scheme pursues a comprehensive conservation approach on all farmland.

Development, monitoring and evaluation of the scheme

The scheme strategy was developed by a steering group of farmers, conservation and agriculture advisors, and representatives from the environment and agriculture ministry, in a series of discussions during the pilot phase. This group also monitored and assessed the pilot project.

Complementary actions: farmer training, publicity and accreditation

The scheme commits farmers to regular training or peer-to-peer networking meetings. For example, the pilot project offered workshops on extensive grassland management, orchard management and marketing, and organic arable farming without livestock. The feedback from the training events was very positive, indicating a high demand and a high value placed on peer-to-peer exchange. A conservation module for trainee farmers and land managers at the local training college has also been developed.

The scheme has produced a logo and published media articles and a leaflet for the general public, and is developing an online presence that will create publicity for the participating farms. The accreditation and logo may have add-on benefits for farms that have already established a profile through direct marketing and/or farm stay tourism, but its value for them will depend on how much effort is put into publicity for the scheme in future, as there is already a suite of quality labelling options available to farms in Rheinland-Pfalz.

Farmer and advisors examining plants in the field
© Partnerbetrieb Naturschutz

Success factors, constraints, opportunities and threats

Main success factors

Cooperative, dialogue-oriented process on an equal footing increases farmer acceptance and motivation

Good communication is essential to overcoming previous negative experiences with conservation requirements which have been perceived as absurd or too demanding. Farmers emphasise how important it is that their point of view is listened to, and that they are able to explain their own farm operations in detail.

Farmers in the pilot project felt that their viewpoint and position as farmers was respected and understood, and that the advisors achieved a good understanding of the specifics of their own farms. They felt this was strengthened through

the presence of the agronomic advisor and the need for both advisors to agree on measures.

Understanding gained through discussions on-site on the farm fields were particularly important for motivation (helped by the fact that visits took place in spring and summer instead of winter). A number of farmers emphasised the importance of getting feedback on the results of the management measures, and of being able to rely on a long-term dialogue.

Farmer & advisors discussions. © Partnerbetrieb Naturschutz

Problem-solving and open-ended approach focused on whole farm makes the scheme attractive

The fact that the scheme is voluntary and does not bind farmers to a fixed outcome is a key part of its attraction.

Farmers are looking for answers that are specific to their farm, such as what effect will extensive pasture management have on the farm's milk production? What is the point of a certain management measure? What is the impact of not doing something? What environmental resources, habitats or species can I conserve on my farm? Providing convincing answers is a key element in building trust in proposed conservation measures.

Farm-specific management flexibility leads to win-win solutions

The advice process is based on systematic planning but focuses on farm-specific strengths and challenges, which facilitates learning and adaptation. The intensive dialogue unleashed surprising creativity and innovation, and prompted the advisors to re-examine standard agri-environment scheme measures and look for ways to improve them.

Farmers see the permanent pasture schemes as generally well-designed and attractive, and many appreciate the scheme that measures results through indicator species, because it allows more flexibility in management measures.

Weaknesses & constraints identified in the pilot scheme

Raised expectations of advisory services and lack of formal structure

The pilot scheme raised the expectations of farmers in relation to both the conservation and agronomic advisory services, and these expectations could not always be met. The project is now developing guidelines and defining limits to the service offered to farmers.

Limitations of financial renumeration through agri-environment schemes

Though the programme gave the conservation advisors opportunities to suggest additional and innovative conservation measures on the farm, the advisors could only offer financial renumeration within the framework of existing agri-environment schemes, which were sometimes inadequate, and lacked the possibility to provide flexible and unbureaucratic financing for small-scale extra measures.

The arable agri-environment scheme is seen as too prescriptive and not offering enough financial compensation for the extra management and administrative effort needed. A universal complaint was the administrative burden of applying for agri-environment schemes.

However, a number of farmers implement small-scale, easily integrated measures on arable fields on their own initiative.

Opportunities for the expanded scheme

Better quality farm advice results in more conservation on farmland

The scheme is a clear opportunity to gain farmers' acceptance for conservation measures by offering a conservation plan that takes account of each farm's constraints and strengths, creates win-win situations for wildlife and farming, and goes beyond agri-environment measures that are limited to selected fields.

The intensive dialogue and direct in-field observations awaken interest and increase farmers' knowledge of species and habitats and their conservation (including complex and controversial aspects).

The scheme builds up long-term relationships. For the agricultural advisors, the scheme offers the chance to give more integrated management support that better helps farmers meet new challenges facing agriculture, by transfer of knowledge and training, especially with regard to sustainable production systems and opportunities to get access to funding and marketing opportunities offered by nature conservation.

The advisory services hope for synergistic gains in the quality and effectiveness of their service to farmers, thereby increasing the acceptability and profile of conservation oriented farm management. The farmers in the pilot scheme had correspondingly high expectations of the advice offered.

Threats & challenges facing the expanded scheme

Limitations of agri-environment schemes for Natura 2000 habitats

Farmers using grassland agri-environment schemes on the most extensive grasslands point out that the low productivity requires them to manage very large areas of land to obtain sufficient forage.

After a number of years of management under the scheme the productivity has dropped so low that the forage is almost worthless, so that the scheme is almost entirely funding the land management, whilst lease rates and land prices are rising.

In some areas toxic plants (such as *Colchicum autumnale*), which farmers would otherwise control with herbicides, make the forage useless for animals, and there are currently no other uses with economic value.

Competition from other land uses, particularly maize for biomass production

The Eifel region in the north west of Rheinland-Pfalz has been selected as a biofuel production area[8], and a bioethanol plant has driven up land prices in its 10km radius. This development can be observed throughout the country - numerous biogas plants of considerable sizes are being constructed. To run them efficiently, biomass has to be produced in the immediate surrounding area with the result that, especially in formerly very extensively-used areas of high nature value, competition for land is increasing enormously with a corresponding rise in lease prices.

At present, one of the pilot farms with significant areas of Natura 2000 grassland is facing the difficulty of keeping its extensive organic dairy farming under the high land lease price, and has asked for advice on how to react to this development.

Conclusions: demonstration value for other areas and countries

The Partnerbetrieb Naturschutz is pioneering a new approach to farm conservation advice, based on tailored, partnership-based dialogue and integrated agronomic and conservation planning.

This approach tackles key challenges to Natura 2000 farmland management - how to gain farmer motivation and understanding, and how to adapt conservation measures to specific situations - by offering a partnership based on mutual respect, and by responding to the challenges and opportunities presented by each farm area and business.

Combined with flexible well-funded agri-environment schemes, this partnership releases the creativity and innovation that is needed to achieve real improvements to Natura 2000 habitats and species within a profitable, ecologically oriented agriculture.

8 http://www.bioenergie-eifel.de/

Examples of benefits for Natura 2000 conservation from Partnerschaft Naturschutz

Pilot project farms

The 18 pilot farms brought an additional 455 ha of grassland into an agri-environment programme, most of it biologically valuable semi-natural habitat in the extensive grazing and/or mowing programme. Most of these farms already had some agri-environment areas before the start of the scheme, but were able to have additional areas accepted because of their participation in the scheme, which produced the management agreement. Three out of eight interviewed farmers said they had made specific management changes as a result of the advice: one converted his grassland from silage to summer mowing, one livestock farmer added buffer strips to his arable areas, and one farmer was encouraged to convert to organic production.

Dairy farm on species rich grassland and Natura 2000 conservation management

The Kordel family manages a dairy herd with 18 ha arable for cereal livestock feed and 80 ha of pasture. As well as managing around 35 ha grassland of high biodiversity value under an agri-environment scheme, the family is considering expanding its capacity to carry out conservation management on local nature reserves.

They already have a contract to graze a publicly owned Natura 2000 site, the Sangweiher SPA, important for migrating birds, and are thinking of setting up a herd of the endangered local breed Glanvieh, which are well suited to year-round extensive rough grazing and rearing their calves in the open.

Organic dairy farm management for the Natura 2000 species *Milvus milvus* and *Maculinea nausithous*

This organic dairy farm in the Westerwald region manages 200 ha of pasture, 70 ha of arable, and 10 ha of biodiverse habitat, including several areas of extensive grassland with populations of *Maculinea nausithous*, and an important breeding population of the Red Kite (*Milvus milvus*). The farmer has set up a herd of Scottish highland cattle in order to be able to offer grazing management of protected areas. Through Partnerbetrieb Naturschutz he is building up conservation management as an economically sustainable part of the farm business, as well as improving conservation management of these species, for example using additional measures for unmown strips and parcel management of hay meadows.

Large-scale hay meadow management with Angus beef cattle and horses

The Hof Kron on the Neumagener Plateau manages around 250 ha of extensive hay meadows and pasture. The extent of the area of connected hay meadows is unique, and contains many Natura 2000 habitats and species, including *Euphydrias aurinia, Maculinea* spp and *Lycaena helle* butterflies, as well as bird and plant species.

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Rheinland-Pfalz agri-environment scheme webpages
http://www.eler-paul.rlp.de

Rheinland-Pfalz Ministry of Environment, Agriculture, Food, Wine and Forestry (MULEWF) – Partnerbetrieb Naturschutz webpage
http://www.mulewf.rlp.de/natur/naturschutz/partnerbetrieb-naturschutz/

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Case Studies

Managing priority grassland habitats reliant on grazing

Creating a model of sustainable agriculture in Ireland

Agriculture and conservation in The Burren

The Burren (from the Irish *Boireann* meaning 'place of stone') is an area of limestone karst of over 72,000ha, located in the mid-west of Ireland on the Atlantic coast. It is one of Ireland's iconic landscapes and amongst the finest examples of a 'glaciated karst' landscape in Europe. The distinctive geology combined with thousands of years of agriculture practiced in the area have produced a unique set of conditions which makes the Burren one of Ireland's most important regions for its flora, fauna and habitats.

Managing this heritage requires an understanding of the integral link between the agriculture practiced in the region and its biodiversity. Due to the warmth retention of the underlying limestone, the calcium-rich habitats and the region's resistance to waterlogging and erosion, the Burren has been long valued for its capacity to store over-wintering cattle before stock were moved to other grasslands for the summer months. Grazing on these areas, known as 'winterages', during winter removes the plant material that builds up over the summer months and has been shown to produce ideal conditions for annual crops of flowers, among them gentians (*Gentiana verna*) and orchids (eg *Neottia nidus-avis*) to prosper in spring and summer (BurrenLIFE, 2010a). This 'hard grazing' of the winterages (ie up to the start of May) also helps prevent scrub encroachment. Excessive summer grazing, in contrast, is associated with a loss of species richness (Dunford, 2002).

An iconic landscape: limestone skeleton moulded by ice and etched by water (Sharon L. Parr)

The Burren also owes its rich diversity of species and habitats to the vast range of local factors (such as altitude, hydrology, soil depth and type, rock cover, and accessibility) as well as the overall composition of individual farms (such as the relative location and extent of upland and lowland grasslands and the size of land parcels), which are critical in determining management on individual units of land (Dunford, 2002).

Natura 2000, key habitats and species and agricultural management

In recognition of the environmental and cultural importance of the region, many areas have been designated as SACs. In total, there are three main terrestrial SACs in the Burren, covering an area of 30,400ha, incorporating 16 habitat types listed in Annex I of the Habitats Directive. The terrestrial SACs in the Burren are:

1. Black Head-Poulsallagh Complex SAC (5,572ha) along the north-western coast.
2. Moneen Mountain SAC (6,070ha) encompassing much of the central 'Uplands'.
3. East Burren Complex SAC (18,820ha) which contains much of the lowland region, and features extensive limestone pavement and oligotrophic limestone wetlands.

Priority habitats under the Habitats Directive that occur at the sites include: turloughs (3180), semi-natural dry grassland and scrubland on calcareous substrates (*Festuco-Brometalia*) (6210), calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (7210), petrifying springs with tufa formation (*Cratoneurion*) (7220), and limestone pavements (8240).

Non-priority habitats include alpine and boreal heaths (4060) and *Juniperus communis* formations (5130) on heaths or calcareous grasslands (5130).

The Lesser Horseshoe Bat (*Rhinolophus hipposideros*), which is listed in Annex II of the Directive also occurs, as well the Irish Mountain Hare (*Lepus timidus hibernicus)* and *Pine Marten* (*Martes martes*).

The habitats occur in an intricate mosaic in which the different plant communities change subtly from one to another along a continuum (Parr et al, 2009) and therefore the relative proportions of habitat types are difficult to assess accurately. Nonetheless, within the terrestrial SACs there are approximately 18,000ha of limestone pavement, 1,560ha of species-rich limestone grasslands, 275ha of turloughs, and 200ha of *Cladium* fens. The diversity and range of plant communities present are dependent on extensive agriculture practices.

Species rich grassland (Sharon L. Parr)

In recent years, a number of changes have threatened this relationship to the detriment of the environment.

Farmers have been increasingly required to take on additional work to supplement farm incomes which has meant less time to access remote areas. At the same time, there has been a move away from a mixed farm system based around beef cattle 'stores'[1] to one almost completely dominated by suckler cows[2], in response to market demands driven by consumer tastes and accelerated by the 'Suckler Cow Premium Scheme', a headage payment designed to provide direct support to suckler cow producers.

These in-calf cows require more care and supplementary nutrients and as a consequence, farmers have steadily reverted to silage feeding on winterages or indoor housing and feeding (BurrenLIFE, 2010b).

This reduces foraging and contributes to abandonment of winter-grazed grasslands and, in some cases, to point source pollution of water resources.

[1] Store cattle are those kept on a low level of growth (often over winter) prior to fattening or 'finishing' when grass/fodder becomes more readily available (definition as per Dunford, 2002)

[2] Suckler cows are those whose primary function is to produce and nurture offspring.

Measures implemented to address conservation needs

Agri-environment schemes

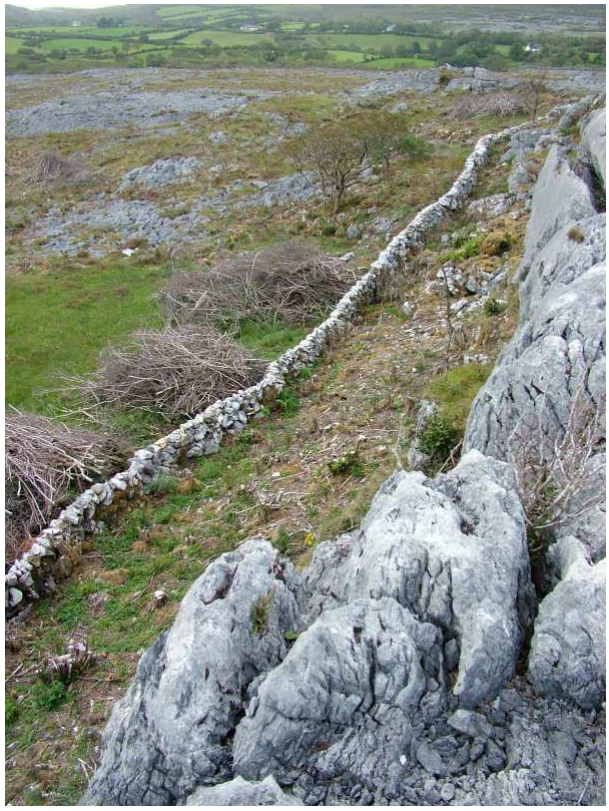
Since 1995, there has been a specific agreement tailored for the Burren under the main agri-environment programme in Ireland, the Rural Environmental Protection Scheme (REPS), which sought to limit summer grazing and supplementary feeding on upland grasslands.

In 2000, a high proportion of the farmers (some 70%) in the Burren were in REPS, in part due to inherently extensive nature of farming in the area. Nonetheless, REPS did not deliver sufficiently proactive or targeted improvements on priority habitats to maintain their conservation status. Farmers complained about the lack of flexibility in REPS, such as the prohibition of any summer grazing on winterages, which limited their ability to respond to exceptional circumstances such as disease or extreme weather conditions.

Farmers meeting (Brendan Dunford)

The pilot scheme - 'BurrenLIFE'

The BurrenLIFE Project (BLP) was initiated to develop a model of sustainable agriculture that could be extended to the whole of the Burren region. In total, 20 pilot farms were selected, covering over 2,485 ha of farmland designated as SACs, to work with the BLP in developing new interventions and monitoring their impact. Individual farm plans were drawn up, and revised annually, following in-depth consultation between the farmer and the project team. Farmers could nevertheless opt out of all measures on their own discretion. Compensation was made for completed actions, at a rate of between 25-75% of total costs; those actions with a greater conservation value had a higher proportion of their costs paid for. It ran for five years between 2004 and 2009, with a total budget of €2,230,487.



Removing scrub, repairing walls (Brendan Dunford)

Main successes/outputs of the pilot scheme

The BLP pilots resulted in the development of a blueprint for sustainable agriculture in the Burren, which succeeded in extending winter grazing on traditional winterages by 25% (as measured in terms of time spent on winterages, i.e. grazing days). This was achieved through:

- Improving access to winterage sites by clearing scrub from 55 km of paths and constructing 5 km of trackways.
- Installation of water pumps and tanks to address severe water shortages.
- Restoration of 15,000 m of internal stone walls to facilitate animal husbandry.
- Scrub clearance over 100 ha of priority habitat.
- Development of a low cost concentrate feeding system to meet the high nutritional requirements of suckler cows over the winter periods, resulting in a 61% decrease in silage use.[3]

[3] http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=2661

The BLP was able to produce a set of accurate costs for these various conservation works, as well as developing a series of best practice guides on grazing, feeding, scrub removal and farming for conservation. Monitoring of the impacts of these measures on priority habitats, water quality, animal health and farmer income found all had a positive impact, suggesting that in future a menu of such measures would be required for the conservation of priority habitats.

The enlarged scheme – 'Burren Farming for Conservation'

As a result of the favourable outcomes of the BLP and strong support from the local farming community, a follow up programme, called the Burren Farming for Conservation Programme (BFCP), was announced by the Irish Government in 2009.

It is funded under Pillar 1 of the CAP by the Department of Agriculture with a budget of €1 million per annum over four years (2010-2013) using funds under Article 68(1)(a)(i) of EU Regulation 73/2009, which amongst others, allows Member States to pay for specific types of farming which are important for the environment.

Its objectives include ensuring the sustainable agricultural management of high nature value farmland across the Burren and maintaining or enhancing the conservation status of Annex I habitats.

While participants are provided with advice on how to maximise the environmental benefit from their land (via a site visit, development of farm plans and provision of best practice guidance), farmers are expected to use their own initiative to create the optimal crop of species-rich grasslands. Actions and priorities are therefore suggested by the farmer; the BFCP team (funded by the National Parks and Wildlife Service) will then advise on which actions the scheme can support.

The scheme is structured around three measures for which farmers can receive compensation. These measures are:

1. Production of species-rich limestone grassland.
2. Capital enhancement works (including scrub removal) on Annex I habitats.
3. Protection of designated land and other areas of Annex I habitat

The innovative compensation arrangements developed for the scheme are considered key to achieving the outcomes desired. The measure 1 payment for the production of species-rich grasslands is based on field-level assessments of habitat condition and environmental services delivered. Each Annex I field is given a score of between 0-10 (where 0 is very poor and 10 is exemplary), based on criteria including grazing levels, feeding systems, scrub and weed encroachment, condition of water sources and site integrity[4]. This score, out of a proportion of ten, is multiplied by the field area (ha) and by the maximum payment per hectare (€120 for the first 40 ha, €60/ha for 40-80 ha, and €30/ha for 80-120 ha) to determine the payments made for that field[5].

Payment ranges under Measure 1 of the BFCP

Payments for measure 2 actions for capital enhancement are made at rates of between 25-75% of the total costs, depending on the relative environmental benefits provided, as in the BLP.

All works are proposed by the farmer and individually mapped and costed by a trained advisor.

Requirements of payments include the cessation of silage feeding in all Annex I habitats (both those designated and not designated) and meeting cross compliance and GAEC requirements on the whole farm. Payments are made only following satisfactory compliance checks of outcomes delivered.

Complementary actions: labelling

4 This measure is intended to be outcome focussed. However, as water bodies are principally subterranean, and hence more difficult to test their quality, the contribution of a farmer to good water quality is ascertained through the adequacy of measures to prevent water pollution (such fencing off water flows from cattle etc.)

5 Hence a field of 5 ha which receives a score of 8 will receive (8/10) x €120 x 5 ha = €480

The Burren Beef and Lamb Producers Group Limited (BBLPG) was established under BurrenLIFE as a co-operative to produce quality meat from a quality environment, with the intention of boosting farmer income. It focussed its efforts on niche marketing and supplying local restaurants and farmers' markets.

However, despite a strong brand and farmer support, it required the input of a part-time coordinator to manage the logistics (e.g. collection of animals for slaughter, engaging with buyers, marketing etc.), which could not be funded without external assistance. It therefore became non-viable once BurrenLIFE was completed and is only likely to be revived in the future if external funding support can be obtained, for example via regional funds and/or as part of a broader marketing effort.

Restoration grazing (Brendan Dunford)

Success factors, constraints, opportunities and threats

Main outputs of the scheme

Initially projected to include 100 farms, the BFCP received applications from around 350 farmers from a total eligible number of between 400 to 500 farmers. As of December 2011, i.e. the end of Year 2, 143 farmers were included under the programme, impacting an area of 13,250 ha. This includes 39% of Black Head/ Poulsallagh Complex, 60% of Moneen Mountain SAC and 38% of the East Burren Complex SAC (BFCP, 2012). The BFCP has seen the introduction of a number of local innovations including solar water pumps, rainwater harvesters, a traditional Burren gate design and the use of bladed strimmers and chippers for scrub work.

The targeted grazing and feeding system, developed during the BLP, has greatly enhanced the sustainability of farm operations and has been a key element in achieving conservation benefits and efficient agricultural production (BurrenLIFE, 2010c). The new BFCP incentive scheme appears to have resulted in a greater proportion of high 'habitat condition scores', in year 2 of the scheme (BFCP, 2012).

The targeted conservation work (scrub clearance etc.) has had the added positive social impact of creating much needed employment in the area and increased knowledge transfer and skills retention. In addition, agricultural monitoring of animal health under the BurrenLIFE regime demonstrated that cattle's annual nutrient requirements are fully met (BurrenLIFE, 2010c).

Main success factors (and strengths) of the scheme

The high level of interest from farmers in the BFCP demonstrates their perception of the programme as a positive development rather than a burden. Probably the most important factor to which this success can be attributed was the decision to make all the actions farmer-led. This feature demonstrates a recognition by the BFCP team that farmers are the foremost experts on their own land and avoids any impression of imposing measures on farmers.

Despite lower maximum payments per hectare than those offered under the REPS (€120/ha top rate compared to €242/ha under REPS), this arrangement appears to be viewed more favourably by farmers. In addition, the partial payment of infrastructural improvements (under measure 2) incentivises the farmer to select those actions that overlap with his/her own priorities, and therefore are more likely to be carried out and maintained to a high standard.

The BFCP provides greater flexibility in grazing of winterages than the pre-existing REPS scheme, by measuring outcomes rather than the completion/omission of actions. This addressed farmers' concerns of restrictions on their ability to respond to exceptional circumstances such as weather and market conditions and disease.

This method also ensures tax-payer value for money compared to payments under REPS and rewards those who have historically managed their land well while presenting new farmers with an opportunity to improve.

Interestingly, farm plans designed under the BLP were long (typically about 14 pages), but these

were reduced to 2-sides of A3 under the BFCP; one side a map of the farm identifying important habitats, cultural features and proposed actions, and the other a list of actions with a costing attached to each one.

Importantly, the programme succeeded in communicating to farmers the environmental benefits these measures could provide to themselves and their communities, who are the first users of the environmental resources of the area, including water quality and landscape amenity, rather than attempting to convince them of the need to satisfy external stakeholders or EU demands.

The project successfully forged strong partnerships between important stakeholder groups and agencies that represent different interests. The project also succeeded in raising awareness amongst the conservation community of the vital role of farmers. The project was helped by the sound scientific basis for all conservation work and strong support from the local farming community.

Weaknesses & constraints identified in the pilot scheme

The main weakness of the program currently is that it requires on-going financing from the government and is therefore potentially subject to change. Most of the programme sites are in private ownership and thus control over future management is limited. Despite the strong support in the community, the BFCP cannot accommodate all the interest due to restricted funds. There is also a considerable paper work required to obtain permissions for any actions that may influence the integrity of cultural monuments.

Opportunities for the expanded scheme

There is considerable opportunity to expand the basic principles of the scheme to other parts of the country and the broader European community, as they are replicable and very simple. Ironically, the economic downturn has signalled a return in interest in farming due to limited economic alternatives and a better availability of competitively-priced skilled local workers.

Capacity exists to continue the innovation led by farmers, which has led to new local businesses (such as the manufacture and design of gates, and solar panel pumps).

Threats & challenges facing the expanded scheme

The main threat to the program is the uncertainly around the continuation of funding, which runs until the end of 2013.

The increasing bureaucratic burden involved in securing permission to undertake conservation works in such a heritage-rich and highly-designated landscape as the Burren is also a huge challenge.

Also, average farmer age in the region continues to rise, with slow replacement from young farmers, signalling an imminent loss of knowledge, and traditional management skills and expertise.

There is also a poor outlook for the viability of livestock sector, particularly in marginal areas, as farmers cannot realistically increase livestock numbers without increasing farm size.

Conclusions: demonstration value for other areas and countries

The BFCP encourages a highly targeted, well researched and locally appropriate set of measures which have been shown to produce environmental benefits. A key component of the popularity of the scheme amongst farmers is the freedom given to farmers to carry out the actions they deem most appropriate (i.e. farmers are allowed to 'opt-in') as well as the output-based payment system which farmers feel is 'tough but fair'.

The new BFCP provides an incentive to raise the overall land quality and change the management of the farm, through the scoring and payment of a range of environment criteria, and thus incentivising farmers to significantly alter their farming practices.

The new scheme has already succeeded in convincing a very high proportion of farmers to move away from feeding silage on sensitive grasslands, - a huge change which previous schemes had failed to achieve. Even in its early stages the BFCP is beginning to show promising improvements in habitat condition.

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Case Studies

Grassland management to enhance biodiversity in Krkonoše National Park, Czech Republic

Tall-sward grassland with *Hieracium aurantiacum* (Habitat 6520), Velká Úpa (NP Krkonoše Administration)

A Natura 2000 site influenced by environmental and agricultural policy

The Krkonoše (Giant Mountain) Natura 2000 site is located on the mountain range located in the north part of the Czech Republic, along the border with Poland. The Czech-Polish border, which divides the historic regions of Bohemia and Silesia, runs along the main ridge. On both sides of the border, large areas of the mountains are designated national parks and constitute a cross border biosphere reserve under the UNESCO Man and the Biosphere program.

Forests cover more than 80% of the Giant Mountains. The rest, which includes the area where the river Elbe rises, is covered by meadows, wetlands and flower-rich mountains meadows of the montane belt, natural alpine grasslands and subarctic wetlands of the summit plateaux, vegetation on siliceous rocky slopes, tall herb alpine meadows and shrubs vegetation of the avalanche slopes of the glacial cirques, and lichen tundra and boreal heaths of the highest peaks.

Agriculture and cattle raising represent an important source of income in the area, together with tourism. Farming in the region is influenced by various strategies and policies, among which the Rural development Programme, the National biodiversity action plan and the State Programme of Nature Conservation and Landscape Protection are the most important ones.

The National biodiversity action plan aims to maintain and restore species-rich grasslands as an integral part of agricultural management of the landscape. The plan supports sustainable use of grasslands in mountains areas through extensive farming and specific restoration actions. Among the main priorities there is also the development of environmentally friendly forms of tourism in mountain areas respecting the landscape and natural values of the territory.

Habitats depending on agriculture

The area is dominated by forest habitats with a mosaic of semi-natural habitats and small fields of arable land in lower parts. Hay mountain Melandrium meadows (*Melandrio rubri-Phleetum alpini*) and species-rich sub-alpine Nardus grasslands (*Thesio alpini-Nardetum strictae* and *Sileno vulgaris-Nardetum*) are the most valuable habitats in terms of biodiversity. The key habitat

types related to agricultural use are described below.

Mountain hay meadows (6520) cover 1,194 ha in the SCI and represent the most widespread grassland type on the most productive soils in higher altitudes. The unique mountain Melandrium meadows (*Melandrio rubri-Phleetum alpini*), which are an association endemic to Krkonoše, belong to the most endangered type of this habitat. It became exceptional notably due to the coexistence of alpine plant species (*Campanula bohemica, Phleum rhaeticum, Poa chaixii*), moist meadow species (*Deschampsia cespitosa*) and common meadow plants (*Achillea millefolium, Hypericum maculatum* and *Ranunculus acris*). These habitats also host several plant species of European importance, as *Campanula bohemica, Galium sudeticum, Gentianella bohemica, Pedicularis sudetica*.

Grasslands in the locality "Klínové boudy" (Záboj Hrázský, DAPHNE CZ).

Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) represent the most common type of meadows in Krkonoše, covering 1,610 ha in the site. The biodiversity value of this habitat (6510) is still significant, even though relevant parts have been degraded over last decades due to intensive agricultural practices.

Species-rich sub-alpine Nardus grasslands on siliceous substrates in mountain areas (Thesio alpini-Nardetum strictae) (6230*) cover only a few tens of hectares of the site. The association includes Nardus grasslands that host mountain grassland species (*Phyteuma spicatum, Potentilla aurea*), meadow species with their optimum at lower altitudes (*Luzula campestris, Silene vulgaris, Leontodon autumnalis*) and plant species of the high altitudes (*Rhinanthus pulcher, Ranunculus platanifolius, Gentiana asclepiadea, Solidago virgaurea*).

Habitat 6230, complex of peat meadows, Natural monument Slunečná stráň (NP Krkonoše Administration)

These habitats were traditionally used by extensive farming, typically mowing and/or grazing by goats, sheep, and cattle. Agricultural activities (including crop and livestock production) are carried out mostly in the buffer zone of the national park, partly on arable land re-grassed in the 1990s.

Currently, grasslands are threatened by both inappropriate agricultural practices and intensive farming. Consequently, Nardus grasslands face the overgrow of invasive species such as *Senecio ovatus, Hypericum perforatum, Bistorta major* or of *Nardus stricta*. Moreover, marginal and economically less profitable areas (e.g. distant areas) are threatened by abandonment that results in habitat degradation.

The area is managed by different type of agricultural enterprises, from small, family owned to large scale farms. Traditional farming practices for maintaining good favourable status of grasslands are practiced mostly by family farms on small patches and remote areas. The majority of valuable habitats are managed by large scale farms that prefer intensive farming (usually on the areas situated close to animal housing).

Apart from single direct payments (SAPS), farmers depend on agricultural subsidies such as Aid to farmers in less favoured areas (LFA) and agri-environmental measures (organic farming, grassland maintenance, permanently waterlogged and peatland meadows, bird habitats on grassland – corncrake's nesting site).

Finally even though the local economy is based on tourism, it is not sufficiently connected to agro-tourism.

Measures implemented to enhance biodiversity

Natura 2000 management plan

Since 2010, grassland habitats are managed according to the Management Plan of the National Park and the SCI Krkonoše that define conservation priorities and agricultural practices for the following ten years. According to the plan, favourable conservation status of grasslands (habitats and species) should be maintained as well as connectivity and coherence of existing ecosystems.

The plan calls for economically effective and environmental-friendly ways of farming in grassland areas (e.g. extensive grazing, regulation of water regime, limited fertilization, etc.). The plan also promotes the identification of new sites to be maintained as grassland habitats, as well as the establishment of monitoring and assessment of sites under RDP schemes.

Rural Development Programme

The Rural Development Programme represents the most important fund for maintenance of biodiversity on grasslands, in terms of supporting extensive farming practices and budget volume. However, agri-environmental measures (AEM) in the Czech Republic are still criticised for not being efficient in habitat and species conservation. They propose schemes and financial settings that do not encourage farmers to diversify or change their agricultural practices towards biodiversity enhancement. Moreover, the implementation of agri-environmental policy has contributed to the unification of landscape structure. Also, the AEM do not motivate farmers to manage less profitable land that has an important biodiversity value.

Therefore, both public and non-governmental nature conservation bodies took an initiative and proposed a model of farm planning that integrates so called "nature-friendly management". The concept of nature-friendly management aims to maintain and improve the status of habitats through farming that is economically viable and well adapted to local conditions.

The concept supports extensive farming while taking into account territorial needs, landscape structure and local biodiversity priorities for habitat and species protection, including animal species. It is a complex approach integrating measures on farm level supported by environmental planning on the municipality level, by an advisory system and by raising environmental awareness of farmers.

The concept of nature-friendly management has been developed within a project (2010-2012) in two pilot areas, one of which is the SCI Krkonose. The project supported by the State Environmental Fund and by the Ministry of Environment, proposed agricultural practices targeted to habitats and species at farm level. Plans are proposed to be developed for protected areas and Natura 2000 sites and to be an integral part of the agri-environmental schemes within the Rural Development Programme.

The measures under farm plans are targeted to species rich grasslands and to selected species of national importance and of European importance under the Habitats and Birds Directives (like *Crex crex*). The aim is also to harmonise measures for the protection of different species and habitats on farm level in order to avoid biodiversity degradation due to inappropriate farm practices supported from various policy instruments (e.g. removal of shrubs under AEM could be harmful for certain butterflies).

Farm plans should be evaluated on the basis of available data and documents such as the management plan of the protected area, biotope mapping, database of nature conservation, etc.

Besides the description of the natural values present on the farm, the farm plan defines detailed management prescriptions for each polygon of farmland. A list of available measures will be based on existing agri-environmental measures for 2014–2020, accompanied by specific measures for grasslands and arable land.

Winter pasture regenerates during summer, while sheep are grazing higher naturally valuable areas at higher altitudes on request of the Krkonoše National Park Administration. (NP Krkonše Administration)

As regards the measures, emphasis is put particularly on more flexible late mowing, diverse grazing regimes, support of partial (strip, mosaic) mowing, decrease of livestock per hectare, and support of exceptions from general rules with permission of a nature conservation authority.

Moreover, the plan may include specific prescriptions for the protection of certain insect species (e.g. parcels without management), for bird protection on meadows (e.g. mowing from centre), or on arable land (e.g. decrease use of fertilisers), etc.

The plans of nature-friendly management cover only practices on farmland, they do not include other measures such as water management, soil protection, as these are covered by other tools of CAP (e.g. cross compliance)

An efficient advisory system and regular communication with farmers contributed to increase the environmental awareness. Consultations with famers appear to be a very efficient tool that contributed to elaborate farm plans well adapted to farmers' needs as well as to biodiversity conservation priorities.

Advisor's work in field (NP Krkonoše Administration)

The project should be completed by management plans for municipalities that propose measures for Natura 2000 site within the framework of spatial planning at the local level (on the scale of the cadastre) based on landscape protection and diversification of activities.

These Management plans for the municipalities also define requirements for habitat management, so as to contribute to reach the overall objectives of the Natura 2000 site (e.g. green belts, grasslands in built areas of villages).

Main lessons learnt

Grassland habitats in mountains face enormous challenges of socio-economic viability today. As intensive farming expands and as incomes rise in the wider economy, it becomes harder to earn a living from farming in mountains regions.

Therefore, there is a need for aligning policy support to small scale and HNV farms in Natura 2000 sites. The approach adopted in the Krkonoše Natura 2000 site, which involve the elaboration of farm plans as "flexible" components within the agri-environmental schemes, represents a potential solution for better targeted grassland management.

The Czech Republic is currently engaged in a process of harmonising farming in Natura 2000 with other policy instruments, in particular with agri-environmental schemes. Examples from Natura 2000 sites such as SCI Krkonose should be considered during the process of revision of the Rural Development Programme for the Czech Republic.

Otherwise there is a serious risk that without implementation of farm plans, support of Natura 2000 sites within the AEM will support only large scale unified agricultural practices that do not promote maintenance of favourable status of grassland habitats. Moreover, farmers tend to choose relatively simple practices with highest payments against labour demanding measures.

Efficiency of farm planning depends greatly on the structure of the farm plans, the methodology of their evaluation, the advisory services, the efficiency of integration of scientific and agricultural data (e.g. grassland inventory) and the associated level of support. There is a need to analyze how such an instrument can better address extensive grassland farming and deliver more targeted grazing schemes benefiting habitat and species conservation.

Agricultural policy instruments will only be successful if the interaction between policy measures and farming systems, and the impact of such interactions on the ecological functions of grasslands, is understood. A Detailed catalogue of measures under agri-environmental schemes should be developed as well as effective methodologies for assessment of the target habitat types and species. It should be noticed that there is still limited knowledge about the effects of different techniques on the habitats. Therefore it is important to establish effective monitoring.

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Case Studies

Management and restoration of alluvial grasslands in the Morava river floodplain of Slovakia

Regular floods influence strongly dynamic of grassland ecosystems in the Morava river floodlains area (DAPHNE)

The Morava River Floodplain

The Morava River Floodplain is an important wetland in the border area of Slovakia, Austria, and the Czech Republic. On the Slovak side, the large complex of well-preserved and species-rich alluvial meadows has been designated as a Natura 2000 site (Šeffer & Stanová 1999). The wetland has also been designated as a protected landscape area since 1989 and as a trilateral Ramsar site since 1993.

The Iron Curtain closed public access to the Morava river floodplains for 40 years in the last century, preserving a large area of unique grassland habitat. Due to the regular flooding, grasslands are naturally highly productive, providing excellent hay for local farmers, especially for horses (Lasák et al. 1999). Meadows were traditionally mown two or three times per year without any additional fertilizers or aftermath grazing. Grazed pastures occur only on a small part due to the regular floods.

In the 1950s, a part was intensified with mineral fertilization and re-seeding, and around 20% was converted to intensively used arable land, that destroyed the biodiversity. However, the main problem causing degradation and loss of grassland habitats is land abandonment, as in the whole of Slovakia.

Land abandonment is partly the consequence of inefficient agricultural policy and challenges to the socio-economic viability of extensive farming in difficult environmental conditions (such as regular flooding), and partly a result of the decrease in agricultural production and number of farmers after the political and economic changes in the post-Soviet period and the 2004 accession to the EU.

During the last two decades, the floodplain has benefited from many projects focused on conservation and restoration of habitats as well as rural development and tourism, as the area is attractive for tourism.

These projects are funded from different EU and national and international sources (e.g. PHARE, GEF). From 2002, pilot agri-environment schemes were established under the pre-accession SAPARD programme, and since 2004, almost all of the area benefits from agri-environment payments.

Natura 2000, key habitats and species and agricultural issues

The Natura 2000 site is located in the northern part of the Great Pannonian Lowland and represents a typical Pannonian floodplain landscape strongly influenced by a regular flood regime.

The site has a mosaic of wetlands, alluvial grassland, floodplain forest habitats, and water bodies (oxbows, former river meanders, etc.). Actively used arable land occurs only on small parts on upper elevated sites. The Natura 2000 site includes 1913 ha of grassland habitats (Šeffer & Stanová 1999), including three Annex 1 habitats that strongly depend on agricultural activities (6440, 6510, 6410). Alluvial meadows of the *Cnidion* alliance (6440) (*Cnidion venosi* Bal.-Tul. 1965) are the key grassland habitat covering the most important part of the site.

These meadows used to be mown two times per year (at the end of May – beginning of June and September - October); historical references mentioned also an exceptional third mowing (Seffer et al. 1999). The site consists of the SCI Devínske lúky, SCI Devínske alúvium Moravy, SCI Devínske jazero, SCI Horný les, and SCI Gajarské alúvium Moravy, and the SPA Morava for the protection of wetland bird species.

Grasslands are mowed two times per year (and partly grazed) while considered to be high-quality forage especially for feeding horses (DAPHNE)

The main conservation objective for the site is the protection of favourable conservation status of the semi-natural and natural habitats through extensive farming. Habitat management is combined with special management for specific animal species, such as mosaic mowing management (birds, butterflies).

Floodplain grasslands host several species in the Habitat and Bird Directives annexes. The butterfly species *Maculinea teleius, M. nausithous,* and *Lycaena dispar* are closely connected with traditionally used alluvial meadows (Ružičková et al. 2007). These species were adapted to traditional mosaic mowing as the site was never mown at once.

Mosaic management is also important for *Crex crex* especially in the years with shorter flood periods. In contrast, other bird species of European importance like *Lanius collurio* or *Ciconia nigra* may benefit from large-scale mowing, because freshly mown grasslands are very attractive food sources.

These examples illustrate that balancing the different management requirements for both species and habitats on the site is very complex.

Nature conservation objectives and measures on the floodplain

The main nature conservation objective is to improve the overall conservation status of the Natura 2000 area through:

1) large-scale restoration of floodplain meadows (transformation of arable land to grasslands on 103 ha),
2) introduction of habitat specific management through extensive farming practices on 1900 ha.

Actions under both objectives were implemented by DAPHNE - Institute of Applied Ecology, an NGO, in cooperation with the State Nature Conservancy. Concrete conservation measures were funded from global (GEF/WB), and European (PHARE) funds, coupled with existing national programmes and agricultural subsidies.

Main results and lessons learnt from the experience

A large-scale restoration scheme for 103 ha of arable land was begun in 1999. The abandoned land had pioneer ruderal vegetation with heavy infestation of the invasive plant *Aster-novi belgii* agg. The land was seeded by local seeds collected from species-rich meadows, and islands of high diversity were created through the transfer of turfs (1m x 1m) from high

biodiversity grasslands. All restored areas have been regularly mowed at least once per year.

Changes in vegetation composition have been regularly monitored. Although a significant increase in the number of meadow species has been observed, the restored grassland has still not reached the biodiversity of species-rich floodplain meadows in the area, probably due to the limited dispersal ability of floodplain grassland species. The transplanted turfs enhanced diversity in a limited area, but plant species dispersal has not been sufficient to recolonize the whole restored area (Galvánek 2011).

Intensive consultation with farmers and site managers

The whole planning process for the Moravian River Floodplain, including the definition of the area proposed for restoration, agricultural practices and restoration techniques, as well as follow-up management, has been carried out in detailed consultation with local farmers and site managers. At the beginning of the process farmers had a very negative or vague attitude often associated with negative experiences with past nature protection initiatives.

Representatives of DAPHNE started a long negotiation process with farmers in order to explain the benefits of nature conservation. After several meetings, farmers started reconsidering their attitudes and 4 out of 11 large-scale farms agreed to participate on restoration schemes. The whole process was supported by "classical" PR and communication instruments, such as a brochure on wise use of grasslands, leaflets and thematic seminars.

Floodplain grassland 12 years after restoration on arable land near the village Suchohrad (DAPHNE)

Facilitatory role of NGO enabled a better agri-environment policy

Importantly, the Ministry of Agriculture used the consultation results in the preparation of the agri-environmental programme. DAPHNE functioned as facilitator not only between the Ministry of Agriculture and farmers but also between the Ministry of Agriculture and the Ministry of Environment, that crossed the "strict line" between agriculture and nature.

Regular bilateral meetings and better insight into complex issues such as nature conservation on farmland helped to find consensus and harmonised priorities to certain extent.

Establishment of agri-environment measures for semi-natural grassland

The CAP agri-environment measure (AEM) is the most important financial instrument for supporting extensive farming on grasslands in Slovakia. DAPHNE developed a strong initiative to integrate biodiversity protection into AEM through habitat specific agricultural practices.

In 2004, Slovakia adopted a new agri-environment programme that defined specific agricultural practices for four (and later for seven) different habitat types. These habitat types were defined on a national level according to the National Grassland Inventory (Šeffer et *al.* 2002).

Slovakia's grassland inventory is not only one of the best developed in Europe, but also the one best integrated into agri-environment support, though it needs to be updated. The AEM for semi-natural grassland now only supports areas recognised as having a minimum biodiversity value (High Nature Value), including Natura 2000 sites.

It should be mentioned that the AEM does cover the specific needs of each Natura 2000 site. Management of grassland is defined per specific habitat types grouped into seven categories: Dry Grasslands, Mesoic grasslands, Mountain hay meadows, Wet grasslands of lower altitudes, Alluvial Cnidion grasslands, Wet grasslands of higher altitudes, Fen and *Molinia* meadows, High-mountain grasslands.

Agricultural practices under AEM defined for different ecological groups of habitats confirmed to be very effective instrument for integration of biodiversity element into agri-environmental schemes. Farmers adopted the system and term

"biotope" is used frequently by farmers. However, as the AEM is applied nationally without considering regional differences, there are still gaps in grassland management in some parts of Slovakia.

Conclusions: demonstration value for other areas and countries

The Moravian River Floodplain is a typical case for floodplain management in the country – for example, a similar project is on-going in the eastern part of Slovakia on the Laborec-Uh river floodplain.

After a very good start, grassland management on the floodplain is being affected by decreases in agricultural payments and by socio-economic development. In spite of these pressures, restoration of grassland and control of invasive species continues, and extensive farming is still supported through AEM. Based on the lessons learned, recommendations for nature conservation management of Natura 2000 areas in Slovakia are:

- Intensive communication and consultation with farmers is key

The large scale restoration project succeeded due to the intensive communication and negotiation with farmers. Personal meetings seem to be much more effective than any other communication means. Farmers often have prejudices and their opinion is influenced by other farmers or stakeholders. Therefore it is important to explain all aspects of nature conservation measures in detail. However, Slovakia still has no effective advisory system that would provide farmers with sufficient information on management of Natura 2000 sites and on available subsidies. This contributes to inappropriate farming in Natura 2000 areas.

- Well-targeted agri-environment programmes need to be based on monitoring and research

Slovakia's well-targeted agri-environment programme based on data from the National Grassland Inventory and the latest research on grassland management practices provides a good basis for the implementation of long term extensive farming practices in Natura 2000 areas.

- Agri-environment schemes need to include small scale farmers

Many Natura 2000 areas in Slovakia are managed by very small scale farmers. These farmers often fall outside the administrative, book-keeping and inspection system for CAP payments, and do not receive any subsidies, or they receive only SAPS payments. This situation is typical for marginal and mountainous Natura 2000 areas.

Small farmers are often discouraged from even applying for support by unattractive payments combined with relatively complicated administrative procedures, or just lack of appropriate information. The current agri-environment system is more favourable for large-scale cooperatives.

As small farmers are important for Natura 2000 site farming, the way they will operate in the future may have a significant impact on grassland management. Therefore, agri-environmental schemes and other rural development measures need to be more accessible for this group of farmers in terms of agricultural practices and administrative procedure.

One solution is to make it possible for farmer cooperatives or associations to sign a joint agri-environment agreement, rather than signing agreements with individual farmers. Conservation organisations such as NGOs often play a crucial role in bringing together the farmers and communicating conservation objectives to them.

- Regional, landscape- based approach to agri-environment schemes

Agri-environmental schemes for Natural 2000 sites should be designed and implemented so that they benefit biodiversity on a regional scale, not just in small patches in the landscape. The definition of regional objectives coupled with a collective approach will provide space for more coherent actions on landscape scale and enhance the environmental impact of AEM, as well as contributing to simplifying the administrative procedure in order to encourage small farmers to participate.

Farmers in Natura 2000 areas should be encouraged to apply AEM on the whole farm. Therefore there is an initiative to develop "farm plans" consisting of specific agri-environmental prescriptions for farms operating in Natura 2000 areas. However, in spite of the considerable

benefits of farm plans and the collective approach, there are a number of administrative, technical and social aspects that need to be considered.

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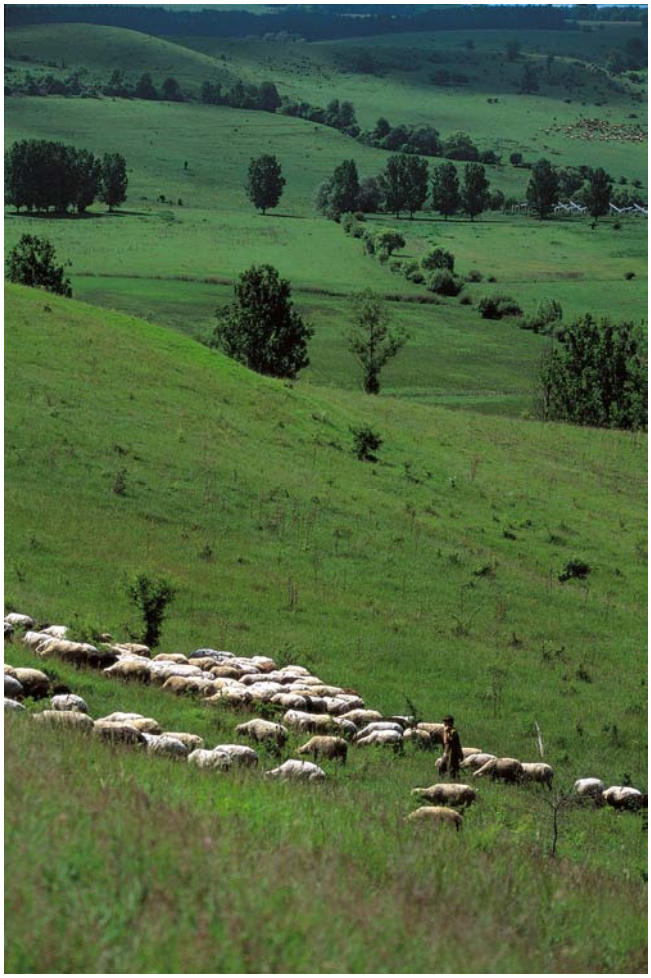
Case Studies

Tarnava Mare. Supporting farmers in Natura 2000 in Transylvania, Romania



Sheep and cattle grazing in Viscri, Tarnava Mare area (Min Wood)

Romanian biodiversity and agriculture

Romania has very high diversity, with 5 biogeographical regions, and varied topography from low-lying areas along the Danube Plain to the heights of the Carpathian Mountains, which curve through the centre of the country. 35% of Romania's agricultural land is Less Favoured Area (LFA). This varied climate and topography supports very high biodiversity - for example, the Carpathian Mountains are home to 60% of Europe's Brown bears, 40% of Europe's wolves, and 35% of Europe's lynx. It also supports a wide range of arable, livestock, fruit and other farming systems.

Land use patterns vary considerably across Romania. Arable and more intensively farmed areas are in the south and east of the country, where 85% of agricultural land is arable and only 9% permanent pasture and 6% forest. Livestock farming and permanent grasslands are concentrated in the north and west of Romania, where less than 20% of agricultural land is arable, 50% permanent grassland and 30% forest.

Romania's population is remarkably rural by EU standards, with 48% of the population still living in rural areas. Farming is chiefly subsistence and semi-subsistence. There are about 3.8m holdings in Romania, of which 68% are under one ha and thus are not eligible to receive direct payments. Of the 1.2m holdings over 1 ha in size, 90% are under 5 ha. These small farm sizes are not economic, and rural depopulation and ageing is a problem. Since the accession of Romania to the EU in January 2007, livestock (especially dairy cow) numbers have fallen significantly. The decrease of extensive dairy farming has affected landscape management and grassland biodiversity, as a result of abandonment, intensification, and conversion of large areas from cattle grazing and hay-meadows to sheep grazing.

The most striking aspect of Romania's farmed landscape is the ecologically well-preserved semi-natural grasslands: the extensively grazed areas in the uplands, and the mosaic landscapes of mid-altitude areas. The Carpathian and Sub-Carpathian regions of Romania probably have Europe's greatest area of wildflower-rich semi-natural grasslands, of particular importance because of their associated biodiversity, and because they are still in ecological working order.

Natura 2000, key habitats and species, and agricultural issues

The Tarnava Mare area was declared a Natura 2000 Site of Community Interest (SCI) in 2007. It covers 85,374 ha within the southern bend of the Carpathians with approximately 35% grasslands (pastures 16,400 ha, meadows 17,250 ha), 43% forest (41,500 ha), and 6.5% arable (6,000 ha). It is a High Nature Value farmed landscape, one of the largest Continental (lowland) Natura 2000 sites in Romania, and a source of livelihoods for over 20,000 people scattered in 24 small villages, almost entirely dependent on small-scale farming for their income. It provides very significant public goods including high biodiversity, clean water, food security, climate change mitigation, natural and farmed habitat resilience, resistance to fire and floods, recreation, and cultural/aesthetic values.

80% of the area overlaps with an SPA, Podisul Hartibaciului, and so is covered by both the Habitats Directive (HD) and the Birds Directive (WBD). At least 60% of the grassland area is made up of Annex I habitats associated with agriculture: Sub-continental Peripannonic scrub (40A0*); Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) with important orchid sites (6210*); Sub-Pannonic steppic grasslands (6240*); and Lowland hay meadows (*Alopecarus pratensis*, *Sanguisorba officinalis*) (6510). There are also significant areas of managed forest (habitat types 9110, 9130, 91E0*, 91V0, 9410, 9420, 9160).

Wildflower-rich grassland habitat 6210* (Tibi Hartel)

The extensive semi-natural vegetation supports a remarkable diversity of flora and fauna including numerous Annex I and II* species. Of the 600 flower species identified in the area, many represent plant communities that have disappeared elsewhere in Europe. 5 plant species are listed in Annex I or II*, and 77 species are on the Romanian Red List. There are 5 Annex I and II* mammal species, 8 Annex I and II* invertebrate species, and 47 bird species listed in the Birds Directive.

The key habitats and species being conserved within this Natura 2000 site, and the management measures they need are:

- Mammals: *Canis lupus*, *Ursus arctos*. Measures: maintain landscape mosaic and connectivity;
- Lepidoptera: *Lycaena dispar*, *Maculinea teleius*, *M. arion*. Measures: maintain damp and dry grasslands especially late-cut meadows, by controlled grazing (establishing minimum and maximum stocking rates), and late mowing, after 1 August at least once a year;
- Plants: *Echium russicum*, *Crambe tataria*, *Angelica palustris*, *Adenophora lilifolia*, *Campanula serrata*, *Iris aphylla* ssp. *Hungarica*. Measures: maintain by controlled grazing, and late mowing, after 1 July, at least once a year;
- Birds: *Crex crex*, *Aquila pomarina*, *Pernis apivorus*, *Bubo bubo*, *Ciconia ciconia*, *Lanius collurio*, *Lanius minor*. Measures: Maintain grasslands, avoid abandonment which will make hunting for food more difficult in the breeding season. Avoid machine mowing/disturbance in the breeding season. Maintain forest for nesting. Late mowing after 1 August to protect nesting birds (*C. crex*).

The community assemblage is more important than any individual component plant species. Such species-rich, dry meadow-steppe and damp meadow grasslands have disappeared over most of Europe. Not only are the habitats important in themselves, but they also provide a model of how traditional agricultural practices can contribute to maintaining threatened habitats and species.

Traditional methods of grazing and haymaking have led to the development of these species-rich semi-natural grasslands, and continued traditional management is key to their survival. This land management, which has continued more or less unchanged for 800 years, consists of

1. Dairy cattle grazed in village herds on commonly-owned land in summer, kept in during the cold winters. Winter forage comes from privately-owned hay mead-

ows which are often in small parcels, leading to a mosaic mowing that promotes biodiversity by the constant provision of food (for example nectar for insects) and refuges/nest sites (for vertebrates and invertebrates), as well as enough areas that are mown late to allow seeding of flowers. Species diversity is also assisted by hand-mowing, still practiced especially on steeper slopes, at varied dates.
2. Sheep are also grazed in village flocks, but with less requirements for hay in winter.
3. Cattle and sheep are grazed on hay meadows after cutting, but otherwise there is a strict separation between hay meadows and pasture.
4. There are many isolated trees and gallery treelines in the pastures, as well as a patchwork of forest areas.
5. Income is from the sale of cow milk, sheep milk and cheese, and from lamb and veal meat.

The species diversity is associated with low soil fertility that has resulted from constant mowing, application of little or no farmyard manure (FYM), and no artificial fertilisers or pesticides. Field research has shown that meadows near villages where FYM is occasionally applied have a mean of 29.2 species per site, whereas the terraces and steep banks and dry grasslands, where no FYM is applied, have on average 43 species per site.

The local agricultural economy, almost entirely dependent on small-scale agriculture, has declined as a result of Romania's transition to a market economy. After land restitution, 90% of villagers have farms under 5 ha and have fewer than 5 cows. Village populations have a high average age and average incomes below the poverty line.

In these circumstances, any conservation programme that has an impact on land management will be viewed critically, and will only receive local support if the programme is seen to take local peoples' interests into consideration.

Without support, this type of landscape will disappear, as it has in much of western Europe. As rural depopulation occurs, there is increasing land abandonment in less accessible pastures and meadows, and intensification in more accessible grasslands. 30% of hay meadows are abandoned and are gradually becoming invaded by scrub, especially hornbeam.

The replacement of cattle by more profitable sheep is more destructive of flowers and herbs, and of butterfly eggs. It also increases the tendency to convert hay meadows into more monotonous pasture, a trend that is already marked in the area, resulting in a noticeable loss of floristic diversity.

Measures implemented to address conservation needs

Joint Farm Advisory Service for small-scale farmers (administration, NGO and local community)

A Farm Advisory Service linking biodiversity conservation, Natura 2000 habitat and species conservation obligations, and rural income support has been active in the area since 2003, led by NGO Fundaţia ADEPT Transilvania in co-operation with local communities and Romanian Ministries of Agriculture and Rural Development (MARD) and Environment and Forests (MEF). Its vision is to achieve biodiversity conservation at a landscape scale not primarily by creating protected areas (the stick approach), but by working with small-scale farmers to create incentives to conserve the semi-natural landscapes they have created (carrot approach).

Haymaking in Viscri, Tarnava Mare area, Transylvania (Min Wood)

This project has carried out mapping and inventories of the area, developed conservation guidelines, worked with MARD in the design of agri-environment measures, and helped farmers to gain access to agri-environment programmes and to markets for products linked to biodiversity image. This has proved effective on many levels: improved conservation status of grasslands, improved farmer incomes, and improved agri-environment measures. This

project has also had an influence at national and EU level (including on the design of the CAP 2014-2020).

The Tarnava Mare Farm Advisory Service project resulted in the following:

a. Increased uptake of agri-environment scheme by farmers as a result of the Farm Advisory Service (6.5 times the number compared to control areas without advisory service);
b. Increased grassland area under traditional management, rather than abandoned or intensified, through agri-environment schemes and through commercial incentives (solving milk marketing problems, developing farmers markets, developing nature tourism);
c. Prevention of loss of HD and WBD habitats and species, and measurable improvement of habitat condition especially through scrub clearance and regular mowing.

Successes and challenges encountered by the project

Improving access to Pillar I direct payments (SAPS) for small scale farmers

About 60% of holdings in the project area are below the minimum size (1 ha total, made up of minimum 0.3 ha parcels) required to receive direct payments. However, this does not appear to have caused a significant problem. Management of land, rather than ownership, is the basis for eligibility of applications. Many owners with holdings below 1 ha are not active farmers, and rent their land to more active neighbours who can apply for payments. This is bringing land under management that, without incentives, would be abandoned.

Agri-environment payments

There are only two grassland agri-environment packages in the area: High Nature Value Grassland (214/1) and Traditional Farming (214/2). Romania has designated eligible areas for its grassland agri-environment payments based on a rough assessment of HNV grassland distribution in Romania, which in turn was based purely on the percentage of permanent grassland cover at commune (NUTS 4) level.

All communes in the project area are eligible. The HNV package requires: no use of artificial fertilisers and pesticides, organic manure allowed up to 30 kg N /ha, annual mowing or grazing obligatory (mowing at least once a year and not before 1 July each year; grazing must be at under 1 Livestock Unit per ha), and ploughing is forbidden. Payment is 124 Euro/ha. The Traditional Farming package requires the same conditions except that use of machinery is forbidden, with an additional 58Euros/ha.

The advantages of these measures for farmers in the area:

- Easy access by farmers. They were deliberately designed as simple packages, and the land for which the commitment is signed is verified via the IACS system so land register papers are not required. In the project area, 1,390 small farmers on 17,641 ha are currently in one of the packages. This is over five times the national average participation rate, and this is a result of the Farm Advisory Service activity.
- Strict inspections on parcels under the scheme have strongly enforced the obligation under GAEC to maintain grassland condition and to prevent scrub invasion. Although this is a general GAEC requirement, enforcement is much higher in agri-environment parcels. There are clear and measurable improvements in grassland condition in the project area, with large areas (approximately 20% of grassland) being visibly cleared of scrub.

Disadvantages are:

- the 1 July first mowing date is applied across all eligible areas in Romania, regardless of altitude. There is a greater cost for lowland farmers, since grasses seed and lose nutrient value earlier. Grassland maturity date varies from year to year: in some years, farmers complain that the losses are greater than the compensation received. In other years, such as 2011, the 1 July start date is not a disadvantage.
- Pastures as well as meadows are eligible for the Traditional (non-mechanised) package. Many graziers, especially shepherds, obtain the higher Traditional payment for no extra work, while farmers who manage meadows have additional costs for hand-mowing.

- There is no obligation to remove cut scrub from the grasslands. In most cleared grasslands, heaps of cut scrub are left on the fields. Burning is forbidden. This makes the restoration of habitat condition incomplete.

Mosaic management suited to small-scale farming results in good overall conservation management

About 20,000 ha of scrub and grassland habitats of conservation importance exist in the project area. These all need to be maintained by regular but not excessive grazing or mowing to maintain floristic conservation status. Only the damper lowland hay meadows have some additional requirements – more restricted grazing in the wet season, and avoidance of use of heavy machinery.

The traditional pattern of mosaic management, with a variety of mowing dates, which arose for socio-economic reasons in the project area (chiefly small-scale ownership and lack of machinery), results in the constant availability of refuges for animal species and of sources of plant seeds to recolonize other areas.

Mixed farming landscape (Tibi Hartel)

Conservation of some of the HD and WBD species classically requires later mowing dates. For example, there are species-specific packages in other regions of Romania, including 214/3.1, targeting *Crex crex*, requiring unmown strips and mowing from 1 August, and 214/3.2, targeting *Lannius minor*, *Falco vespertinus*, requiring phased mowing before 1 July.

However, the ideal system to suit the varied demands of the different fauna and fauna groups seems to be mosaic management, where small parcels of land, often 0.3 ha or less, are mowed at different times in neighbouring parcels. In our opinion, if measures can be found to maintain this management, more complex species-specific management packages are not required.

Long term models for common grazing with agri-environment payments

An additional element of agri-environment payments is their potential to support common grazing. Common grazing is a strong tradition in Tarnava Mare, and is essential to the survival of the small-scale farming communities of the area. However, it is breaking down under economic pressure. Common land is owned by Town Halls who are not eligible to receive agri-environment payments, and Town Halls are not permitted to sell common land.

Increasingly, Town Halls are renting out common land for periods of 5 years or over, so that the land users can claim agri-environment payments. Typically, a Town Hall owns 2-3,000 ha of common land. Of this, generally 2,000 ha are rented out to shepherds, and the remaining 1,000 ha is used by village grazing associations, usually made up of over 30 small-scale farmers. Until now this land has not been eligible for agri-environment payments, but in one village in the project area, the Town Hall has rented 1,000 ha to the grazing association for 5 years.

The grazing association is using the income derived (224,000Euros/year from direct payments and agri-environment payments combined) to buy machinery for scrub control, improve tracks and cattle drinking troughs, etc. This is an excellent model for linking common land to incentive payments.

Advice and capacity building for the dairy sector

Small-scale dairy production is key to the survival of the HNV landscapes of Romania. Over 50% of registered producers (that is, excluding those with under 1ha of land) have fewer than 5 cows. Small-scale farmers depend mainly on dairy cow or ewe products for their income.

Small producers all deliver to one or two milk collection points in each village, from which the processors take delivery. These communal milk collection points have quality problems: not only poor cow health and

unhygienic milking and milk storage, but also watering down milk by some farmers to obtain higher volume payments.

In 2009, as a result of cheap imports and of stricter milk quality controls, many milk producers lost their market: this threatened the economic survival of these communities, and the survival of surrounding grassland habitats. Surveys showed a reduction of cow numbers by 25% in 2009 alone. The Farm Advisory Service raised funds to improve the hygiene of milk collection points, and to carry out other actions to improve hygiene and discipline (including workshops with individual farmers and with village dairy associations).

Eight villages have had their milk collection reinstated under the project, giving income again to over 200 small-scale farmers, and reversing the fall in cow numbers. In the villages with new milk collection points, the number of cows and number of owners supplying the points are already rising now that a profit motive has been restored. Over 700 cows are now in the area which would not be without intervention – about 1,000 ha of grassland are therefore under continued management which might otherwise have been abandoned.

This project was fully funded by the Norwegian Government. Such investment activities are eligible for support under various EAFRD Pillar I measures, such as Measure 123 Adding Value to Agricultural and Forestry Products, but the 50% co-financing requirement is a problem for small producers.

Adding value to agricultural products

The Farm Advisory Service also helps small-scale farmers to produce high-quality products, including developing a design for food processing units for village use that meet minimum EU hygiene requirements.

A free manual detailing the design of the processing units, and other marketing advice, has been distributed. This has been combined with development of a local brand and labelling, and of farmers' markets. This is bringing significant additional income for biodiversity-branded products to local producers (currently 25 producers, total 78,000Euros/year from sales at farmers markets). This will help develop economically viable small scale farming that is not entirely dependent on agri-environment payments.

It is worth noting that the sale of these products in farmers markets was threatened by inconsistent interpretation of EU hygiene regulations, especially those relating to authorisation of premises for small-scale production and of points of sale (especially farm-gate direct sales).

The Farm Advisory Service worked closely with the state food hygiene agency to clarify that a flexible approach should be applied to local and direct sales by small-scale producers in marginal areas. This message was published in a booklet supported by EU Delegation funds, in 2007, in order not only to reassure small producers, but also, equally importantly, so that local inspectors receive a clear message from central government that this is an approved approach.

As above, such activities are eligible for support under Measure 123 (although 50% co-financing is a problem for small producers); and Measure 142 Setting up of producer groups (although thresholds are too high to help small groups in initial stages).

Conclusions: demonstration value for other countries and regions

The key message of the Tarnava Mare Farm Advisory Service is the importance of a good delivery service to help small-scale farmers gain access to schemes for which they are often the prime targets, but which farmers find intimidating in the application process.

The case study illustrates that:

1. Continued traditional management by farmers is the most effective way of maintaining HD habitats and species at the landscape scale. Simple incentive schemes that have high uptake and keep farmers on the land and farming as they have done in the past is the main requirement.
2. Although the grassland agri-environment scheme has been simplified in Romania and uptake is generally good, small-scale farmers are blocked from EAFRD investment measures by the complexity of the application proc-

ess, requirement for co-financing, and cash-flow problems because of retrospective reimbursement.
3. Small-scale farmers generally will not take the initiative to solve practical problems to meet quality and other commercial standards, but respond to advisory services where they are available.
4. Agri-environment payments linked to other economic development such as adding value to products, and diversification, offer long-term solutions to the problem of small-scale community sustainability and the conservation of important habitats and species, at landscape scale, in agricultural protected areas.

Effective consultancy and advisory service for small scale farmers in partnership with NGOs

This case study suggests that improvements in consultancy and advisory services will deliver much improved results on the ground, in terms of uptake by farmers. The study also shows that if the range of NRDP support measures is combined in an innovative way, it can be very effective in supporting small-scale farming communities.

The challenge is to broaden such activity from localised, patchy implementation to wider, national-level implementation: for this, highly trained and motivated advisory services are required.

This case study also shows that the role of NGOs can be significant, by helping government agencies to deliver policy in a very cost-effective manner, and by providing feedback from farmers to guide modification of NRDP measures where suitable. However, these local actions are not currently eligible for support under NRDP Measure 143 (Providing Farm Advisory and Extension Services).

Partly as a result of the Farm Advisory Services, the potential role of NGOs in such local actions has been recognized, and future financial support has been included in the legislative proposals of the CAP post 2014, as the Co-operation Measure. This could have an important effect, supporting replication of such projects more widely in Europe.

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Case Studies

Management of traditional rural landscapes in Finland

Cooperation between multiple stakeholders in Rekijokilaakso River Valley

Traditional rural landscapes in Finland

Traditional rural landscapes in Finland consist of meadows and wooded grasslands created by extensive livestock farming during the past centuries. These landscapes are widespread in Finland, ranging from shore meadows at the southern Baltic Sea coast to alpine heathlands in northern Lapland.

Traditional landscapes have high biodiversity value: around one third of all threatened species in Finland use these landscapes as their primary habitat and a similar share of the traditional rural landscapes, in total 500 sites and 6000 ha of land, are protected as a part of the Natura 2000 network.

Traditional rural landscapes have been decreasing steadily since the late 19th century due to changes in agricultural management regimes. Extensive livestock farming has now been preplaced by intensive dairy and meat production with significant changes in production systems (e.g. use of artificial fertilisers). This in turn has resulted in the conversion of meadows into cultivated fields and/or a complete abandonment of previous management activities. (Trinet project 2010).

Given the threats above, continued management of traditional agricultural biotopes and other ecologically valuable farmland areas is one of the key national objectives for biodiversity conservation.

View over Rekijokilaakso (Eija Hagelberg)

Rekijokilaakso Natura 2000 site: introduction and key characteristics

Rekijokilaakso River Valley Natura 2000 site is an extensive (1209 ha) complex of semi-natural grasslands and wooded pastures situated in the Rekijoki river valley in Somero and Salo, south-west Finland.

The area provides a range of habitats for different flora and fauna, and it is also a regional scale ecological corridor for many species.

The key conservation objectives for the site include:

- Increasing the number of appropriately managed meadows and wooded pastures
- Increasing the number of conservation agreements for herb rich forests
- Improving the effectiveness of management practises
- Protecting and increasing the number of certain flagship species
- Promoting ecosystem services associated with the site, especially tourism, recreation and the development of sustainable, value-added products
- Communicating the values and benefits related to the Natura 2000 network.

Habitats and species of Community interest

Rekijokilaakso Natura 2000 site consists almost entirely of habitats protected under the Habitats Directive. The most common habitats include mowed / grazed lowland hay meadows (6510)[1] and herb-rich forests (9050). Other meadows, such as mesic and Filipendula meadows (6270 and 6430), are also characteristics to the site. Finally, some riverine and old forest habitats can be found in the area.

Rekijokilaakso provides a home for several important grassland and grazing-dependent species, including vascular plants, birds, beetles and butterflies.

[1] Hay meadow mowing management ceased during 1940s – 1970s and the main management method is currently grazing. See also "future long-term management" for further discussion.

Species of Community interest include Flying Squirrel (*Pteromys volans*) and Clouded Apollo (*Parnassius mnemosyne*). In addition, Rekijokilaakso also hosts a range of species protected under the Birds Directive.

Different habitat types in Rekijokilaakso: mowed lowland hay meadow (6510, above) and stream with decaying wood (9050, below). Preservation of the latter area is arranged via voluntary Metso-programme. (Eija Hagelberg and Iiro Ikonen)

In general, 93% of the traditional rural landscapes in Finland are classified as endangered. Not surprisingly, several habitats and species present in Rekijokilaakso are endangered or critically endangered and all remain in an unfavourable conservation status.

Socio-economic role, status and trends

The traditional management practices no longer exist in Rekijokilaakso, leaving its habitats and species vulnerable to change. The annual traditional regime of mowing and aftermath grazing has almost ceased as it is no longer profitable and abandonment of grasslands is a major threat to biodiversity in the area. Consequently, finding ways to maintain - and preferably increase - extensive management practices within intensively cultivated landscapes poses a key challenge for the area.

On the other hand, the Rekijokilaakso Natura 2000 site has outstanding scenic, landscape and cultural values, estimated to receive around 5000 visitors per summer. This creates significant opportunities for tourism, recreation and education, including related business opportunities (e.g. Ikonen 2002, Luoto et al. 2002, Heikkinen et al. 2007). The site also functions as a natural buffer between the river and its surrounding landscape, capturing the run-off from agricultural areas. The meadows provide important habitats for insects that also pollinate fruit and flowers within the broader landscape. These benefits, however, have not so far been studies in detail.

Finally, the Rekijokilaakso area is ideal for production of cattle whose meat can be marketed as sustainably grazed and biodiversity friendly, supporting the management of traditional rural landscapes (i.e. so called "meadow meat"). While some farmers have successfully taken up this opportunity there is still need to mainstream the practice and build capacity among farmers to add more value to their products (See also "long-term management").

Management activities – demonstrating best practise

Key management measures

Rekijokilaakso's valuable habitats are, to a large extent, maintained by landowners (farmers and foresters) parallel to other farming practices as a part of agri-environment schemes under the EU Rural Development Programmes. These schemes are based on approved management plans, which cover the costs of grazing and mowing of targeted habitats in order to enhance landscape and species biodiversity. Alternatively, in a number of locations management activities are coordinated and carried out by local and regional organisations, in particular the local nature conservation association.

The key management measures in Rekijokilaakso include extensive mowing and grazing. These activities are carried out on a regular basis by farmers (under the agri-environment schemes), various organisations and volunteers (see below) to both restore and maintain meadow habitats. One of the key objectives in the future is to improve the quality of management by reintroducing mowing and aftermath grazing in a number of key areas within the site.

Grazing is the main on-going management activity on the site. It is done by cattle (beef cattle and heifers, also some sheep and highland cattle) and carried out in a rotational manner, i.e. cattle graze one patch and are then transferred to the next one. The typical period for grazing is from early June to late autumn. The rotational grazing has proven to be suitable for Clouded Apollo, ensuring that its larvae and pupae remain undisturbed during spring. However, some species clearly benefit from an on-going and somewhat more intensive grazing regime. Such a regime (one neat per hectare) is currently in place in some areas within the site and there are plans for further increase.

Mowing is currently a lesser management activity. It is carried out on two habitat patches with the help of the Association for Traditional Rural Landscapes, using specialised machinery. Machine-based mowing also helps to break soil surface and facilitate seed germination. The objective is to establish and maintain an on-going mowing-based management regime and monitor its long terms impacts on the species composition on dry and steep habitat patches along the river valley.

Mowing in Nikkalanoja rivulet valley. *Centaurea phrygia* has strongly increased in the area because of timely mowing (Eija Hagelberg)

In general, mowing has been the traditional method for managing the area and it is also recognised as the preferred management method for lowland hay meadows (6510) (Airaksinen & Karttunen 2001). The impact of mowing on species composition and dynamics is different compared to grazing. Therefore, an integrated regime combining grazing and mowing creates a more optimal way for enhancing biodiversity and preventing local extinctions. In addition, trying to encourage the uptake of traditional mowing by scythe is also an integral part of maintaining cultural heritage in the Rekijokilaakso area.

Re-introduction of species in the future is foreseen to support the restoration of biodiversity in Rekijokilaakso. Based on promising results from southern Finland, re-introductions of Clouded Apollo to new habitats within Rekijokilaakso are planned for 2012.

Role and engagement of stakeholders

The management of Rekijokilaakso site is carried out by engaging a range of stakeholders. These include local and regional authorities, farmers and foresters, entrepreneurs and local businesses, scientists and experts, and local associations (e.g. local village associations in Somero municipalities, Finnish landscape associations, nature conservation associations and associations interested in rare species such as butterflies and dragonflies).

Development of the management plan with stakeholders

The Rekijokilaakso management plan was developed by combining information from stakeholder questionnaires with ecological and historical studies, seeking engagement of all farms in the area (83). The finalised plan was distributed to all farmers and landowners, successfully supporting uptake of agri-environmental agreements within the site (e.g. the number and quality of agreements).

Establishing conservation agreements with landowners

Building on the close cooperation with landowners (above), altogether 184 agri-environment agreements covering an area of 390 ha have been set up.

These agreements are established for 5 to 10 year period with a dedicated view for achieving conservation objectives. Majority of these agreements have been established under the national agri-environment schemes. In addition, altogether 54 ha of forest areas have been protected by voluntary agreements established under the national Forest Biodiversity Programme METSO.

Voluntary actions

The regional association for traditional rural landscapes has been responsible for carrying out some mowing activities in Rekijokilaakso, in particular areas around the Rekijoki village and Nikkalanoja stream.

Financing

The management of the Rekijokilaakso Natura 2000 site is financed by a number of public and private sources. These include:

- Agri-environment schemes under the EU Rural Development Programmes, including basic and high level schemes that cover and/or compensate the costs of mowing and grazing activities to farmers. (See "lessons learned" below).
- EU funding from the LIFE programme, including financing for the reintroduction of Clouded Apollo to some old habitats
- EU Fund for Regional Development (EFRD) (Interreg IIA), to support capacity building activities (Ikonen et al 2001).
- Financing by NGOs and local associations, including financing for the establishment of nature paths, developing guidance for management and carrying out management activities.
- Public funding by environmental authorities, to fund a part of management actions and coordination of conservation activities.
- National public funding schemes, including the national Natura 2000 compensation schemes and the national Forest Biodiversity Programme METSO 2008–2016 to fund the (voluntary) conservation of wooded areas in southern Finland.

Key insights and lessons learnt

Rekijokilaakso River Valley is one of the largest and well-known traditional rural landscapes in Finland. Therefore it provides a valuable "show case"-example for establishing successful management regimes for semi-natural Natura 2000 sites. The area is also very typical of southern Finland where traditional biotopes have survived only in steep, inaccessible river valleys.

The area under appropriate management (i.e. extensive mowing and grazing) inside the Rekijokilaakso Natura 2000 site has increased steadily, resulting in enhanced biodiversity in the area. Furthermore, a number of private conservation areas (both wooded pastures and old-growth forests) have been established. On a species level, increased management has effectively supported the conservation of Clouded Apollo. The most important best practices and lessons learned are outlined below.

Integrated management as a key to success

The EU agri-environment schemes enable farmers to integrate management of semi-natural grasslands into their normal farming activities. This provides a unique marketing and selling point for products, e.g. "meadow meat" from sustainably grazed cattle.

Conservation and management of the site – including both design and implementation of activities - is carried out in a participatory and innovative manner in close co-operation with environmental, agricultural/ forestry authorities and private land-owners.

Also, NGOs and other stakeholders play an active role. Scientific studies, carried out in cooperation with researchers and site managers, have helped to develop and adopt the most appropriate management measures.

Cooperation between stakeholders to minimise conflicts

The participatory planning processes and actions, supported by development of guidance and information, have significantly minimised conflicts between stakeholders in the area, fostering positive attitudes among land-owners, farmers and foresters towards Natura 2000.

Good cooperation between authorities, NGOs, scientist, farmers and other local stakeholders (e.g. organisation of several participatory events) has created a positive atmosphere for long-term management.

Widening the basis for funding increases opportunities

Securing and successfully coordinating funding from a range of sources has enabled the (re)establishment of a relatively comprehensive management regime. This has to a large extent been facilitated by successful and pro-active engagement of several stakeholders.

For example, supporting extensive grazing via revenue from "meadow meat" has proven to be a promising and innovative way forward. A wide funding portfolio creates a good basis for managing the site on long-term.

Improving the design of the Rural Development Programmes

The experiences from Rekijokilaakso have also shown that a revision of agri-environment support is needed to better match the management requirements of the site. Existing incentives for restoring areas with high biodiversity value are both inadequate (i.e. the level of support does not cover the costs of management) and, from the perspective of an individual farmer, come with an unappealingly high bureaucratic burden.

More attention should also be paid to facilitating collaboration and information flow between stakeholders, for example by encouraging cooperation between land- and cattle owners to establish grazing regimes. Finally, funding should be made available for monitoring the impacts of management activities at farm levels.

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Case Studies

Managing cereal steppe land for birds in Southern Portugal

Little Bustard (Gabriel Sierra & Juan M. Simón)

Background

Mainland Portugal is almost entirely (86%) classified as rural with a very low population density (41 inhabitants per km2), which is significantly lower than the EU average. Biodiversity in general – and the diversity of bird species in particular – is very high in Portuguese rural areas.

The Portuguese RDP is conceptually in line with the National Strategy for Conservation of Nature and Biodiversity (NSCNB), especially with regard to four strategic lines which are common to both documents: to guarantee the conservation of the Natura 2000 network; to develop specific actions for conservation and management of target species, habitats and landscapes; to integrate nature conservation policies with the policies and planning of other sector politics and to promote education and training on subjects relating to nature and biodiversity conservation.

However, since Portugal's accession to the EU, there has been a considerable effort towards the modernisation of farm holdings and agri-food businesses, through infrastructure development and improvement with an emphasis on irrigated land, with the aim of fulfilling one of the main objectives of Portugal's RDP: to enhance competitiveness in the agricultural and forestry sectors.

Because of this, and although the Natura 2000 network represents 21 per cent of Portugal's territory and 16 per cent of all farmland and managed forest, the largest proportion of the EARDF investments has so far been earmarked for intensification of farming and forestry activities.

This case study targets an inland area of south Portugal where traditional extensive cereal crops integrated in a mosaic of natural and semi-natural Mediterranean forest habitats are being challenged by intensification incentives, namely by RDP's Axis 1 funds, with measures such as the promotion of the competitiveness of eucalyptus plantations and the support given to irrigation schemes.

Natura 2000, key habitats and species and agricultural issues

As in other inland areas of mainland Portugal, human population density is low in the Special Protection Area of Mourão/Moura/Barrancos: a mere 7.62 inhabitants per km2, against a national average of 113.20 in/km2. A high propor-

tion of the population is dedicated to agriculture and most of it (63.63%) is older than 55 years.

The arid climate and poor soils of the region have led to the dominance of extensive agricultural systems based on cereal cultivation on a rotation basis on open and relatively plain land. This habitat is known as cereal steppe or pseudo-steppe and is typical of the Iberian Peninsula. It is characterised by a mosaic of habitats that include cereal areas (mainly oats and wheat), stubble plots, fallow land, non-irrigated legume crops and pastures.

Pseudo-steppes sustain significant populations of several bird species with unfavourable conservation status, such as the Little and Great Bustards, which have adapted to this artificial habitat, very similar to the natural steppe environments, while these last ones were still available. However, since the end of the 19th century and beginning of the 20th, agricultural mechanisation and forestation have led to the fragmentation of natural habitats and the reduction of the populations of these species.

The SPA Mourão/Moura/Barrancos is quite heterogeneous, with an open agricultural area dominated by extensive cereal crops interspersed with holm and cork oak montados. Permanent pastures and a few vineyard and olive grove areas complete the agricultural mosaic. Habitat diversity is enhanced by the presence of torrential water lines with typical riparian vegetation, sometimes associated to steep banks and some calcareous rocky outcrops add to the landscape diversity.

Cereal steppe in Alentejo (SPEA/LIFESisão)

The area is of extraordinary importance for steppe birds. Among other species, it hosts important populations of Little Bustard, Great Bustard, European Crane, Black-bellied Sandgrouse and Stone Curlew. According to the NSCNB, its conservation objectives focus on the conservation of steppe birds, raptors (mainly forest species) and the crane, the SPA hosting one of the most important wintering grounds for the species in Portugal. The management requirements identified are the maintenance of open extensive cereal crops based on rotation schemes, the maintenance of traditional olive groves and the preservation and restoration of cork and holm montado areas. The details are yet to be defined under a management plan of the SPA, which hasn't yet been completed.

Since Portugal's accession to the EU, in 1986, the evolution of the agricultural landscape also started to depend on the Common Agricultural Policy (CAP) programmes, which tended to encourage the reconversion of the extensive pseudo-steppe systems into more productive uses, namely through the irrigation of areas with more productive potential, the reforestation of the less productive land and the installation of permanent crops such as vineyards and olive groves. Although olive groves were a traditional culture, they were confined to small areas and integrated in the DOP (Denominação de Origem Protegida) "Azeite de Moura" but the tendency now is for large companies to purchase large land plots and install intensive olive groves.

More recently, this tendency has been supported by the construction of the Alqueva dam, the largest artificial lake in Europe and the core of the Alentejo Irrigation Plan, which aims at achieving the economic development of the region, based on promoting the agricultural and tourism sectors. Although the entire complex of the Alqueva will not be completed until 2025, on February 2002 the reservoir started to fill and since then, several irrigation projects have been developed, drastically changing the traditional agricultural practices and deeply impacting on wildlife in general and steppe birds in particular, because only a small part of the CAP funds are available for agri-environmental measures – and therefore used to counter-balance the negative impacts on wildlife of the funds used to finance more productive agricultural systems.

The Little Bustard (*Tetrax tetrax*) is a medium sized bird, strongly associated with steppe habitats. It lives in dry grasslands with scarce tree cover and is a ground-nester. Little Bustard populations have been declining since the 19th century, becoming extinct in many countries of Central and South Europe. Its global distribution is now divided into two distinct areas. In the East, it seems to be abundant in Russia and Kazakhstan. In the West, inside the European Union, the larger populations are found in Spain

and Portugal, while relic populations remain in France and Italy. In Portugal the Little Bustard is largely distributed to the south of the river Tagus, particularly in the Alentejo Region, where the largest known populations occur. The species is closely connected with the traditional farming system, where they inhabit mosaics of long-rotation fallow, extensive dry cereal and pasture.

This species is listed as Near Threatened according to IUCN's Red List of Threatened Species, because it is probably experiencing a moderately rapid overall population decline, driven by rapid declines in the west of its range, owing mainly to habitat loss and degradation, as well as low-level hunting pressure. The primary cause of decline has been the conversion of dry grassland and low-intensity cultivation to intensive arable agriculture, especially where this has included the planting of monocultures or perennial crops, irrigation or afforestation. The fragmentation of traditional habitats, by means of agricultural intensification or infrastructure development, negatively affects habitat quality and availability for the species, as well as male density. The use of pesticides could also reduce food availability.

Measures implemented to address conservation needs

Between 2002 and 2006, a partnership was established between SPEA (the Portuguese Society for the Study of Birds, BirdLife partner in Portugal), the government agency responsible for nature conservation (ICNB - Institute for the Conservation of Nature and Biodiversity), and two local farmers' unions (AACM - Association of Farmers from the Municipality of Mourão and AJAM – Association of Young Farmers of Moura).

This partnership led a Life-Nature funded project aimed at conserving the Little Bustard in Alentejo through the implementation of a Species Action Plan and an experimental land management plan developed together with local farmers so as to benefit the little bustard while maintaining farmers' incomes.

For a period of three and half years, 127 contracts were signed with 45 farmers inside the SPA, aiming to develop farming management trials for the conservation of Little and Great bustards and other threatened steppe birds. Tests were made using 23 species and varieties of legume crops and three management measures, targeting a total area of 3.241 ha. The conclusions of this work resulted in a proposal of agri-environmental management to the open farmland of Mourão/Moura/Barrancos, in order to preserve the steppe habitat and maintain farmer's income. The proposal included the following elements:

1) Rotation scheme – to keep the structure of the habitat, the farmland management had to include threshold percentages of four crops: dry cereal, dry legume crops, permanent pasture and fallow;

2) Maintenance of fallows – the minimum percentage of fallow in each farmland should be defined, as well as the compulsory non-intervention during the breeding period, in order to guarantee the availability of safe nesting areas;

3) Legume crops – a list of legume species and varieties was recommended, which included preferentially those that can be used by birds as food, like alfalfa, silage-pea, and chick-pea.

Legume crops (SPEA/LIFESisão)

Additionally, an inventory of breeding and wintering little bustards in the region was performed in order to identify key populations and locate where agri-environmental management could best be applied.

An awareness campaign was developed and implemented to inform decision-makers, farmers and the general public about the need to preserve the little bustard and other dry grassland birds of Alentejo and a regional action plan for the little bustard, in co-operation with farmers, local and central administration was drafted.

The drafting of the action plan started with the organisation of a workshop with the participation of 36 experts in agriculture and nature conser-

vation from farmer unions, environmental NGOs, administrations and universities of Portugal and Spain.

The general objective for the conservation of Little Bustard in Alentejo is to maintain the populations in the whole distribution area of the species. The specific objectives are:

1) To maintain the suitable habitat during breeding, post-breeding and wintering periods in the whole distribution area;
2) To secure a survival rate large enough to maintain the actual distribution of the species and the higher densities in the most important areas;
3) To suppress gaps of knowledge regarding the biology of the species;
4) To raise public awareness about the conservation of the species.

To achieve these objectives, the following priority measures were identified:

- To designate new SPAs for steppe birds in areas important for the Little Bustard;
- To set up specific agri-environmental measures in IBAs with Little Bustard, in order to promote a farmland mosaic with dry cereal, legumes crops, pasture and fallow;
- To create a protocol to protect the habitat of the Little Bustard to be applied in large development projects in Alentejo;
- To create an Iberian specialist group to coordinate research and monitoring of Little Bustard.
- SPEA and ICN, together with other public and private partners will be responsible for the implementation and monitoring of this Action Plan.

By the time the Life project reached the end, in December 2006, a momentum had been reached with the local farmers who, together with the NGO charged with the project coordination, had worked on the proposal of a new agri-environmental measure, which was proposed to the competent authorities.

Main results and lessons to be learnt from the experience

A major achievement of this project was the fact that its results were the basis for the designation of new SPAs for steppe birds in 2008, following a compromise of the Portuguese authorities that the information gathered by the LIFE project would be used to enlarge the Natura 2000 Network.

The involvement of the governmental agency responsible for agriculture was crucial to the creation of specific agri-environmental measures by adapting the proposals made by the project, first for the SPA of Mourão/Moura/Barrancos and later for the remaining SPAs recently designated.

This specific measure is based on the maintenance of the rotation scheme dry cereal – fallow, as proposed by the Life project. To be eligible for this measure, farmers need to declare the totality of open land of their agricultural holding (except intensive irrigation areas), which must be larger than 5 hectares and have less than 10 trees per hectare.

Seeding (SPEA/LIFESisão)

Farmers have to agree to maintain the eligibility conditions, keep the whole open land area free from scrub cover, keep a record of the area covered by each crop and all the farming operations undertaken and the total stocking density must not exceed 0,7lu/ha (livestock units per hectare of forage area) + 10% of the area of small-grain cereal.

A rotation scheme approved by the Local RDP Support Structure (LSS) must be put into place that guarantees, each year a minimum of:

- 20 - 50% of the open land area covered by small-grain cereal crops;
- 10 - 30% of the open land area left as fallow;
- 5 - 10% of the area mentioned above must be fallow for two or more years (in those farm holdings where there is no fallow at the onset of the contract, there is a period of

two years for this compromise to begin being fulfilled).

The minimum cereal area defined by the LSS cannot be cut for fodder, except under exceptional climacteric situations defined by the LSS as well.

The farming calendar and set of allowed farming techniques will be annually defined by the LSS but between 15 March and 30 June, grazing, fodder cutting and soil mobilisation are interdicted in at least 20% of the fallow (depending on the agricultural and climacteric conditions of each particular year, grazing or fodder cutting can be authorised by the LSS until 31 March).

Under favourable conditions where there is no erosion risk, the LSS may determine that part of the fallow (always inferior to 10%) should be mobilised until 15 March to create areas of bare soil favourable to steppe birds.

Only one soil mobilisation is permitted per year and the way it is undertaken is conditioned to the erosion risk.
Land plots subject to chemical weeding must include untreated stripes with an area equal or larger to 5% of the plot.

Farm holdings larger than 50 hectares must include on accessible water point per 100 hectares and specific crops for fauna (e.g. back-eyed-peas, chick-pea, vetches, grasspea) in a 1:50 proportion, distributed in non-contiguous crops with areas of 1 ha or less.

Fencings, installation of arboreal hedges, small woods or increase of the crown cover can't take place without previous permission from the LSS. Finally, existing temporary ponds must be preserved and a 20 m protection stripe around them must be kept without soil mobilisation or use by livestock.

Although the design of this agri-environmental measure was based on the work undertaken by Life, it was approved in December 2010, a long time (four years) after the Life project had ended, the momentum having been lost and its final version being more complex than the initial proposal made by the project and unlike that one, not negotiated with the farmers. So far, the take-up of this measure has been weak. Some of the reasons pointed by the NGOs for this lack of receptiveness are:

- the measure has not been sufficiently advertised
- the measure demands too many obligations for too little compensation payments

The farmers that do take up the measure, benefit from technical support for its implementation from local support structures which are well organised and include NGO representatives, who have good communication channels with the farmers' community. However, these structures have insufficient funds, which limits their ability to intervene.

In order to achieve better results it would be important to:

- properly advertise the new measures
- make the measures more appealing, by increasing the subventions
- guarantee the local support structures the necessary funds to adequately support the farmers in the implementation of the new measures
- finalise and approve the SPAs management plans

An important lesson learned with this case study is that in the absence of a long term commitment by the relevant competent authorities, valuable measures carried out in agricultural areas within Natura 2000 may be largely lost.

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Case Studies

The conservation of the Common Hamster *Cricetus cricetus*

Hamster-friendly management with good farmer uptake in the Netherlands

Hamster burrow © Gerard Müskens

The Common or Black-bellied Hamster *Cricetus cricetus* in Europe

In Europe, the Common Hamster *Cricetus cricetus* occurs from Belgium, the Netherlands and northern France in the west to Russia in the east, and from northern Germany, Poland and Russia in the north to Bulgaria in the south (IUCN 2007). It used to be widespread from sea level to 650 m on arable land on deep, heavy, well-drained soils, which correspond to its original steppe habitat. Until a few decades ago, the hamster was deliberately killed as a pest or trapped for fur in many European countries.

In Western Europe, the hamster now has a very low population and a highly fragmented distribution. The hamster is critically endangered in the Netherlands, Belgium, France, and Germany, and subpopulations have gone extinct (CoE 2008, Orbicon et al 2008).

In Eastern Europe it was still relatively widespread until more recently (IUCN 2007). However here too it has suffered a severe decline in the last five years, and significant population outbreaks are now very unlikely (CoE 2008, Orbicon et al 2008). Hamster populations are in step decline in southern Poland, the Czech Republic, Slovakia, eastern Austria, northeast Slovenia, Croatia, Hungary, Romania and Bulgaria.

Member States must protect the hamster from deliberate killing, capture, sale or transport, and disturbance, and protect its breeding sites and resting places from deterioration or destruction, because it is listed in Annex IV of the Habitats Directive for all countries except Hungary (which is allowed to trap hamsters provided this does not affect their conservation status).

The European Commission has sent a Reasoned Opinion to Germany (in 2001), Belgium (in 2005) and France (in 2008) for failure to properly ensure the protection of the breeding sites of the species under the Habitats Directive. The European Court of Justice ruled in 2009 that France was not doing enough to protect the hamster's breeding sites, judging that France's agri-environment measures are not sufficient (ECJ 2009).

Hamster habitat requirements, key threats and agricultural issues

The hamster lives in areas of productive arable land. It prefers crops that give it springtime cover and forage opportunities, especially winter cereal crops and lucerne (*Medicago sativa*) (Orbicon et al 2008). In contrast, maize and root crops provide no cover in spring, leaving them highly vulnerable to predation.

Perennial clover and grass-legume cover crops are particularly important as they offer more continuous food availability and shelter, and lower disturbance, and act as refuges when other habitats have been ploughed up.

Field edges, roadsides and ditches are sometimes occupied in times of need, and offer an important source of cover, invertebrates and wild plants. In some places hamsters are found in gardens, orchards and parks.

Strips of unharvested cereal and lucerne
© Gerard Müskens

Hamsters are highly vulnerable in July and August after harvest, when the youngsters emerge and females have still only produced one or two litters, which is not enough to maintain the population. They are also particularly vulnerable to predation and lack of food in spring (April-May), when they move around to mate, and in the last weeks before they enter hibernation, when most fields are harvested but they need to gather winter food stores and youngsters need to dig sufficiently deep burrows to survive ploughing.

Key threats to the common hamster

Key threats to the hamster are:

- the loss of perennial fodder crops[1], plus the loss of small uncultivated patches of land as habitat refuges;
- simplification of crop rotations and monoculture, meaning that large areas are harvested or ploughed at the same time, leaving no suitable habitat;
- improved harvesting techniques that leave shorter stubble and less food on the ground;
- ploughing of stubble directly after harvest, removing autumn food sources, and deep ploughing that destroys hamster burrows;
- abandonment of arable cultivation: hamsters also occur in meadows and fallow land, but densities are much lower than in arable land because of lack of food;
- habitat destruction and fragmentation through urbanisation, transport infrastructure, etc., and direct deaths from traffic, cats and dogs etc., affects some populations.

Forecast increases in market prices of cereal grain and other agricultural products could trigger another wave of intensification in Europe, to the detriment of hamsters and other wildlife linked with agricultural fields. In Western Europe, the replacement of wheat with maize in hamster areas has been one of the main factors behind the species' decline.

Arable intensification in the EU-12, such as the use of more efficient harvesting machinery, could quickly have a detrimental effect on hamsters. At the same time, the decline in green fodder area is likely to continue - for example eastern Germany lost most of its lucerne crop area in the last decade.

Key measures to protect the common hamster

Key measures to protect the hamster are:

- Perennial fodder crops such as lucerne on at least 10% of the habitat area

[1] In the core hamster countries these important refuge crops now constitute less than 6% of the arable land, compared with 13-14 % around 1990 (Orbicon et al 2008).

- Late cereal harvest
- Survival strips - unharvested strips of cereals along field boundaries and in-field left till October, at least 15m wide (preferably 20m)
- Small field size or strip-cropping
- Long stubble left after harvest, late ploughing
- Cutting and harvesting only during daylight
- Avoid deep ploughing, or use minimum tillage techniques
- Minimise use of agro-chemicals and ban on use of rodenticides
- No use of irrigation, which floods hamster burrows

Measures to address the conservation needs of the hamster in the Netherlands: The Dutch Hamster Experiment

The Dutch Hamster Experiment replaced the first Dutch Hamster Conservation Plan in 2005, which had failed to establish viable hamster populations. Some initial releases of captive-bred hamsters took place from 2002, but they only started to have a positive impact on the hamster population after the Dutch Hamster Experiment was established.

The Dutch Hamster Experiment is financed by the Dutch Ministry of Agriculture and the Province of Limburg. The initial project budget planned for 200 ha of hamster-friendly management on farmland reserves and 300 ha of hamster-friendly management by farmers.

Farmland reserves were established by buying regularly managed farmland by the government and by delivering these fields to nature conservation organisations. Total costs of all hamster-friendly management amounted to €755 thousand each year, not including the additional costs of research, monitoring practices or farmland purchase.

The Dutch Project developed four hamster-friendly management packages which had high farmer acceptance, as they were sufficiently close to conventional management that farmers found them efficient and easy. By the end of 2009, 24 farmers had signed agreements for hamster-friendly management for the maximum area of 300 ha, and even more farmers are interested. The hamster populations strongly profited from these measures and increased significantly.

Dutch hamster-friendly management packages

The most effective hamster protection measures were found to be areas of cereal and lucerne crops, where the lucerne can only be cut before 15th June and 20m wide strips of cereals are not harvested at all.

Fertilizers, manure and herbicides can be used as in normal practice. Ploughing is restricted to less than 25 cm depth. The packages specify four different crop combinations and rotations, for management units of at least 3, 4 or 6 ha divided into equally sized lots for each crop, rotated over 6 to 8 years and across the management units (depending on the package). Crop combinations include lucerne and spring and/or winter cereals with black garden radish (*Raphanus sativus*) or with potatoes or beets, or a combination of all these crops.

Crops combination © Gerard Müskens

Main results and lessons learnt from the experience

Enthusiasm of farmers due to close co-operation

In the Netherlands, farmers had been reluctant to collaborate on safeguarding the hamster because they were afraid that the strict legal protection would force them to

implement management measures that damage their possibilities of regular, profitable farming. It ended up in a negative vortex with a crash of the hamster population. The project therefore worked in close co-operation with the Limburg Farmers Association (LLTB).

Farmers in selected core areas were visited and asked if they were interested in a hamster-friendly agreement, and a few farmers asked about signing a contract. A Hamster Committee was set up in 2005 and met regularly, chaired by a farmer, to exchange information between all parties and to discuss problems, failures and successes. The committee included all relevant stakeholders (researchers, nature conservation organisations, farmers, hunters, the Ministry, the Government Service for Land and Water Management (DLG), and the province of Limburg). This changed the atmosphere, and the Dutch farmers are now generally enthusiastic about joining the management schemes targeted at the protection of the species and its habitat.

Role of hamster coordinator: one-to-one farmer advice and supervision

Direct and continuing advice and one-to-one support to farmers significantly increased the success of the project. During the project, the researchers informed and helped farmers with crop management and other hamster aspects, answering questions such as "Is it possible to harvest?" or "I have found a burrow, what should I do?" Currently, one of the hamster researchers is working for the province of Limburg to fulfil this role. The hamster coordinator also continues the monitoring, checks calls for new management agreements, and checks compliance with the crop management measures. During the past year, the hamster coordinator played a vital role in helping farmers obtain their payments from the government, after administrative mistakes and delays meant farmers were being paid too little and too late.

Lessons learned from initial unsuccessful management scheme

The initial hamster scheme in 2000 was only taken up by three farmers because it specified too many restrictions for the farmers. Agricultural management restrictions, such as a ban on the use of fertilisers and herbicides, resulted in open crops and an explosion of unwanted weeds. Within a few years most of the fields were unsuitable for hamsters and the weeds had to be suppressed with conventional herbicides. This resulted in concern amongst the farmers that hamster-friendly management implies restrictions on crop protection and other farming operations that lead to long-term weed problems which are not compensated.

Research results and flexible management regulations allowed adaptive management

The management advice was altered significantly during the project as a consequence of increased insights from the hamster monitoring research carried out by Alterra, Wageningen & Radboud University Nijmegen. The management flexibility was possible because the project was officially an experiment under EU-regulations, allowing the involved parties to change regulations and management prescriptions. For example, the 20 m survival stripe was agreed in yearly contracts, so each year researchers could approach farmers who had the optimal location to benefit hamsters.

Releases of captive-bred hamsters and long-term population monitoring

Hamster releases in both the farmland reserves and farmer's fields under the hamster management contract meant that local populations rapidly increased in the seven core areas.

Hamster release in a crop © Gerard Müskens

The use of radio transmitters on the hamsters enabled effective research on impacts and

survival. Numbers peaked in 2007, but in 2008 the population crashed after unfavourable weather and an increased predation rate in April–May, following a crash of the common vole population.

This shows how vulnerable small hamster populations are to crashes; they probably need at least 1500 individuals (autumn density) to be resilient (Kuiters et al 2010). Long-term population monitoring and research is needed to ensure that improvements are sustainable.

Sufficiently large area of implementation

Hamster-friendly management was implemented on 300 ha of farmland, plus 106 ha established as farmland reserve, managed by three nature conservation organisations.

This contrasts to the experiences in Alsace and Nordrhein-Westfalen which indicate that the schemes have a positive effect on hamster densities on the very local scale where they have been implemented, but that these areas were too small to create measurable effects on the population as a whole (Orbicon et al 2008).

Sufficient financial compensation

Agri-environment measures on high-productivity arable fields are only acceptable to farmers if financial compensation is high compared to schemes for other farming systems.

The inclusion of lucerne in the rotation at the expense of high-value crops, growing crops in narrow strips, or leaving parts of a cereal field unharvested call for serious financial compensation. For example, in the Netherlands, payments have been 2200 or 2300 €/ha/year[2].

In Bavaria (Germany), and France, where annual payments are lower, uptake is also low, allegedly because the level of compensation is insufficient (Orbicon et al 2008).

Challenges to implementing the next generation of agri-environment schemes for hamsters in the Netherlands:

Retaining flexible management

The adaptive and flexible management that ensured increasing benefits for hamsters in the Netherlands during the Dutch Hamster Project was not possible in the contractual agri-environment schemes that started from 2010, which had to prescribe measures per field for six years.

Farmers are reluctant to tie down their arable surface area for such a time period, and if they do, they often wish to locate any strips in the least productive areas where they have least benefit for hamsters. However, all the farmers who took part in the Hamster Experiment signed agri-environment contracts for this period.

The new agri-environment agreements include the flexibility for farmers to rotate the hamster-friendly measures around the farm. For example, the agreement specifies measures for 10 ha of arable fields that can be rotated around a 20 ha arable farm.

This benefits the farmer who maintains flexibility in management, and benefits hamsters because it ensures good agricultural quality on all of the area. The agri-environment specifications are strict, and are regularly checked by a hamster coordinator.

Transparent, efficient administration of payments

It is critically important that the administration of the payments is efficient, transparent, and timely.

In the Netherlands, several farmers have stated that they will not prolong their agri-environment agreement after 2016 because of the administrative mistakes and delays that meant farmers were being paid too little and too late, and because from their point of view the paper work and administration is too time-consuming, opaque and inflexible.

[2] Payment rates are recalculated each year based on the profitability of a modelled farm. In Wallonia (Belgium), a payment of 2500 €/ha/year was made, but this covered only 0.5ha.

Conclusions: Opportunities for more effective hamster conservation in Europe

The hamster is critically endangered or declining all over Europe. Hamsters are a challenge for nature conservation because they thrive in highly productive agricultural habitats.

This means that protection measures on arable land may need relatively large compensation payments, and progress is continually threatened by market pressures. However, Eastern European hamster populations have a much wider range and less survival pressure, because their habitat has more refuges in field margins and unmanaged pockets on farms, and is much less fragmented by roads and other barriers.

They also have an active season of only 4 months, compared to the Western European population which is active for up to 7 months[3]. It should therefore be possible to find simpler, cheaper management measures that have a significant impact on populations.

Learning from the Dutch success to design simpler, cheaper agri-environment schemes

Although all western European countries and regions with hamsters have implemented agri-environment schemes, the Dutch project is the first to report positive results on the hamster population. However, paying European farmers well above 1000 €/ha/year for conducting hamster-friendly land management is only sustainable where hamster populations are reduced to very small areas.

Agri-environment measures targeted at the species across larger areas must have smaller compensation payments per hectare, and, consequently, serious restrictions on cultivation must be limited to parts of the field, such as lucerne strips or unharvested strips. However, these must be wide enough and cover enough of the field.

Some new schemes are being tried out. The current scheme in Flanders pays 415 – 600 €/ha/year and Flemish farmers seem very interested in joining the scheme.

Thüringen in Germany offers 350 €/ha/year in areas with hamster populations, so the impact could potentially be very important. However, judging by Dutch experiences, the percentage of the field area with harvest restrictions and/or the width of the harvest strips in most of the German schemes may be too small to benefit the hamster populations significantly.

Importance of research and monitoring feeding into adaptive management, and retaining flexibility for innovation

The Dutch approach cannot be directly applied to countries with different farming methods, climate, and other ecological factors influencing hamster populations. It is therefore important to test conservation measures for their effects before implementing them widely.

A key success factor in the Dutch case was the intensive research and monitoring programme, which highlighted where the measures were failing and fed directly into adaptive management.

Very few countries or regions currently carry out regular hamster monitoring, despite Member State's obligations under the Habitats Directive Article 11 to monitor and assess hamster populations. It is therefore important to invest in research, and to retain where possible flexibility in management measures.

The Dutch project team is hoping to obtain LIFE+ funding, in cooperation with Belgium, France and Germany, for a demonstration programme to develop innovative hamster-friendly management measures that are much cheaper to implement. This could provide valuable insights for Eastern European countries.

Importance of direct farmer advice and close cooperation with farmers as well as wider public communication

The Dutch Hamster Project showed the importance of significant investment in

[3] Personal communication Maurice La Haye. It is known that the Western and Eastern populations differ genetically, but it is not known why their hibernation behaviour is different.

communication and cooperation with farmers and farmers' organisations. In Eastern Europe, conservation efforts targeted at the species can be controversial in regions where economically significant outbreaks have occurred in the not too distant past.

Wider public communication is also very important to create a positive image of the species and those who make efforts to protect it. Although hamsters and hamster-friendly agricultural measures do not have direct agro-tourism potential (hamsters are very difficult to spot), the positive image could nevertheless bring benefits for a region's image, thus increasing acceptability for farmers.

The role of hamster coordinator is particularly important, in order to have a direct personal contact for farmers, to maintain monitoring, sign up new farmers to management agreements, check compliance with the crop management measures, and mediate any conflicts.

The Dutch experience also shows the critical significance of an efficient, transparent, unbureaucratic administration of agreements and payments.

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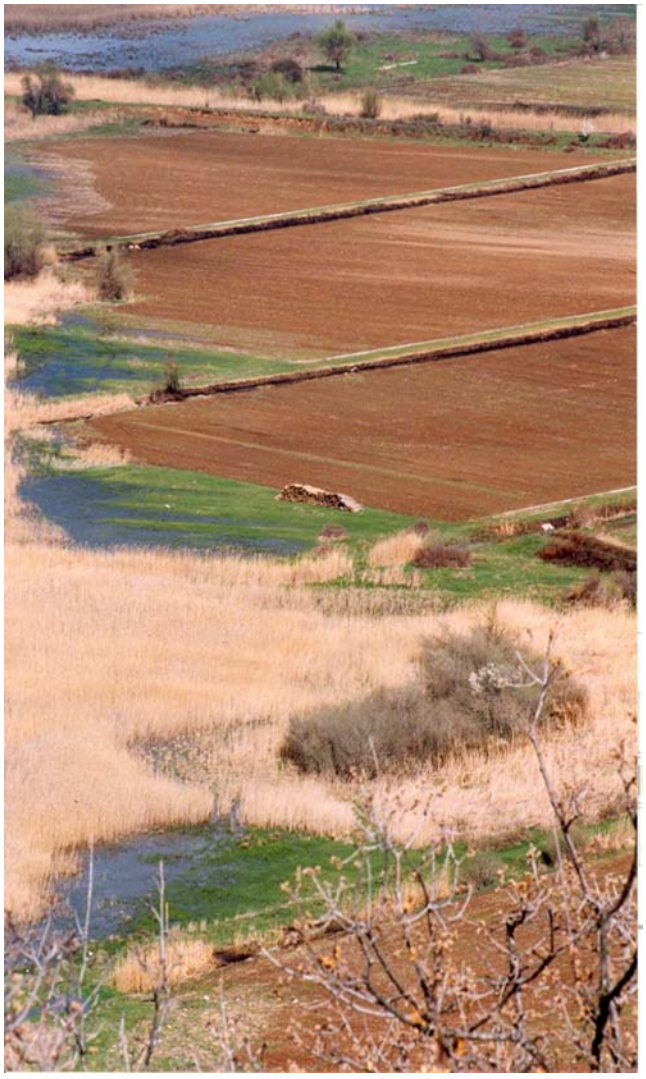
Case Studies

Creation and restoration of bird habitats in Prespa lake, Greece



Wet meadows and agricultural land (L. Nikolaou – SPP Archive)

Prespa, an important area for biodiversity

With the advent of modern times, many mountain areas of the Balkans have witnessed a mass exodus, leaving villages and previously cultivated areas either abandoned or with altered management practices. This has also been the case of Prespa, an area nested in a remote mountain range shared by Greece, Albania and the former Yugoslav Republic of Macedonia, FYROM. Small-scale agriculture had been an integral part of the landscape mosaic, yet nowadays it is either being abandoned or has been replaced by more intensive practices, involving irrigation schemes.

Yet those areas, probably thanks to their inaccessibility until recent decades, and due to the wild geomorphology, have managed to conserve a very rich biodiversity, with species ranging from bears and wolves, to endemic plants, and habitats ranging from beech forests to natural lakes. Though various conservation efforts have been in place since the early 1970's, there are still clear threats to the biodiversity, some stemming from changes in agricultural practices and their impact on semi-natural habitats that constitute feeding grounds for many species, notably birds, others stemming from illegal activities such as illegal logging and poaching.

The area has been protected since 1974, but no management plan had been developed until 2010. Consequently, until recently conservation and management actions, especially towards the conservation of important wetland habitats and waterbird species had been based on the Action Plans of Dalmatian Pelican and Pygmy Cormorant.

Key habitats and species and their relation with agriculture

The area of Prespa actually consists of two lakes, Mikri (Small) and Megali (Large) Prespa and their basin. The two lakes, which lie at an altitude of about 853 masl, are connected by an artificial channel with a sluice that controls the outflow of Mikri Prespa to Megali Prespa. The largest part of Mikri Prespa lies in Greece, with its southernmost tip stretching in Albania, while the largest part of Megali Prespa lies in FYROM with two smaller segments in Greece and Albania. The Greek part of the Prespa catchment basin totals to a surface of 209.6 km^2.

Prespa is an area that combines exceptional biodiversity, evocative landscapes, old villages and Byzantine monuments. In terms of biodiversity, Prespa hosts a very high number of habitats and species, concentrated in a very small area forming a lush mosaic of lakes, rivers, wet meadows, grasslands, rocky outcrops, beech and conifer forests, as well as alluvial forests.

The avifauna is of particular significance also at European and international level, due to the number of species as well as the presence of important populations of world endangered or vulnerable species. Indicative of the site's important biodiversity is that it hosts the largest breeding colony in the world of the Dalmatian pelican *Pelecanus crispus*, the largest breeding colony in the European Union of the Pygmy cormorant *Phalacrocorax pygmeus* and it is one of the two places in the European Union where the White pelican *Pelecanus onocrotalus* breeds, the other being the Danube Delta, Romania. These examples concern 3 out of the 148 breeding bird species in the area.

In order to protect the area's biodiversity, Prespa has been declared as a national park since 1974. Two Natura 2000 sites (Lake Mikri Prespa and Varnous Mountains) are found within the catchment, and were jointly declared as the Prespa National Park in 2009. Since the year 2000 the area is also part of the Transboundary Prespa Park, the first transboundary protected area in the Balkans, the aim of which is to protect its ecological values through collaboration between Greece, Albania and FYROM, and also to promote the economic prosperity of local communities in the three countries.

Recent changes in agricultural activities

The inhabitants of the Greek villages in the area have been historically linked to three major activities: agriculture, fishing and livestock breeding. The 1980's were a turning point for Prespa, as inhabitants turned to intensive bean farming, at the expense of cattle grazing and fishing. Nowadays agriculture still focuses mainly on bean production, though there is a tendency to move from intensive farming to more environmentally friendly practices, including the production of organic beans. Fishing is vanishing as an activity in the area, while livestock rearing focuses mainly on large cattle, and some nomadic practices remain alive. Tourism, focussing on the cultural and natural assets of the area, is becoming an increasingly important source of revenue for local inhabitants.

The changes in agricultural activities observed in the last decades have had a direct impact on the biodiversity of the site, and notably the littoral area.

A first problem is related to the intensification of farming and the ensuing encroachment of farm areas at the expense of wet meadows; this problem became particularly intense after the 1960's when a new irrigation system allowed the transformation of wet meadows into farmland.

The second problem is related to the abandonment of traditional practices in the reedbeds around the lake, such as grazing, controlled burning and cutting. This had led to the expansion and densification of reedbeds at the expense of wet meadows. For example, wet meadows covered 117 ha around the lake in 1945, but in 2001 this area had been reduced to only 32 ha.

Why are wet meadows so important for biodiversity?

What are exactly wet meadows and why are they so important for biodiversity? They are a type of marsh occurring in littoral lake areas where grazing is prevalent. The annual flooding of those meadows in spring is a vital part of their life cycle, as it allows the proliferation of many species, both plant and animal: the grasses, sedges and wild flowers growing in wet meadow soil constitute ideal spawning grounds for amphibians and fish and host large numbers of invertebrates and amphibians, which are main feeding sources for many waterbirds. Wet meadows also provide other vital functions, such as collection of runoff, reduction of flooding, and removal of excess nutrients.

Wet meadows are critical habitats for waterbirds, and notably for two flagship species found in Prespa lake, the Dalmatian Pelican and the Pygmy cormorant, two fish-eating species. Those bird species need a balanced mosaic of reedbeds, which are ideal roosting and nesting sites when surrounded by water in order to avoid predation from land mammals, and wet meadows, which are spawning grounds for their food sources. In order to restore wet meadows, reedbeds have to be managed through grazing and cutting, while in order to maintain them this management scheme has to be applied annually in combination with spring flooding. The EU Ac-

tion plans for the Dalmatan Pelican and the Pygmy Cormorant prepared by Birdlife consider that vegetation management and hydrological management are two essential priorities in order to counterbalance habitat degradation, which is the most important factor of the two species' population decline in most countries.

Dalmatian Pelican colony (L. Nikolaou-SPP Archive)

Wet meadow management for birds conservation

Following an important decline in breeding colonies of the Dalmatian Pelican and the Pygmy Cormorant, a number of local stakeholders set out in the late 1990's to implement concrete measures in order to reverse this trend. Central to those efforts was the Society for the Protection of Prespa (SPP) which elaborated back in 1997 the very first study on the Mikri Prespa wetland vegetation and the various management possibilities, and implemented various measures on a pilot level. The methods used were grazing with water buffaloes, summer reed cutting, winter reed burning and combinations of these three methods. The conclusions of this preliminary work provided much anticipated hands-on experience that led to a LIFE-Nature project that started in 2002 and was completed in 2007.

Thanks to this project, two key measures responding to the two species' Action Plans were materialised: the restoration of wet meadows through grazing and cutting and the management of Lake Mikri Prespa water level.

Vegetation management

A system of controlled grazing and annual cutting of the reedbed vegetation was introduced in eleven littoral areas that had the potential to become wet meadows. Under the guidance of SPP, one SPP-owned buffalo herd and two cattle herds grazed the eleven areas, while cutting was introduced on an annual basis every summer; in certain cases summer cutting was also followed by grazing. The cut reeds were used either to feed cattle and buffaloes or to re-instate the traditional activity of thatched barn roofs.

SPP introduced the buffaloes in the area as their hoofs are more appropriate for the trampling of reedbeds. Following a couple of years of management, the areas showed increased wet meadows characteristics, namely low herbaceous vegetation which is valuable as fodder for feeding animals in winter. SPP had started with the introduction of 5 buffaloes prior to the LIFE project on a pilot level; this turned into a prolific 130-animal herd in a period of about 14 years. After this period, it was considered that the maintenance of the buffalo herd did not have any added valued compared to a cattle herd; given that cattle grazing is the traditional activity, SPP sold its herd in 2011, and grazing is being continued exclusively by the private cattle owners, under a specific grazing scheme.

Buffaloes in the wetland (Y. Kazoglou 2005)

Water level management

The existence of wet meadows is dependent on the fluctuation of the lake water level. Given that the water of Mikri Prespa lake flows into Megali Prespa lake through a sluice-regulated channel, the proper management of this sluice is of primary importance. However, water management in Mikri Prespa lake had become problematic in the last decades. On the one hand, the sluice existing back in 2002 was rudimentary and damaged, allowing water to seep through even when closed, while when water level was high there was run-off above the closed sluice, sometimes with disastrous effects. On the other hand, the study conducted by SPP had identified

that to ensure conservation of the ecological values in Lake Mikri Prespa, water level fluctuation during the spring should range between 854.40 meters and 854.80 meters above sea level, while water level decrease should be slow during spring (16 cm in May to June). Nonetheless, within these water level values, littoral agricultural land would become inundated, bringing into the light a conflict that would have to be resolved.

It was thus important for all stakeholders, mainly conservationists and farmers, to come to a common agreement on the water level management in Mikri Prespa. Two parallel measures were undertaken in order to provide a long-lasting solution to this problem.

The first one consisted of the technical works for the reconstruction of the sluice, which were overseen by SPP, and completed in 2004. The whole procedure followed a thorough consultation process with all stakeholders and relevant bodies at the national as well as the transboundary level. No major obstacles were encountered for the completion of the construction works, except the discovery of World War II ammunition, which called for additional specialized interventions.

The second set of measures concerned the operation scheme of the sluice: who was to operate it and how? To ensure the appropriate operation of the sluice taking into account the hydrological needs of habitats, species and farmers, a three-member Water Level Management Committee was created constituted by the Municipality of Prespa, the Local Land Reclamation Service (LLRS) and the SPP. A key task of this committee, which operated under the Management Body of the Prespa National Forest (MBPNF), was to ensure that water level ranges between 854.40 masl and 854.80 masl, that water level decrease is slow in summer, and that should the water level exceed 854.40 masl, appropriate solutions must have been found beforehand in order to deal with flooded agricultural land (e.g., reimbursement, acquisition, etc.).

This committee later transformed into the Wetland Management Committee (WMC), remaining under MBPNF auspices, its main objective being the conservation of the Mikri Prespa lake ecological balance and the socio-economic development of the area. However, it was broadened to include other stakeholders, such as the Ministry of the Environment, Energy and Climate Change, the Departments of Water and Environmental Planning of the Regional Authority, cattle owners and fishermen associations. Farmers are being represented in terms of irrigation needs by the LLRS.

The responsibilities of the WMC include the programming and overviewing of annual management implementation and assessment of the wet meadows restoration activities. Those activities are being guided by management guidelines elaborated during the LIFE project, and focussing on all aspects of the Prespa wetland management, while reports and suggestions on water, vegetation and waterbird management are elaborated annually by SPP.

Sluice works (A. Rigas, SPP)

Main results and lessons to be learnt from the experience

The conservation efforts in Prespa have been particularly successful due first of all to the establishment of a new decision-making scheme, which has allowed the participation of all relevant stakeholders. This collaboration proves that consensus can be found to accommodate what initially can be considered as "conflicting interests", those of conservationists on one hand and farmers and stock breeders on the other, in a delicate situation involving water management.

A major success is also the fact that regulatory means have been put into place in order to ensure the sustainability of the water level management as well as vegetation management and habitat restoration. Most notable is the creation of the Water Level Management Committee and its transformation into the Wetland Management Committee (WMC), which is constituted by key stakeholders.

Although the WMC is concerned with wetland management mainly on the Greek Prespa National Park, there have been several steps to-

wards involving the other two littoral countries, Albania and FYROM, in wetland management. Within the recent Trilateral Agreement for the Prespa Park, the operation of a trilateral Prespa Park Management Committee has been foreseen and will be the main cooperation channel for littoral countries to participate actively in integrated wetland management.

Additionally, the exceptional results of the LIFE Project for wetland management in Prespa has already prompted the other two littoral states to become involved in wetland management. Consequently, through a GEF-Small Grants Program, the SPP had the opportunity to provide advice and guidance to local stakeholders (Korcha Forestry Service, Womens' Association of Zagradec and local cattle raisers) in pilot reedbed management in the Albanian part of Lake Mikri Prespa. Additionally, a KFW project for the Albanian Prespa National Park is organizing a more systematic approach to wetland management based on the same principles and the results of the completed projects (LIFE in Greece and GEF-Small Grants Program in Albania).

In terms of biodiversity gains, the main result of vegetation management activities was the tripling of the total wet meadow surface at Lake Mikri Prespa, from 32.5 ha before the LIFE project in 2000 to about 100 ha in 2007. The impact of this was clearly visible on the two key target species, the Dalmatian Pelican and the Pygmy Cormorant, whose populations either increased or remained at high levels. In addition, about twenty other bird species benefited directly from the habitat restoration, including the Glossy Ibis *Plegadis falcinellus* which bred again in Mikri Prespa Lake after 35 years of nesting absence and only sporadic presence during spring migration, and the Bittern *Botaurus stellaris* which was confirmed to breed for the very first time in Prespa.

The implementation of the meadow restoration and water management measures also had clear socio-economic impacts as it created new zones at the littoral for cattle grazing, improved fish stocks, promoted vegetation management through cutting and use of fodder as a new economic activity for local cattle owners, enhanced rational water use from farmers and increased the reputation of the area, which is now hailed as a key eco-tourism area in Greece.

Despite the exceptional results and the event of multi-staholder participation within the Wetland Management Committee, the process has not been without obstacles. Initially, there were conflicts regarding the sensitive issue of water level. There is an ongoing tendency for encroachment of the littoral zone by agricultural fields, which may become inundated with high water levels. Nonetheless, the irrigation needs, especially following two rough years of drought, have dictated that the water level, should remain within the proposed levels, in order to store water. The MBPNF has included within its programming the acquisition/swapping of littoral land, in order to resolve the issue of inundated fields and compensation claims by farmers.

In terms of future needs, the activation of the Trilateral Agreement for the Transboundary Prespa Park and the operation of the multi-stakeholder Prespa Park Coordination Committee will further promote the principles that underline the successful wetland management in Lake Mikri Prespa. Additionally, the role of the EU and the application of the Water Framework Directive in Prespa, will allow for the harmonization of water management based on EU standards, even outside its borders.

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Case Studies

Sustainable farmland management for the conservation of the Baltic Aquatic Warbler in Lithuania

Rural landscapes in Lithuania

The Lithuanian landscape is flat and low-lying with numerous lakes and the large Nemunas River Delta creating extensive areas of wetland habitats such as bogs, fen mires and flooded alluvial meadows. In many areas, land drainage has resulted in the formation of dry continental meadows. In all, two thirds of the country is managed as farmland, and coniferous forest covers much of the rest (The Ministry of the Environment of the Republic of Lithuania, 2009). Some large areas of natural landscape survive in the east and south and in delta zones to the west, covering 4% of the land area (European Environment Agency, 2010; Peepson et al, 2007).

Approximately 13% of Lithuania's landscape is protected as part of the Natura 2000 network, across 2,013 sites (Peepson et al, 2007).As in most European countries, many of Lithuania's habitats developed under a long history of agricultural management. However, in recent decades – particularly since the breakup of the Soviet Union - there has been significant abandonment of farm land and approximately 400,000 ha of agricultural land is not currently farmed (The Ministry of the Environment of the Republic of Lithuania, 2009); (Dunford, 2007). Traditional management practices such as haymaking and extensive cattle grazing are no longer economically viable and have ceased in most areas. Some areas have been converted to intensive farming.

Landscape of Kliosiai project site within Tyru Pelke SPA © Žymantas Morkvėnas

Natura 2000 sites. Key features and agricultural issues

Three Natura 2000 protected areas in Lithuania – Nemuno delta SPA, Tyru pelke SPA and Zuvintas SPA – are the site of an EU LIFE+ project[1] which aims to restore the habitat of the Aquatic Warbler (*Acrocephalus paludicola*). The project is also active in two sites in Latvia.

The Aquatic Warbler is the rarest migratory songbird in Europe and is classified as 'vulnerable' on the IUCN Red List of globally threatened species. Its breeding range is highly fragmented and focused on fewer than 50 regular breeding sites across Eastern Europe. In 2007, the estimated total remaining population was just 24,000 individuals (International Union for Conservation of Nature and Natural Resources, 2011).

The Aquatic Warbler. © Žymantas Morkvénas

The species is endemic to wet meadow or fen habitats covered by sedges and scattered reeds with stable above-ground water levels and few woody shrubs. This includes the Habitats Directive Annex I habitat types transition mires and quaking bogs (7140), calcareous fens (7210), alkaline fens (7230), Molinia meadows (6410), and meadows associated with hard oligo-mesotrophic waters (3140) (Flor, 2011).

These habitats were maintained in Lithuania by traditional extensive agricultural management using low-intensity mowing and low-density cattle grazing. With the widespread abandonment of these farming practices, many areas of suitable warbler habitat have become overgrown, whilst in other areas, agricultural intensification, often involving land drainage, has destroyed characteristic habitat features. In 2011, just 90 singing males were recorded in Lithuania (Morkvenas, 2012).

The LIFE+ project aims to restore and maintain semi-natural warbler habitats across six sites, which all fall within Natura 2000 protected areas:

- The Kliosiai site is within the Tyru Pelke SPA and is the most important Aquatic Warbler breeding site in Lithuania. It comprises flooded sedge meadows bordering the Curonian lagoon. The area was traditionally used for reed harvesting, but has been mostly abandoned in recent decades.

- Tulkiarage is one of two project sites within the Nemuno delta SPA. The area was traditionally managed for haymaking but practices have now been abandoned across most of the site. Surviving open sedge patches offer suitable warbler habitat.

- The second site within the delta is the Sysa site. This is the second most important aquatic warbler site in Lithuania. Half of the land is privately owned and has been converted to intensive agriculture with inappropriate grazing and mowing regimes.

- A site within the Zuvintas Biosphere Reserve is the oldest known breeding site for the Aquatic Warbler. The warbler population has declined to 3 singing males.
- The final two project sites are in Latvia: Lake Pape and Lake Liepaja. These provide important migration stop-over sites for the aquatic warbler but have become degraded due to the abandonment of pasture and hay making (Morkvenas, 2012).

[1] LIFE09 NAT/LT/00233 Baltic Aquatic Warbler. See the project website: www.meldine.lt/en. The project also covers two sites in Latvia; Lake Pape and Lake Liepaja.

Conservation measures. Demonstrating best practice

Restoration measures

Restoring abandoned aquatic warbler habitat involves reinstating water management regimes, removing woody vegetation, and reintroduction of regular mowing of overgrown reeds and grasses (Prieksa, 2005).

Mowing should be carried out late in the growing season and in some areas an additional cut early in the summer will also be necessary. In 2011, over 150ha of meadows, abandoned for over two decades, were mown at the Tulkiarage site. Mowing has also been carried out at the Sysa site and is planned for the Kliosiai site but has been hindered by high water levels which prevent access by cutting machinery.

The aquatic warbler requires meadow water levels to remain at approximately 10 cm above ground. In some areas therefore, restoration of favourable habitat conditions will require the reinstatement of water management infrastructure. In the Tulkiarage site, for example, new water gates have been installed in an abandoned water station which used to regulate meadow water levels (Morkvenas, 2012).

Agri-environment measure

As the aquatic warbler is dependent on actively managed habitats, conservation of the species within much of the Natura 2000 protected areas requires the involvement of farmers to implement sensitive and, where possible, self-sustaining agricultural practices.

In Europe, agri-environment schemes under the Common Agricultural Policy (CAP) are a key way to encourage farmers to adopt less-intensive land management practices which promote species and habitat conservation and which may not be economically viable without compensation payments.

The Baltic Environmental Forum (BEF Lithuania) – the non-governmental organisation leading the LIFE+ project – has developed a specific agri-environment (AE) measure for the Aquatic Warbler, which it aims to get included in Lithuania's Rural Development Programme (RDP). To produce the proposed management actions (Box 1), BEF Lithuania consulted both scientists and conservation experts - who suggested suitable measures - and local farmers, who assessed whether they would be able to adopt the practices on their land.

The measure has received broad support from national stakeholders including the Ministry of Environment and the Ministry of Agriculture, and is now being reviewed by the European Commission. So far, it seems to have been well-received, but negotiations are set to continue until autumn 2012. If it is approved, the measure will be initially introduced in 2013 and could also be included on Lithuania's RDP at the beginning of the new financial period for the CAP, running from 2014 to 2020.

The AE management measure will only be applied within the Natura 2000 sites designated for warbler conservation and, within these, will be focused on areas with current or historical records of the aquatic warbler, and areas verified by conservation experts as being potential warbler habitat. The Sysa site, for example, has undergone significant agricultural intensification but still supports good warbler numbers. LIFE project activities in this area will be focused on encouraging farmers to adopt more suitable management under the AE scheme. In some cases, farmers may not agree to adopt these extensive farming practices and in the Zuvintas site for example, the LIFE+ project partners will consider the acquisition of privately-owned land to bring it under appropriate management (Morkvenas, 2012).

Box 1. Proposed requirements under the Aquatic Warbler agri-environment measure

For alluvial flooded meadows:
- Land must be mown twice a year
- The first mowing should occur in July and only in areas where warblers have been confirmed by the protected area administrator to be absent
- The second mowing must be late in the season, after August 15th

For less productive mires:
- Land must be completely mown over two years (ie half in the first year, the other half in the second year)
- Mowing must be delayed until after August 15th

Where shrubs and reeds occur:
- Shrubs must be removed

Reeds must not be taller than 30cm on the 1st October.

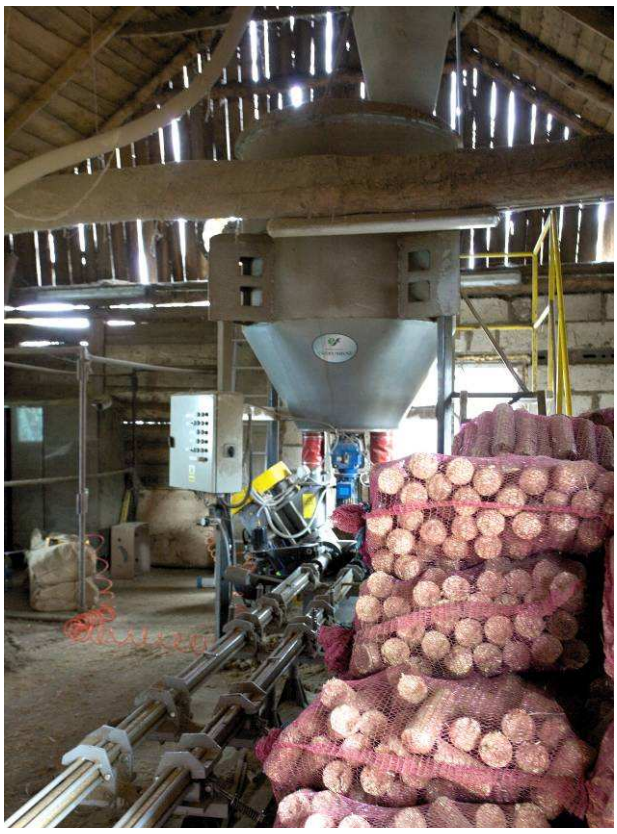
In 2020, the CAP is due to undergo a review and the continuation of AE payments cannot be guaranteed. Therefore, partners in the EU LIFE

project are exploring the possibility of more economically sustainable schemes to support farmers based on market supply and demand.

Developing a biomass market

Traditionally, the biomass produced by mowing mire habitats was made into hay and used as fodder and bedding for cattle. However, nowadays, few farmers in the protected areas keep cattle and, additionally, the later mowing required for warbler habitat conservation means plants become woody and unsuitable as animal feed. As part of the EU LIFE project, partners are exploring the potential to use this waste biomass to produce solid biofuels in the form of pellets or briquettes (Zadrag et al., 2012).

Work is currently focused on analysing the potential biofuel market and considering the most suitable facilities. In order for farmers to receive a sufficient income from this process, it will be critical that they are able to produce a value-added product. Processed briquettes will command a higher price than unprocessed biomass, and have the potential to be marketed under an 'environmentally friendly' product label to capitalise on the growing consumer demand for sustainable goods. Biofuel creation could therefore offer a long-term source of income for farmers who adopt warbler-friendly farming measures.



Briquetting facility and briquettes © Žymantas Morkvénas

However, keeping a large briquette processing facility running at its capacity requires a biomass input from a land area of at least 200 ha. In addition, for the process to be profitable, transportation of biomass from the field to the facility must be no further than approximately 20 km. This would be challenging to achieve with Lithuania's diverse and small-scale farmland ownership and may lead to centralised processing of the biomass, reducing the price individual farmers receive.

Nevertheless, the Zuvintas Biosphere Reserve Directorate are in the process of purchasing a large briquette facility and are agreeing contracts with farmers to guarantee their supply of hay. For other areas, the LIFE+ project partners are researching alternative solutions for small landholdings, such as field-scale briquette facilities suited to production from 5 ha of land, which are available on the EU market.

Targeted, coordinated management

The LIFE+ sites cover large and diverse areas (1,358 ha in total), and factors such as habitat pressures, land ownership and proximity to potential markets vary. Therefore, BEF adopts a systematic approach to habitat management in which restoration measures are not done 'ad hoc' but are planned and adapted to site conditions (see Box 2). In some cases, special measures may be necessary, for example, reinstating access by repairing a road may be more critical as a precondition for restoration of a habitat, than restoration of the habitat itself.

Box 2. Main restoration activities in each site

The Tulkiarage site is affected by abandonment so restoration will involve the reintroduction of extensive mowing regimes and reinstatement of water gates/pump houses to restore water levels (400ha). Mowing will also be implemented in abandoned areas of the Kliosiai site (450 ha), the Latvian sites of Lake Pape (20 ha) and Lake Liepaja (100 ha), and some parts of the Sysa site (60 ha).

Elsewhere in the Sysa site, land is privately owned and degraded by intensive farming. In these areas, activities will encourage sympathetic farming, including promotion of the AE measure. Some land at the Zuvintas site (328ha) is also privately owned, and much has been abandoned. Restoration activities here are likely to involve land acquisition by LIFE partners in order to reintroduce extensive management. There are also plans to pursue biofuel production.

Building relationships with farmers in the Nemunas Delta

Conserving the Aquatic Warbler and its habitat is dependent on involvement of the farmers who manage the land within the Natura 2000 sites. Making contact with these stakeholders presented a major challenge to the LIFE+ project due to the number of farmers involved and the diverse ownership of the land.

The Sysa site within the Nemunas Delta, for example, comprises 700 ha of land shared between a large number of private owners with farm sizes ranging from 1 ha to 20 ha. Even with the help of the Municipal Administrator, it proved difficult to identify who owned what land due to the limited availability of accurate ownership records, and to make first contact with the relevant land managers.

BEF Lithuania addressed this issue by adopting a programme of door-to-door visits. Two staff members, over several weekend days, visited farms within the area, talking with farmers about the aquatic warbler and suitable habitat management.

Approximately 50 contacts were made, covering nearly 50% of the grassland area, and regular communication is maintained with these farmers via letters and by providing a phone number allowing them to contact the BEF directly.

Member of BEF Lithuania project team talking to local landowner © Žymantas Morkvėnas

A dedicated meeting was also held at a local school – publicised through these contacts and adverts in the local press – allowing farmers the chance to give feedback on the proposed AE measure. Further meetings and events are planned, including a festival in the Nemunas Delta at the end of May to welcome the migrating Aquatic Warbler back to its Lithuanian habitat.

Face-to-face contact with farmers has also been made in the field through a volunteer warbler surveyor. Where the surveyor has seen farmers beginning to mow areas where warblers are nesting, she has approached them, offering information about the warbler and a mobile phone to call BEF Lithuania who persuade farmers to delay mowing for a couple of weeks.

The response has generally been positive, with farmers complying and following up with BEF Lithuania after two weeks to check whether mowing can begin.

Lessons to be learnt from the experience and demonstration value for other countries

Personal contact with landowners

The Aquatic Warbler LIFE+ project has demonstrated the value of a personal approach to landowner consultations. The face-to-face negotiations during door-knocking, and by the volunteer surveyor in the field, have resulted in good relationships between LIFE+ project partners and local farmers and the ongoing dialogue has provided valuable input to the development of the agri-environment measure.

There has been a positive response to consultations and a general feeling of support amongst land managers for the proposed protection measures.

Cooperative development of a dedicated agri-environment measure

Work to develop a specific Aquatic Warbler agri-environment measure to be included in Lithuania's RDP is an innovative approach to ensuring suitable management of agricultural land within Natura 2000 protected areas. Formalising management recommendations and providing compensation payments should encourage broad uptake of the measures and encourage farmers to recover abandoned land.

Developing a market for biofuel production to support management

The pursuit of biofuel production is an innovative use of the economic market to provide financial support for environmentally sensitive

agricultural management. Provided farmers are able to produce a value-added product, possibly under an environmental label, they should be able to capitalise on the growing demand for sustainable goods. The money generated will help cover income-foregone for farmers adopting low intensity warbler-friendly measures, such as later mowing.

This market-based funding is potentially a more economically sustainable option in the long-term than agri-environmental subsidies.

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Case Studies

Sustainable management of wet grasslands for meadow breeding birds in the northern Flachgau (Salzburg, Austria)

The Flachgau area

Measures to restore and maintain the habitats of meadow breeding birds have been carried out in five Natura 2000 sites located in the Flachgau area in the northern part of Salzburg. These sites include raised bogs *(comment: raised bog restoration was put through, but not aiming at the meadow breeding birds, because bogs are not their typical habitat!)*, fens, wet meadows and hay meadows. Some threatened birds depend on the specific characteristics of these habitats for breeding and surviving.

The region is characterized by a small-scale agricultural landscape dominated by the cultivation of grasslands and the dairy farming. Today the availability of farmland in this region is low and as the area is situated close to the city of Salzburg, field prices are quite high. Since the 1950s, farming methods have changed significantly. As a consequence of increasing intensification and mechanization of farming, large areas of typical wetland meadows were drained and transformed into rich pastures or fertilized meadows. Wet areas like moor grass meadows were drained to become arable lands. Litter meadows were fertilized and intensively cultivated or else they became afforested. In the course of these interventions, the area's natural vegetation changed significantly, thereby changing the habitats of wild species such as the Common Snipe (*Gallinago gallinago*) and the Corn Crake (*Crex crex*) that depend on wet meadows to forage for food and as nesting areas. Despite these losses, the Natura 2000 areas still offer important habitats to a number of wild birds, but the conservation status of these habitats has to be improved.

Wet meadows are important habitats for several bird species and serve as breeding and foraging habitats. Nowadays in some of the recreated plots the Siberian Iris (*Iris sibirica*) grows again. © Land Salzburg Naturschutz

Key habitats and species and their relations with agriculture

The largest Natura 2000 site, Wallersee – Wengermoor (300 ha), contains a richly structured mosaic pattern of raised bogs and fens, litter meadows, wet meadows and forests. Streams and lake side areas of the Wallersee are also characteristic of this area. The area has been under cultivation for centuries, and has also been used for forestry and peat cutting.

The Oichtenriede Natura 2000 area (100 ha) also formes an important wet area, with widespread litter and wet meadows but some areas were drained in the 1970s. In part of the site there are still extensive areas of the Slim Sedge *(Carex acuta*) and the Black bog-rush mire (*Schoenus nigricans*). A large number of bird species live at these sites, like the Corn Crake (*Crex crex*), the Eurasian Curlew (*Numenius arquata*) and the Common Snipe (*Gallinago gallinago*). The wet meadows are still in agricultural use, although they result in a poor harvest, which can only be used as litter (as a substitute for straw).

The Weidmoos and Bürmooser Moor Natura 2000 areas are dominated by former peat fields with some litter meadows on the edges. These areas are considered to be particularly important for bird species, for example the Northern Lapwing (*Vanellus vanellus*) and the Common Snipe (*Gallinago gallinago*) that live in wet meadows.

One of the main objectives for the Natura 2000 sites was to restore and enhance agriculturally used areas as habitats for meadow breeding birds.

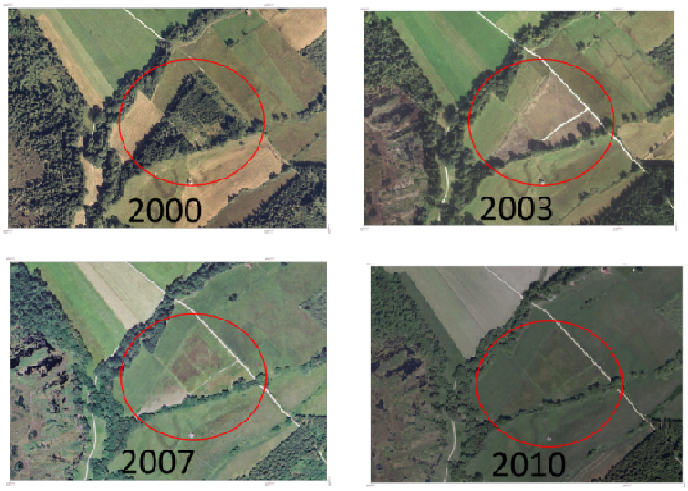
The existing wet meadows and litter meadows were enlarged to create appropriate nesting areas for the Corn Crake, Eurasian Curlew and Common Snipe. They need the wet meadows for several reasons: on the one hand, the grounds of these meadows are quite soft, so the birds can easily poke out insects, larvae and worms. Moreover, the humid soil warms up later in spring and the plants begin to grow later than on dry ground.

These factors enable the bird species to use the wet meadows even when the nearby intensively cultivated meadows are already covered with dense vegetation. High and dense vegetation makes it harder for meadow breeders to find enough food and move around, especially when migrating with chicks to other meadows.

Most meadow breeding birds prefer an open, treeless landscape because it gives them a good view to quickly spot potential predators like raptors that use trees as perches. Only a few trees can grow in wet meadows and most of them remain small, so these areas provide an appropriate habitat for these birds.

Wet meadows and litter meadows also offer suitable habitats to three butterfly species that are protected under the Habitats Directive, the Dusky Large Blue (*Maculinea nausithous*), the Scarce Large Blue (*Maculinea teleius*) and the Marsh Fritillary (*Euphydryas aurinia*). The caterpillars of the Dusky Large Blue and the Scarce Large Blue depend on a single food source, the Great Burnet (*Sanguisorbia officinalis*), which mainly grows in wet meadows. If this plant no longer exists, the butterflies will also disappear. The Marsh Fritillary also mainly occurs in wet meadow habitats and only deposits its eggs on special plants like the Devil's Bit (*Succisa pratensis*) or Scabiosa (*Scabiosa columbaria*).

Cultivation methods used in recent decades led to a significant destruction of these habitats. Drainage systems caused changes in the soil and vegetation, making the ground no longer appropriate for foraging by meadow breeding birds. Furthermore in spring, the soil heats up faster and vegetation growth starts earlier. The drained areas can also be worked by heavy machinery, can be fertilized and mown more frequently. Under these conditions, the areas become even less appropriate for meadow breeding birds. Additionally, fast growing tree species like spruce are used in afforestation.



In the NATURA 2000 areas some spruce forests were removed and transformed into valuable habitats for meadow breeding birds such as Corn Crake (*Crex crex*) or the Common Snipe (*Gallinago gallinago*).
© SAGIS, adapted

Measures implemented to address conservation needs

A number of measures have been developed to restore the habitat of meadow breeding birds. These measures have been funded by two LIFE projects.

The first LIFE project in the NATURA 2000 site Wallersee-Wengermoor took place from 1999 to 2004. The project executing organisations were the Salzburg federal state government (department for nature conservation) as well as the Wasserverband Wallersee, an association that includes adjacent municipalities. The total project costs were 1,644,732 €, of which 50 % were funded by the EU, 47 % by the Salzburg federal state government and 3 % by the Federal Ministry for Agriculture, Forestry, the Environment and Water Management (BMLFUW).

The second LIFE project in this region took place in the NATURA 2000 site Weidmoos from 2003 to 2007. The project executing organisations were the Salzburg federal state government (department for nature conservation), two adjacent municipalities as well as the Weidmoos Peat Renewal Association. The total project cost of this LIFE project was 1.21 Mill. €. Overall, 50 % of this sum was funded by LIFE, 44 % were paid by the Salzburg federal state government and 3% by the Federal Ministry for Agriculture, Forestry, the Environment and Water Management (BMLFUW); the two adjacent municipalities and the Weidmoos Peat Renewal Association paid each 1%.

In the core area of the Wallersee-Wengermoor NATURA 2000 site, several spruce forests were cleared and the area was transformed into wet meadows and litter meadows, creating an additional 3.3 ha of meadow breeding bird habitat. In order to make the area accessible to mowing machinery, the rootstocks had to be removed and chopped with forestry cutters up to a depth of 20 cm. The chopped wood was mixed into the subsoil. There was only one cleared area in which the forestry cutter could not be used because it was too humid the tree trunks were removed by an excavator. Extra seeding was not necessary because the influence of the nearby plants and natural pollen dispersal were sufficient. Mulching of the tree trunks raised the nutrient content of the area within the first few years, but with regular mowing they will go back to their natural levels in the coming years.

Intensively used grassland was converted to extensive use and cultivation methods that have more positive impacts on meadow breeding birds were promoted. The fields have not been fertilized since 2001 and the meadows are mown twice a year to support their re-naturalisation. A total area of about 1.99 ha was converted into extensive land use, about half of this area was purchased and license agreements were made with the landowners for the other half. The areas where such measures were implemented were selected in partnership with experts in order to prioritise sites that will have the greatest impact on meadow breeding birds.

As a result, the decline of meadow breeding species has been stopped and the population stabilized, and in some cases a population increase has been detected in the area.

In the Weidmoos Natura 2000 site the litter meadows were threatened by the encroachment of bushes and trees which would have resulted in them losing their function as a habitat for the bird species. Litter meadows covering an area of 28 ha are now cultivated in a nature conservation compatible way. Hay-flower seeds were used to promote the growth of rare plants in the restored litter meadows. Mowing practices have been adapted over the years to meet local needs. Annual "litter meadow meetings" were organized to discuss and improve measures in partnership with local farmers.

In the Oichtenriede Natura 2000 area, successful measures were also put in place to benefit meadow breeding birds. The habitats were enhanced, despite unfavourable preconditions such as drainages, intensive methods and afforestation. The areas were secured in a sustainable way by purchase or through long-term license agreements with the landowners.

Mulcher and tracked tractors were used e.g. to remove shrubbery and small trees, in order to recreate habitats for meadow breeding birds.
© M. Kumpfmüller

Conclusions. Demonstration value

Improved perception of nature conservation amongst farmers

The projects have had a significant impact on changing the perception of nature conservation in Salzburg. Because the Natura 2000 site had been designated without the agreement of landowners, at the beginning of the project the farmers were very sceptical of environmental protection measures.

The measures were implemented in a close cooperation with the landowners, whose active participation was a key to the success of the project. Local farmers were informed about the characteristics and needs of meadow breeding birds. They were also advised how to adjust their cultivation methods to improve the habitat conditions for the birds.

The organisation of individual talks, information events and the establishment of a project committee made the project very participatory and the land owners were motivated to take part in the development of appropriate measures. The background and purpose of the measures were discussed with the farmers to make the objectives more transparent. This was a long process that took about two years, but in the end it proved to be successful.

Through these activities, acceptance amongst the local farmers was significantly improved. In the final phase of the project, local farmers showed a high acceptance of the conservation project, and apparently strongly identified with the measures.

The project demonstrated that nature protection can be carried out in a dynamic and participatory way. The project also had an effect on the farmers' economic situation. By making license agreements for the agro-environmental programme, farmers received fair financial compensation.

Improved public image of Natura 2000 farmland management

Also relevant to the project's success were the implementation of guided hikes and similar events held in the NATURA 2000 areas, when the ecological value of the area could be communicated in a vivid way to farmers and landowners. On those occasions, farmers contributed their know-how about cultivation methods and local traditions. Events like these helped to develop a basis of mutual trust between those involved in agriculture and those in nature protection.

Special equipped peat diggers were used to create small ponds and to recreate habitats in some plots where it was not possible to work with tracked tractors. © Land Salzburg Naturschutz

A litter meadow (molinia meadow) with a rotating stripe of fallow land improving the habitats for rare butterflies such as the Marsh Fritillary© Land Salzburg Naturschutz

Ensuring the future management of Natura 2000 areas for meadow breeding birds

To ensure the survival of meadow breeding bird populations, their habitats had to be further enhanced and cared for in the future. The long-term management of these areas was ensured

through license agreements with the farmers and by land purchase.

In the NATURA 2000 areas there are possibilities for farmers to continue participating in the protection of meadow breeding birds. In the Wallersee-Wengermoor NATURA 2000 area more habitat areas can be restored by converting spruce forests and intensively farmed grasslands.

Additionally so called "migrating stripes of fallow land" - averaging five to ten per cent of each meadow - are left to stand and not mowed. Here, an important retreat and hibernation area can be found for the caterpillars of the Marsh Fritillary. That ecologically optimized method of wet and litter meadow management was developed within the LIFE project Untersberg-Vorland and is now applied to more and more meadows in the Natura 2000 sites of Salzburg. The agri-environmental schemes were especially adapted to integrate this new management method.

The unique mowing mobile for maintaining especially wet meadows © O. Stöhr

Furthermore a special mowing mobile was bought in the course of the LIFE project. That mobile can complete mowing and loading in one operational step and its soil pressure is very low. With the help of that mowing mobile even the maintenance of very wet meadows is ensured in the long run. Farmers can rent that mobile for a reasonable price.

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Case Studies

Sustainable catchment management programme

A water company led project in Northern England

Croasdale Meadow on 28th June 2007, showing dominance of Yorkshire Fog Grass and low abundance of wildflowers (Anderson and Ross 2011).

Agriculture and conservation

Background

United Utilities (UU) Group PLC is the UK's largest listed water business and provides water and wastewater services to approximately 7,000 million people in the north west of England. It is also the largest landowner of the water companies, with approximately 57,000ha including considerable tracts of upland areas, much of which lie within Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and/or Special Sites of Scientific Interest (SSSIs)[1].

These include important habitats of blanket bog, upland dwarf shrub heath, and upland acid grasslands as well as a wide range of pastures (such as hay meadow and rush pasture) and woodlands. The land is leased to tenant farmers either as farms (with farm buildings), bare-land lets (with no farm buildings) or as common land (where multiple farmers have grazing rights).

Natura 2000, key habitats and species, and agricultural management

UU owns 19 SACs and nine SPAs in total (McGrath and Smith, 2006). The initial Sustainable Catchment Management Programme (SCaMP), implemented between 2005 and 2010, covers an area of 20,000ha, of which 13,500ha is designated as Natura 2000 under two main sites: the Bowlands Fells (SPA) located in the Bowland Estate in the county of Lancashire; and the South Pennine Moors (SPA/SAC) in United Utilities' Southern Estate principally in Derbyshire. The sites overlap with national designations of SSSIs which cover the same area (P. Wilson, pers. comm.)[2]

The Bowland Fells SPA was designated for the presence of at least 1.3% of Great Britain's breeding population of Hen Harrier (*Circus cyaneus*) and 1.5% of Great Britain's breeding population of Merlin (*Falco columbarius*). The habitat is typified by expansive blanket

[1] A SSSI is a UK national conservation designation denoting a protected area for biological or geological interest.

[2] Pete Wilson, United Utilities Biodiversity Officer.

bog and heather dominated moorland which provides suitable habitat for a diverse range of upland breeding birds. The South Pennine Moors SPA/SAC was designated primarily for blanket bogs (7130), European dry heaths (4030) and old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (91A0). Other habitats act as qualifying features but not as the primary reason for site designation, such as Northern Atlantic wet heath with *Erica tetralix* (4010) and transition mires and quaking bogs (7140).

The sites face a number of pressures that impact their biodiversity value. Between the 1950s and the 1970s, UK Government policy encouraged the draining of upland blanket bogs to increase food security, with significant detrimental impacts on habitat condition. In the Southern Estate area many of the habitats are in poor condition as a consequence of historic air pollution, high grazing pressure and wildfire burns. In recent years, continuing pressure from over grazing and air pollution have prevented effective vegetation regeneration (Anderson and Ross, 2011).

As a result of poor vegetation quality and associated soil and peat erosion in moorlands, there has been a rise in water colour from upland sources in the UK which, in turn, is pushing up the costs of water treatment (McGrath and Smith, 2006).

Measures implemented to address conservation needs

Description of the scheme: SCaMP I

In 2005, UU initiated an innovative new scheme to attempt to secure the sustainable management of these two key areas. The primary driver for the project was the UK Government target to bring 95% of the country's SSSI area into favourable or unfavourable-improving condition by 2010. Other objectives included maintaining tenant farmer's incomes, improving water quality, increasing rates of carbon sequestration and securing greater water retention.

All expenditures had to be approved by the water services regulator, Ofwat, and therefore establishing willingness to pay of customers was an important pre-condition for the commencement of the project.[3] Between 2005 and 2010, £10.6 million was spent for the entire SCaMP I project[4].

Measures implemented by the scheme

The project set out to restore drained, burnt and overgrazed moorland and highly degraded blanket bog and increase diversity of hay meadow/rush pastures and woodlands. The restoration measures applied included:

- re-wetting blanket bog through grip and gully blocking.
- re-vegetation of eroded bare peat to restore blanket bog vegetation (e.g. through application of lime, seed and fertiliser).
- woodland creation and enhancement (through planting of trees, stock fencing and removal of non-native trees).
- reducing grazing pressure through stock reduction, removal or seasonal changes.
- new farm infrastructure (such as buildings for overwintering).

Croasdale meadow on 20th July 2010, showing a shorter, more wildflower-rich sward after three years of traditional hay meadow management (Anderson and Ross 2011).

Engagement with farmers and farm selection

In order for the programme to function, it required the active agreement and participation of farmers who leased land within the project area. United Utilities sought ways to encourage farmers' participation by ensuring mutual benefits for the farmer. The primary means

3 Based on a survey of customers to test willingness to pay for biodiversity.

4 Personal communication, Phil Austin, United Utilities SCaMP project manager.

through which this was achieved was through facilitating entry to the Higher Level Stewardship (HLS) agri-environment scheme which can provide significant support to farm income.[5] The statutory agency (Natural England) identified areas of particular biodiversity interest for entry into the scheme, and outlined the actions required to gain entry. As the HLS scheme only covers half the costs of the capital investments, United Utilities offered to provide part or all of the upfront costs (e.g. building, fencing, gripping) to facilitate farmer's entry to the scheme.

For those farmers who did not qualify for HLS, United Utilities offered to provide certain concessions (e.g. construction of overwintering building, or increasing the length of the tenancy agreement) to make their business more viable in return for more biodiversity-friendly farming practices.

Once entered into the programme, the measures applied to all the land that the farmer farms, including that not owned by United Utilities. In the end, SCaMP I covered 38 land holdings, 17 in the Bowland Estate, 21 in the Southern Estate.

Integration with other schemes

Circa 20-25% of the capital costs were recouped via grant-aid from Natural England (through the HLS) or the Forestry Commission (e.g. the English Woodland Grant Scheme). This latter scheme pays 80% of the grant upfront to contribute to capital costs and 20% after five years.

The farmer also receives a payment per hectare, depending on biodiversity value. As the delayed grant payment may deter some farmers from entering, United Utilities provided the upfront capital payments with a view to securing biodiversity objectives.

Development, monitoring and evaluation of the scheme

A specialist ecological consultancy was commissioned to design and carry out annual monitoring of selected botanical and hydrological parameters in order to ascertain the impact of restoration measures. Five years of data is now available since the baseline year of 2005.

Description of the second scheme: SCaMP II

SCaMP II is an expansion of the SCaMP I approach to the remaining United Utilities owned land (approximately 30,000ha). Due to the lower proportion of protected areas in the area (4,000ha of SSSI), the project focuses on water quality improvement as its primary goal, but also aims to enhance biodiversity, improve carbon sequestration and increase tenant farmer incomes.

It includes 53 projects in total, of which six are on common land. United Utilities are proposing to spend £11.6 million between 2010 and 2015. The measures taken are similar to those in SCaMP I, with an emphasis on those that provide water quality benefits.

Success factors, constraints, opportunities and threats

Main results

By 2010, all capital works for SCaMP I had been completed. An independent review of the scheme (Anderson and Ross, 2011) found that restoration and management measures contributed significant improvements in protected areas; all Natura 2000 sites in the Southern Estate and most of those in Bowland are now in favourable or unfavourable recovering condition (including 98.6% of designated blanket bog).

In addition, 273 ha of new native broadleaved woodland was created; 23 ha of degraded Upland Hay Meadow was brought into favourable management, 10 ha of Upland Heath was restored, and 9.3 km of new native species hedgerows were established (United Utilities, 2011).

Furthermore, the re-establishment of vegetation has seen a corresponding reduction in sediment reaching the streams. The removal of grazing stock appears to have had the greatest impact in stabilising bare peat on blanket bog, enabling common cotton grasses and crowberry to recolonise vegetatively.

There are early signs of reduced grass dominance in grasslands managed for hay with cattle aftermath grazing, with diversity either

[5] HLS agreements last for a duration of 10 years and aim to deliver significant environmental benefits in priority areas, often involving complex environmental management with the support and advice from local farm advisors.

maintained or enhanced (see photos of Croasdale Meadow) (Anderson and Ross, 2011).

The project has had a significant impact on changing culture within the water industry. The successful implementation of SCaMP I has prompted Ofwat to require water companies to investigate the potential of catchment management as a measure to improve water quality at source before capital investments in hard infrastructure are approved.

There are now 105 catchment management programmes or investigations underway in England.

Gully 'Quiet Shepherd' in 2007 (United Utilities, 2011)

Gully 'Quiet Shepherd' in 2009 (United Utilities, 2011)

Main success factors

Successful stakeholder and farmer engagement

Strong, established relationships with the farmers and the nature conservation agencies and NGOs were a key factor in the success of the project. United Utilities had already developed these relationships through their catchment management teams, composed of land agents (who dealt with tenant farmers), a biodiversity officer, and a woodland officer. The project worked to meet targets and needs of its local stakeholders, which ensured a high level of support and co-operation.

Strong support from statutory agencies and national regulators

The statutory agency responsible for the delivery of agri-environment schemes, Natural England, showed a high degree of interest and flexibility in collaborating with United Utilities. The national water regulator similarly granted permission for a set of measures not traditionally associated with a water company's remits and have since expanded the learnings from the scheme into their general practice.

Landscape scale operation

The scheme has the advantage of working on a catchment scale, compared to just working a single farm basis, and therefore can generate benefits on a much greater scale over a wider area.

Weaknesses & constraints identified

The scheme depends on landowner interest in the scheme; SCaMP worked particularly well as the water company owned the land outright; thus where farmers own the land within a catchment, the process is more complicated. In cases of common land, negotiating agreements is exceptionally complicated, with farmers' interest in maximising stocking density being in direct competition with Natural England's interest in reducing stock numbers to protect biodiversity. For time-bound agreements, farmers may deem it not in their interest to join if markets change and it becomes more profitable to pursue other management practices.

A potential conflict of interest exists between water quality and nature conservation. United Utilities has a policy to reduce *Cryptosporid-*

ium at source by limiting cattle grazing[6] and do not agree to expanded cattle grazing where they are not already present, despite this being a measure under the HLS on grasslands. Furthermore, despite documented gradual improvements in vegetation cover, it may be 20 years before significant improvements in water quality in reservoirs are noticed, particularly for colour.

Opportunities for the expanded scheme

An opportunity exists to expand the scheme beyond land owned by a water company, to which it is currently principally restricted. All expenditures must be reported under either 'revenue', which means it is attributed to the annual accounts and affects the profit margin of that year, or as 'capital costs' for expenditures that represent a long-term investment, the costs of which are spread over longer time periods. As United Utilities owned the land on which the work was carried out, Ofwat facilitated the project by allowing Unitied Utilities to report expenditure under 'capital costs', with the understanding that they constitute a long-term investment, which allowed them to apportion the costs of the agreement over several decades.

Conversely, any expenditure for works on land not owned by the company is currently reported as 'revenue', which affects the profit margin, making it a barrier to expansion. Nonetheless, Ofwat recently allowed a signed agreement between a water company and a neighbouring farmer to itself become an asset, which meant the costs could be reported under 'capital costs'. Allowing this practice to become more widespread practice in the future present the opportunity to expand this kind of program to land not owned by the water company[7]

SCaMP II represents a move away from work on protected to areas with a potential for water quality improvements. It is likely that the focus of such works may be rolled out to meet objectives under the Water Framework Directive.

The Environment Agency is already viewing this model as a means of meeting targets under the Directive, although it is not yet clear who will pay for the measures.

Threats & challenges facing the schemes

There is a danger that payments to reduce polluting behaviour within a catchment will incentivise farmers to engage in polluting practices in order to qualify for payments.

Also, Durham University, who provide scientific assistance to the project, advise that likely projections of climate change pose a serious threat to the habitats in question (particularly *Sphagnum* spp.) and schemes such as SCaMP may only be slowing the rate of degradation rather than resulting in long-term positive trends.

Conclusions: demonstration value for other areas and countries

SCaMP is often hailed as a flagship-type project as it succeeds in providing multiple benefits for different stakeholders and serves as an interesting example of 'payments for ecosystem services' financing nature conservation.

There are useful lessons for different actors. For statutory agencies responsible for agri-environment schemes, it shows the importance of developing relationships with different types of large landowners, including private companies, and being flexible in the design of the schemes.

National water regulators can play an important role by requiring water companies to investigate dealing with the source of water pollution through catchment management approaches which can have significant positive impacts for biodiversity before granting permission for large infrastructural investments.

For water companies, the project shows that it can be economically beneficial to invest in certain biodiversity conservation measures as a means of addressing deteriorating water quality and increasing costs.

The scheme has the potential to expand to land not owned by the water company via

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[6] Note: many other companies rely on their treatment systems to remove *Cryptosporidium*.

[7] E.g. the water company may decide to buy a new system for a neighbouring farmer to reduce pesticide application, which could save water treatment costs several times greater than the upfront costs.

partnership approaches where there are win:win opportunities (e.g. water quality and biodiversity benefits) or through contracts with neighbouring farms to halt polluting practices.

References and sources of further information

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Acknowledgements: Phil Austin (United Utilities)

Case Studies

Pastoral Management Plan in the French Alps

Fighting against land abandonment and the reduction of mowing and grazing pressure

Background

Haute-Alpes is the only county in France to be completely recognized as a Mountain Area. Local farmers will thus generally be entitled to the allowance for the Less Favoured Areas. Local farming is well adapted to natural alpine constraints. It consists mainly of livestock production and pastoralism in altitude. However, during the last 10 years, the number of farms has decreased by 23 % mostly the small holdings. The number of farmers has also reduced by 28 %. This decrease has accelerated in the last few years. The restructuration of the farming industry has an impact on land use: the significant decline of Utilised Agricultural Area and of different animal stocks allow woodland to grow back naturally, a sign of land abandonment.

The grassland areas occupy 86 % of the utilized agricultural area of the «*Hautes-Alpes*» (in 2010) which enable a dynamic pastoralism. The area of extensive permanent grassland alone accounts for 45 % of the agricultural area.
Considering the richness of some habitats, 38% of the county has been designated as Natura 2000 which is well above the national or regional average. Farmers are strongly involved in the management of these sites.

Shepherd in "Les Ecrins" © Parc National des Ecrins

Natura 2000, key habitats and species and agricultural issues

The study case is located around the town of «*Argentière la Bessée* ». Three Natura 2000 sites cross over this town forming a continuous landscape entity starting from the valley of "*Durance*" 1000 m high all the way up to the summits of the "*Ecrins*", which culminate at an altitude of 3000 meters:

- The SAC «*Steppique durancien et queyrassien* » covers the natural areas of the valley of "*Durance*" which also includes the major part of the built-up areas;
- The SAC «*Vallons des bans-vallée du Fournel*»;
- The SPA «*Les Ecrins*»

"Les Ecrins" SPA and National Park © Parc National des Ecrins

The SAC «Stepique durancien et queyrassien» is an exceptional site for the subcontinental steppic grasslands (6210), rare in Europe and which at the national scale in France consists mostly in small areas.

The three Natura 2000 sites host other agricultural habitats: different dry grasslands (6110; 6210; 4060; 5130), lowland hay meadows (6510), mountain hay meadows (6520), alpine and subalpine calcareous grasslands (6170), alpine and subalpine calcareous grasslands (6170) and limestone pavements (8240).

The species of European interest *Eryngium alpinum,* which is endemic of the Alps and a plant associated with hay meadows of high grasslands, has its most remarkable populations of the Alpine region on these sites.

Other species are also present: *Dracocephalum austriacum* (plant found on mountain rocky pasture), *Rhinolophus ferrumequinum* (bat associated with extensive livestock), *Euphrydyas aurinia* (butterfly found on meadows, alkaline lowland peat bogs), *Tetrao tetrix* (notable bird species linked to pastoralism).

The biological diversity is intimately linked to local agro-pastoral or grazing practices, which are in turn conditioned by the mountain habitat and the difficult access of this valley.

The farms located within these three Natura 2000 sites are geared towards the ovine meat production. During the winter season the farmers generally run other businesses.

There are two periods of lambing, one at the end of winter and another at the end of summer. The herds stay in the sheepfold almost six months per year due to the local climate conditions.

The sheep farmers in this area need different type of lands:

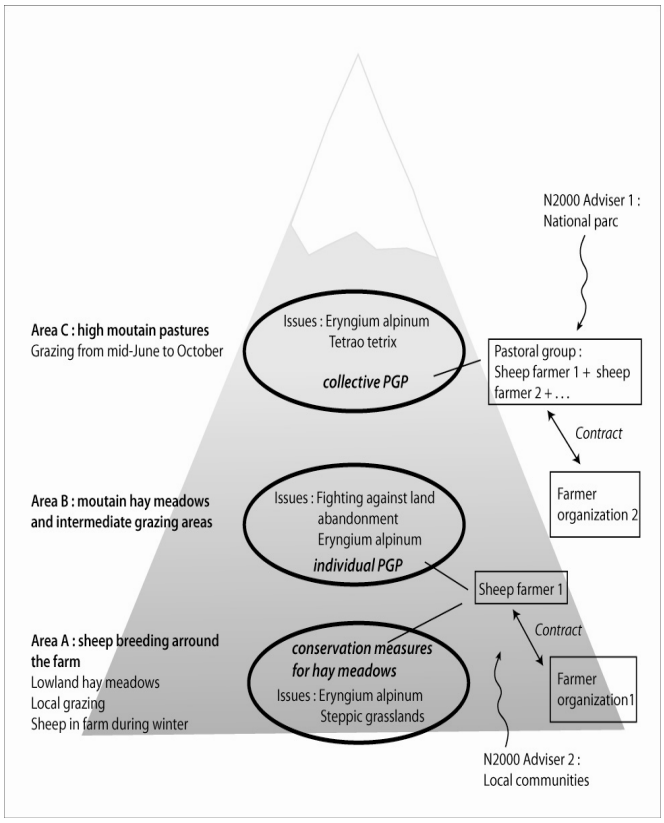
A. Hay meadow plots near the farm usually located above 1000 m high, which provide hay supplies used for feeding the herd over winter (the number of animals are determined by the storing capacity of hay); these meadows are sometimes grazed during the autumn;

B. Grassland areas for the intermediate grazing areas located near the main farm, which are grazed between May and mid-June and then from the end of August (especially for the second lambing) to the first snow falls; the herd are left a limited number of days on these areas;

C. «Alpage» (high mountain pastures of the Alps), collectively shared and managed by a group, where a shepherd keeps the herds from mid-June to the beginning of October.

The principal threat to these Natura 2000 sites is the decline of local agriculture. The land is progressively abandoned in some areas. The least accessible parcels and the hardest to graze are left over. The abandonment of land has structurally transformed farming practices. The drop in numbers of employed farmers has led to the increase of the herds in size, a

change in the way they are led, a phasing-out of manual grassland management and an uneven grazing pressure.



Areas of steppic grasslands have suffered from damage or have vanished because grazing was stopped due to their low productivity This decline leads to a progressive development of Mountain ash, Dog rose, Common aspen followed by pine trees such as Scots pine and Larches; all of which have an impact on the landscape and on the floristic richness and the quality of intermediate grazing areas due to scrub encroachment. The impoverishment of these grasslands generates an increase of pressure on other more sensitive areas (mountain hay meadows, wetlands or alpine calcareous grasslands).

Another phenomenon is the phasing-out of hay cut by mowing to the benefit of grazing. This is due to the steep slopes and a reduction of labour available on the farm.

The conservation of *Eryngium alpinum* is partially compromised as a result of the reduction of natural hay meadows. The steppic grasslands are also threatened by the irrigation and the urban sprawl.

The closing-in of theses habitats represents:

- An impoverishment of the ecological richness;
- The abandonment and standardization of landscapes which play an important part in attracting tourists;
- A decrease of the utilized intermediate agricultural area, in particular pastoral areas;

- Risks of fire, mainly on the south-facing slopes ;
- A loss for the local economy due to a drop in numbers of farmers.

Eryngium alpinum (Wikimedia commons)

The major conservation objectives for these Natura 2000 sites are the following (in order of priority):

- To maintain the habitats of European interest such as the steppic grasslands or the hay meadows both in the valleys and the mountain, and
- To safeguard the two key species which depend on farming practices:
  - ✓ *Eryngium alpinum*: a rare and fragile plant thriving in full sunlight, of which the seed dispersal is involuntarily carried out by animals and their fur. It can only be found in mountain or subalpine habitats. It is sensitive to the closing-in of habitats, and early mowing and grazing in particular before July;

- ✓ *Tetrao tetrix* is a bird found in mountain moors, grasslands and copses. During the breeding season, the females look for areas with high grass cover in mosaic habitats while the juveniles feed essentially on insect larvae. This species is sensitive to the closing-in of its habitats but also to grazing occurring at brooding time. Sheep disturb nesting and the quantity of insects is less when the grass has been grazed.

Furthermore, care must be taken on maintaining the current floristic diversity and the conservation of wetlands.

Tetrao tetrix (Naumann,*Naturgeschichte der Vogel Mitteleuropas*, 1905)

Measures implemented to address conservation needs, conflicts etc.

In order to answer to these objectives for these three Natura 2000 sites, several agri-environmental measures - as detailed in the regional rural development plan 2007-2013 - have been contracted by the farmers or the pastoral groups involved.

Commitments include (see details below):

A. Mowing and limitations and restrictions to grazing and fertilization in valley or mountain hay meadows

B. Individual Pastoral Management Plan (PMP) to maintain open habitats

C. Collective Pastoral Management Plans (PMP)

A. Hay meadow parcels near to the farm	
Valley or mountain: to maintain mowing and increase the floristic diversity	- limited organic fertilization with nitrogen, phosphorus and potassium, excluding droppings from grazing animals (65, 90, 160 units /ha/year respectively); - mineral fertilizer inputs not allowed; - mandatory annual mowing delayed until 10th July (10 days delay over the usual date); - destruction by ploughing of concerned permanent grasslands or other heavy duty work not allowed; - wood products controlled
Mountain: to maintain mowing and the conservation of the *Eryngium alpinum* populations	- total absence of mineral and organic fertilizer inputs (including magnesium and lime); - annual mowing mandatory; - absence of mowing and grazing before 15th August two years over the 5-year period; - absence of mowing before 10th July the three other years.

B. Parcels used for intermediate grazing: Individual Pastoral Management Plan (PMP)	
To maintain the habitats open (Herding methods enable to limit, stop or slow-down the growth of wood. Scrub clearance works are used in addition if required)	Clearance (by machines or with hand-held tools) of wood and manure of grazing stock for 2 years over the 5-year period. These works must be carried out between 1st August and 31st March. The level of scrub encroachment of concerned areas must be kept below 30 %.
Conservation of *Eryngium alpinum* populations	Postpone grazing after the fruiting period for 2 years over the 5-year

(To allow the development and fruiting of the plant and seed dispersal)	period.

C. «Alpage»: collective Pastoral Management Plans (PMP)	
«Alpage» 1: to maintain habitats open and to protect the *Tetrao tetrix* (broods to be left undisturbed and maximize feeding opportunities for the chicks)	- particular method of herding: controlled grazing to force the livestock to graze targeted plants which are usually neglected, especially on old hay meadows that are overgrown; - grazing to be delayed (different dates depending on which parcel : 20th to 30th August or October)
«Alpage» 2: Conservation of *Eryngium alpinum* populations and habitat protection	- grazing to be delayed (10th to 25th September); - fencing around sensitive areas (wetlands for instance).

In 2007, around 200 ha have been contracted on these three Natura 200 sites as collective Pastoral Management Plan (PMP) and 24 ha as individual PMP.

The Pastoral Management Plan has been produced in the framework of the agri-environment measures. The implementation of a PMP aims at maintaining pastoral areas consisting of a mosaic of habitats. The PMP are adapted to the farming system and to the conservation of a structural and functional diversity. The individual PMP are subscribed by a single farmer while the collective PMP are subscribed in high mountains by a group of pastoral farmers and implemented by a shepherd.

The PMP are based on specific surveys carried out by a local accredited farming organization and considered at a wide scale (for example by including the whole of the «Alpage»). An assessment is carried out 5 years after the start of its implementation. The Natura 2000 advisers undertake works to raise awareness and to monitor the outputs.

The PMP presents a particular approach of pastoral management based on the co-construction, the monitoring of the herd and the dynamics of the plants, the recognition of habitats often considered as difficult to use for grazing.

Certain conditions are required to be able to contract the measures discussed herein:

- A set of measures on the management of grassland areas which must systematically be included in the method statement;
- A set of measures dedicated to collective groups;
- There is a minimum threshold (300 €) and a maximum threshold (7,600 €) for the cumulated amounts of all measures chosen by each farm. This condition applies not only to farms but also to collective groups in the "Alpages" where each farmer will get a complementary allowance with a maximum amount of 7600 €. The minimum threshold is a constraint for mountain farmers because it is not easily reached.

The amount of each grant is decided at the national level while the combination of the different grants is decided at regional level and supervised by national rules

The individual or collective PMPs receive a sufficient compensation, except for the PMP surveys of which the costs are not entirely covered. However, the shortfall is greater for the contracts related to the hay meadows (areas A & B) because the parcels are very small and difficult to access in these areas. The delay in mowing means that a hay of low quality will be produced. The farmer therefore sees its actual losses not fully offset.

In addition to the grants given for extra hours of work or the extra cost related to the commitment to such agri-environmental measures, other grants are obtained from the EARDF with the allowance under the Less Favoured Areas regime, that reach its maximum in this area

All allowances granted by the CAP have significant implications in the economy of this type of farming. The expenses related to facilitating (a key factor in achieving success) are not included in the grants and come from other funding sources.

Generally speaking, the different measures are not always understood or accepted: fencing of a parcel requires a significant number of hours; the delay in grazing involves a greater difficulty in attracting sheep to graze (considered as a waste by farmers).

Agri-environmental payments

Example for the measure taken for the "Alpage" (Area C, collective PMP); the same measure in area B (individual PMP) has a higher cost (117 €/ha/year) and similar obligations

Mandatory measures	Management of extensive permanent grasslands committed by a collective group	27 € /ha /year
	Track recording of machine works and grazing practices	16,54 € /ha /year
PMP	Undertaking of an independent survey (initial approach, writing, 5-year period monitoring) carried out by an accredited farming organisation	3,69 € /ha /year
	Extra cost due to additional working hours required for the implementation of the PMP (estimated at 3 hours /ha)	49,62 € /ha /year (maximum)
	Total	***97 € /ha /year***

Example for the measure taken for the hay meadows with patches of *Eryngium alpinum* (Area A)

Mandatory measures	Management of grasslands	76 € /ha /year
	Track recording of machine works and grazing practices	16,54 € /ha /year
Specific measures	Shortfall : loss of income due to the delay in mowing and the total absence of organic and mineral fertilizer	210,72 € /ha /year (this amount is a local adjustment which does not match the maximum possible)
	Total	***303,26 € /ha /year***

Main results and lessons learnt from the experience

The different constraints related to this alternative form of management can force the farms and shepherds to change certain of their habits. For instance, the size of herds is limited in order to minimize the delays in grazing or fencing.

The delay in mowing can in some cases lead to a yield of hay of lower quality, and during the periods of drought, to force the farmer to buy hay from other places. It is moreover not always easy to find the right balance between, the passage of the herds (to prevent scrub encroachment), and a not too strong and/or delayed grazing pressure (to assist in the conservation of the meadows and associated species such as *Eryngium alpinum* or *Tetrao tetrix*).

An important work aiming at raising awareness and advising the farmers and shepherds was carried out by the local farming authorities and the Natura 2000 advisers. The farmers have thus committed themselves more openly in a process which requires a certain level of skills and monitoring.

Certain limits of feasibility exist: for instance, it may be not possible to incorporate new areas within an « Alpage » (high mountain pasture) into a PMP without making the grazing calendar not applicable.

Significant results related to the conservation of habitats and species on these Natura 2000 sites are due to the implementation of these

measures. For example, on one of the patches of *Eryngium alpinum* where measures were taken since 1995, there was in the last ten year an increase of 24 % in the number of plants. In another place, where delayied grazing had been carried out , was abandoned between 1999 and 2005, with a consequent decrease in the number of plants of 60 %.

Since 2005, a change of trend occurred when favourable management was implemented. For *Tetrao tetrix*, the site was surveyed several years in order to know the number of individuals and to monitor the trend for the local population and its annual breeding success. These surveys show a constant increase in numbers.

The farmers represent a fragile link but essential for the management of numerous habitats and species found within Natura 2000 sites. Their involvement relies above all on good advising. Indeed, for those who actually commit themselves in implementing agri-environmental measures in areas suffering from decline, the grants do not match the level of resulting constraints, in particular for the delay in mowing. Furthermore, they do not gain much recognition for their efforts (like a label for instance). Some of them have accepted the process in reference of old traditions: the delay in mowing used to be carried out reluctantly because access to the mountain by foot was much longer than it is today by car.

Since the 1990s, various schemes have been designed to assist the growth of agri-environmental practices. Theses successive schemes have been fairly uneven because not always adapted to local circumstances.

The current form of the agri-environmental measures of the regional rural development plan 2007-2013 rely today on the possibility to adapt locally the method statement through the association of different single commitments. Once grouped together, they seem appropriate to the issues at stake. The measure that enables a pastoral management is based on an approach even more targeted, since it involves the production of an individual PMP allowing a finer adaptation at the scale of the considered area. This is a considerable advantage because it means that inconsistencies between the objectives and the technical specifications, frequently encountered with the previous schemes, will be solved.

Every 5 years, an assessment of each PMP is carried out (Have the objectives been fulfilled?; Are there any adjustments to be made?). This assessment includes a site visit (the « Alpage » being considered globally and not only on the areas concerned by the PMP) and a meeting with all stakeholders.

The adjustment of the measures is undertaken every year in a light fashion and more in-depth at the end of the 5-year period. Their implementation on the long-term and the involvement of the various stakeholders are the key factors for the successful conservation of habitats and species dependent on pastoral farming practices on these Natura 2000. Considering the case taken as an example, some of the measures are already implemented since 1995. Regarding the monitoring, the Ecrins National Park invest significant human resources; hence an output and its resulting adjustments that are realistic and a constructive feedback. This is not always the case.

Moreover, the farmers, the pastoral groups and the shepherds involved commit themselves with trust in this process. On other sites, the farmers can show more reluctance. It is then necessary to take more time in order to reassure them and to let them realize that this alternative form of management is not unaffordable. On the contrary, some farmers who commit themselves to numerous measures cannot always manage.

The "*Hautes-Alpes"* county has a long experience of pastoral management plans and work hand in hand with various organizations in order to achieve satisfactory results: the national authorities, the National Parks, the CERPAM[1] who works on PMP since 1995 and assist the pastoral groups, the « *Chambre d'Agriculture* » (a farming Public body) that works on the individual PMPs, the municipality as the owner of the site and the body in charge of the implementation the Natura 2000 programme.

The agri-environmental measures implemented in the Natura 2000 sites have been used as models for other sites not included in the European network. Nonetheless, only 41 % (35 out of 85) of eligible sites within the Natura 2000 areas and

[1] Study centre for the implementation of pastoral practices in the Mediterranean Alps: http://www.cerpam.fr/

located in the Ecrin national park benefit from these measures.

In the same park but outside of the Natura 2000 sites, it drops down to 13.7 %. Within the Natura 2000 areas, the various schemes of the CAP and the techniques used are the same as elsewhere. However, the implementation of agri-environmental measures makes them different. In addition, the efforts made to prevent the agricultural decline provide an added value: a new boost was given to touristic attractions which thus benefit from preserved landscapes.

At the heart of the contracting process, one of the key factor to success is the partnership between the farmers and their delegations working on the definition of the technical specifications. There is a bottom-up approach and not just a top-down one. The ownership was excellent and that is why it was such a success and considered as a pilot project in this county. The national authorities work today on ways of going a step further with the application of PMPs at a regional level.

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Case Studies

Preserving sand grasslands on the Szenes pasture and other parts of Transdanubia, Hungary

The status and chances of conservation of HNV grasslands in Hungary

Almost all Hungary's large geographical regions still have some form of traditional farming. In the Great Hungarian Plain, which was almost completely turned into intensive agricultural fields, grasslands have only survived as fragments.

The interconnected patches of these grasslands, most of which are High Nature Value (HNV) areas, serve as ecological corridors, and are indispensable for a large proportion of Hungary's natural values, ranging from birds of prey of European importance to populations of corncrakes, great bustards, ground squirrels and many nationally protected and endangered insect and plant species. For some of these species there are targeted agri-environmental schemes in the Rural Development Plans (RDP), while other species are affected favourably indirectly.

Grasslands represent almost thirty percent of the Hungarian Natura 2000 network, and RDP measures, which target also 'reversing biodiversity decline' include payments for Natura 2000

Grassland in Szenes (Ferenc Elblinger)

areas, agri-environment and Less Favoured Areas (LFA). The only quantifiable target however relates to farmland birds: stock index of wild birds nesting at agricultural areas increases by 12%.

Geographic location, key Natura 2000 habitats and species and agricultural issues

Mezőföld is the Transdanubian part of the Great Hungarian Plain, which lies between the rivers Danube and Sió at an altitude of 100-180m. Originally a steppe, it is now an agricultural area of high quality. The landscape includes intensive cropping fields and extensive grasslands, with soils affected by sediments from the nearby streams and sand. Native ecosystems vary from sandy steppes to humid meadows and alluvial forests with *Alnus glutinosa*.

The fauna is rich in endemic and endangered species such as the nosed grasshopper (*Acrida hungarica*) or the tiger moth (*Ammobiota festiva*).

The Szenes pasture Natura 2000 area is located at the southern part of Mezőföld. It is a part of the largest adjacent grassland mosaic of the area. No management plan has been drawn up so far for the pasture itself. However, the main conservation objectives have been identified by the national park officially responsible for all conservation activities in the Szenes pasture Natura 2000 site. These are the following:

- to prevent encroachment by shrubs with grazing and mowing,

Sand dune and sandy grasslands typical of Szenes pasture (Hungarian Geocaching Association)

Iris humilis subsp. arenaria (Wikimedia Commons)

- to maintain the population of ground squirrels by permanent grazing,
- to conserve the population of *Iris humilis ssp. arenaria* by using an adequate grazing method,
- strict protection of habitats in order to maintain populations of plant species of European importance (*Eleocharis caniolica, Sphagnum spp*.) and rare and characteristic species of the habitat types (*Iris pumila, Iris humilis, Stipa borysthenica, Orchis morio, Dianthus superbus, Alkanna tinctoria, Orchis militaris, Listera ovata, Eriophorum latifolium*),
- to halt the spreading of the invasive plant species (black locust, tree of heaven, common milkweed and Canada goldenrod),
- to maintain the desirable water regime in humid habitats,
- to preserve the wetlands in the area.

The grassland communities found in the area, i.e. the Pannonic sand steppes and the lowland hay meadows *(Alopecurus pratensis, Sanguisorba officinalis)* are habitats of a wide range of species of European importance like *Iris humilis ssp. arenaria* and species under national protection such as hoopoe (*Upupa epops*), red-backed shrike (*Lanius collurio*), saker falcon (*Falco cherrug*) and *Lycosa singoriensis*. The main threats to these habitats are abandonment of pastoral systems on the one hand and the

intensification of the agriculture on the other which in many cases lead to these valuable grasslands being turned into croplands.

The steppe polecat (*Mustela eversmanni*) occurs here as it can feed on the stable populations of rodents to whom this mosaic of habitats is favourable.

The situation is less favourable for the European ground squirrel (*Spermophilus citellus*), due to the many barriers to migration between colonies and to habitat fragmentation, intensive agriculture, and afforestation or lack of management of primary or secondary steppes. Ground squirrels abandon sites where the grass grows tall, probably because short vegetation can facilitate the detection of predators or conspecifics.

Ground squirrel (MME archive)

These habitats and species were preserved and maintained by traditional grassland management in the past, providing a living for farmers. But some of the former grasslands were converted into intensive arable fields, while others were abandoned.

This was due to a number of reasons, including intensification of agriculture , higher financial incentives for crop production rather than for animal breeding, loss of knowledge and culture of animal husbandry during the years of large cooperatives and, last but not least the changing life standards (urban vs. rural life)

Rural development measures targeted to maintain the traditional grazing and mowing type of grassland management provide the only chance to preserve these species and habitats. These measures are the following:

- agri-environment (particularly the zonal schemes),
- payments for Natura 2000 grasslands,
- LFA payments,
- preservation of native and endangered farm animals' genetic resources through breeding and
- assistance provided to non-productive investments.

A future potential source of income could be linked to eco-tourism, taking into consideration the attractive landscape, the presence of the ground squirrel population and the native sheep herds in the area. Meat and milk products might be sold later with an eco-label, but this opportunity has not been used yet.

Feather grass meadows in the Mezőföld area (MME archive)

Schemes, programmes and measures applied in the Mezőföld area to preserve HNV grasslands

In the southern Mezőföld area the most widely used agri-environmental scheme for grasslands is the general agri-environmental grassland scheme. The requirements of this scheme are very basic, such as:

For grazing (area grazed only):

- grazing density 0.2–1 LU /ha must be between on the grassland;
- no chemical weed control, fertilization, irrigation is allowed;
- by the end of the third year of the scheme 0.3 LU /ha value for grazed livestock should be reached;

- application of shepherding / sectioning grazing;
- haymaking is allowed for winter feeding;
- annual clearing cutting to be carried out in the autumn, thereafter the hay should be removed from the land by 31 October;
- time of mowing should be reported to competent authority.

For cutting (area cut only):

- grasslands should be utilized by 2 cuttings a year;
- no chemical weed control, fertilization, organic manuring and irrigation is allowed;
- after cutting, the hay should be removed from the land by 31 October;
- time of mowing should be reported to competent authority.

Out of the 2178 ha of grasslands in the protected part of the southern Mezőség area this scheme is used by some tens of farmers on only 294 ha. The only reason for this is the insufficiency of funds: many other farmers have applied and have been rejected due to the lack of resources.

A scheme with somewhat stricter requirements is also run in a small area of the southern Mezőség. Additional requirements for this are the following:

- harrowing, grassland aeration is prohibited;
- 10% uncut area to be left;
- bird friendly mowing methods;
- bird deterring chain use when mowing;
- bale removal within 1 month;
- draining of surface waters is prohibited;
- 1st cutting is after 15th June;
- reporting on bird nests found to national park directorate (NPD);
- reporting the timing and location of the mowing to NPD;
- only daytime machinery work is allowed;
- electric fences can only be settled by the permission of NPD.

These requirements are set to maintain the nesting and feeding sites of ground-nesting birds (such as corncrake, short-eared owl and Montagu's harrier) and the habitat for protected plant species. The only user of this scheme in this area is the Danube-Drava National Park Directorate which manages 110 ha of grasslands here. Being more complex, this scheme is not very popular among farmers here.

The Szenes pasture was a model area for the LIFE 05NAT/HU/000117 project "Habitat Management on the Pannonian Grasslands in Hungary" run by BirdLife Hungary (MME) in partnership with some of the Hungarian national parks between 2006 and 2010. One of the goals of the project was to elaborate a more sophisticated scheme to be used and monitored on different sites. One of these was the Szenes pasture Nature 2000 area. The scheme is more tailored to the needs of biodiversity (as explained later), but can only be taken into practice with a wider group of farmers if they are provided with advice on a regular basis.

The sandy hills were grazed by a native breed of sheep called cikta, re-establishing an old traditional practice.

Flock of traditional cikta sheep near Szenes (Hungarian Geocaching Association)

Grasslands with higher yields were maintained using a mower dragged by a tractor, at the front of which a frame was fixed with chains hanging from it and making a big noise so that animals like nesting birds or small rodents have a better chance to escape. The width of the mower used in HNV areas should never exceed 3 meters. According to experiments, the survival rate of these animals at a given area can increase 2 to 3 times this way.

In areas where encroachment has already started or weeds are more dominant, flail mowers have been used.

In order to prevent non-native and other dominant weeds from spreading, regeneration of the abandoned grasslands was enhanced by sowing seeds of native plants, regular mowing and by a sophisticated grazing method. These would mean extra costs for farmers, so need to be compensated.

The fact that the Danube Drava National Park manages grasslands in the area allowed for some experimenting in plots separated from

each other with fences. Results are still to be analysed and discussed.

Regular biomonitoring has been an integral part of the programme. Botanical surveys were carried out for 5 years at each phases of succession. It showed e.g. that grazing and mowing results in a much easier regeneration of the grassland: the grazed and mowed plots had the highest plant cover with the lowest litter depth. It also showed that the idea about propagules of a protected grass species *Stipa borysthenica* arriving through grazing on the sheep's hair does not work and additional propagule introduction would be necessary in the following year.

Some important lessons learnt are connected with the season and the frequency of mowing during one year: mowing should be carried out once, between July and August. This would benefit biodiversity and the farmers' needs for a hay yield. The mower type (sickle mowers giving a better result than rotary ones) and the height where the mower is set are also important factors.

Another positive aspect was the full-time employment of shepherd during the Life project–a profession that has almost disappeared in Hungary due to the unfavourable conditions and low living standards the profession offers.

To disseminate the results and also to draw people's attention to the importance of nature conservation in HNV areas a number of stakeholder fora have been held, information posts were installed on site and brochures have been produced from the LIFE project.

Although the project itself was finished in 2010, the Danube Drava National Park is planning to continue with awareness raising activities started during the Life project on the importance of nature conservation in HNV areas, as well as the regular biomonitoring of the sites affected. The National Park has been using the practices developed during the project in the area managed by them since then.

As the Danube Drava National Park manages grasslands in the area it was possible to experiment in different plots and with different results

Main results and lessons learnt from the experience

Biomonitoring data and observations show that populations of the ground squirrels and the plants of European importance have been preserved, pointing out that further monitoring is needed to detect the long-term effects of the different methods applied.

The main conclusion is that HNV grassland ecosystems are complex and their protection can only be ensured by specific and well-planned programmes: well-targeted schemes are necessary for the conservation of specific natural assets.

To preserve what remains of Hungary's HNV grasslands and their biodiversity it is vital to define the sufficient payment levels to get farmers on board. Their involvement is therefore fundamental during the planning of the next period of agri-environmental and other rural development schemes,

Small and cheap inventions like a frame with chains at the front of the tractor dragging the mower can help a lot to save a significant part of the fauna of grasslands. To get these into everyday practice, the collection and publication of good examples, best practices is needed as well as an active network by which these can be more easily spread among farmers participating in agri-environmental schemes.

Chained frame on tractor (MME archive)

It is also important to have an adequate advisory service to share with farmers information on natural values, make them understand natural processes and help them to implement best practices that contribute to nature conservation at no or very low cost in many cases. These services do not exist in Hungary at the moment, with the exception of the work carried out by some national park employees and a few green NGOs Involving stakeholders from the very start in the preparation of management plans could offer an important contribution to raising farmers awareness of nature's need and also to improve the knowledge of farmers needs by naturalists.

Further capacity and a programme with a much more solid funding base should be established to monitor how successful agri-environmental schemes are in preserving biodiversity in HNV and especially in Natura 2000 areas.

Although in many cases it is crucial to run conservation programmes with specific objectives, taking into consideration the limited financial resources available for these, we can conclude that in the next planning period rural development measures need to be elaborated in a more targeted way, measurable indicators need to be established against which a real evaluation is made throughout the programme.

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Case Studies

Action plan for conservation of Mediterranean Ancient Olive Groves

Ancient olive tree in Vico del Gargano – Pineta Marzini, Apulia, Italy (G. Ladisa)

Background/context

The olive-groves characterize the agricultural land use in the Mediterranean region, and today the "Olive Region" has become virtually synonymous with the "Mediterranean Region".
Occupying 25% of the agricultural land, with 60 million plants and about 350.000 hectares, the olive-groves play a dominant role in the agricultural system of the Puglia region, in southern Italy, where 3,8% of the olive-groves of the planet is concentrated.
About 3-4 million of these plants are centuries old. The oldest specimens are about 4.000 years old. They are wooden giants carved from natural phenomena and patient care of generations of pruners.

Ancient Olive Groves or Orchards (AOOs) are cultivated applying traditional environment-friendly practices. They are extensive crops (less than 50 trees per ha) constituting one peculiar element in the mosaic of semi-natural and cultivated areas, typically intersected by small-scale structural elements or landscape features such as edges of Mediterranean shrubland, dry stone walls and woodland strips.
The traditional cultivation practices of the Ancient Olive Orchards (AOOs) create a variety of structural conditions (e.g. hedges, cover crop strips, tree rows, wild shrubs) that allow the diversification of plant and animal species and since AOOs are managed traditionally, they can be considered high nature value farmlands – HNVF.

Natura 2000, key habitats and species and agricultural issues

In Italy the Ancient Olive Orchards' sites are located in the Mediterranean region, on the Adriatic coast.. The areas fall within 3 Natura 2000 sites which, in turn, fall within areas protected under national or regional legislations (natural reserves, regional and national parks). A fourth AOO area is placed just on the southern border of another two Natura 2000 sites (SCI IT9140005 – "Torre Guaceto e Macchia S. Giovanni" and SPA IT9140008 – "Torre Guaceto") and within a state nature reserve ("State Nature Reserve Torre Guaceto").

The Mediterranean vegetation typically dominates the area ecosystems:

Mediterranean garrigue, maquis, steppic grasslands, oak woodlands and pinewoods. The agricultural land includes mainly olive groves, followed by herbaceous and permanent crops, almond orchards and vineyards.

The HNV AOOs host different agricultural habitats and species of EU Community interest, whose presence is linked to the traditional agricultural practices:

- Habitat *6220 - Pseudo-steppe with grasses and annuals of the Thero-Brachypodietea: patches of the habitat are present within the olive groves, but they are subject to pressure from land use conversion, use of pesticides, herbicides and fertilizers and to the invasion of the evergreen shrubs of the maquis vegetation.
- *Stipa austroitalica, endemic grass typical of Mediterranean xeric grasslands of southern Italy. Isolated individuals are located along the dry stone walls in residual patches of therophytic grasslands referable to the priority habitat *6220.
- Different birds and forestry bat species (see list) nest or find refuge in the cavities between the twisted trunks of age-old olive trees, or feed on different insects linked to the olive trees or on the berries of the shrubs.

Traditional dry-stone walls bordering ancient olive groves in Apulia (G. Ladisa)

- Reptiles, such as Kotschy's Gecko (*Cyrtopodion kotschyi*), Italian wall lizard (*Podarcis sicula*) and Green Whip Snake (*Coluber viridiflavus*) found places to hide and hunting in the cavity of the olive trees, or in the stone walls, or in the shrubs of the Mediterranean maquis crossing and surrounding the olive groves.

The groves of ancient olive trees are cultivated following traditional environment-friendly practices and play a crucial role to combat the effects of wind and water erosion and in controlling soil loss and organic matter impoverishment.
These plants give a significant contribution to mitigate the causes of desertification, since in areas with little forest cover, olive groves represent a valuable carbon sink that can trap large amounts of carbon dioxide (six years after being planted, a young olive orchard can retain up to 55 kg of CO_2/plant).
Century-old olive trees have been living from immemorial time, characterizing and shaping the landscape. The habitat, characterized by hollow and twisted trunks of age-old olive trees and by a dense net of dry-stone walls, where some wild shrubs still survive, has a great historical, cultural and landscape value.

The olive grove cultivated following the traditional cultural practices is a high natural agro-ecosystem: big olive trees are extensively grown (50-60 plants per hectare), with an irregular spacing following the original location of the oleaster; pruning is performed every 2-5 years and the only cultural practice to date is the removal of basal shoots: Soil management is characterized by low-impact inputs and by the presence of cover crops growing also under the wide canopies; cavities of the trunks, cultivated strips, hedgerow shrubs and small-scale structures (dry stone walls an other stoneworks, water pools) create a "complex" system with a variety of structural conditions allowing the diversification of micro-habitats which are shelters for beneficial insects (predators, parasitoids, alternative preys), mites, birds and other animals (bats, amphibians and small reptiles). This high level of biodiversity, in turn, maintains a good balance between beneficial and insect pests, and a certain level of "resilience".

The main threats to these agro-ecosystems and to the habitats and species they host, are related to changes in farming practices that can be summarised as:

1) Adoption of intensive systems of cultivation;
2) Abandonment of low-input traditional plantations less economically viable and depopulation of rural areas related to the low profitability of their cultivation.

Intensive agriculture aimed at higher yields has strong repercussions on the intensification of olive growing (planting

density can increase from 250 plants /ha up to 1800 plants /ha in super-intensive groves) as a result of application of fertilization, pesticides and herbicides, repeated tillage, use of increasingly powerful and heavy machines, trickle irrigation systems, elimination of small-scale stone structures, substitution of ancient olive varieties and a general neglect of the agro-ecosystem. Over the time these factors contribute to:

- fragmenting and altering the agroecosystem and the historical landscape;
- loss of habitats and fauna species, particularly of Chiroptera and beneficial insects;
- loss of the xeric grasslands habitats;
- soil and groundwater pollution;
- soil salinization, above all along the coastal areas;
- soil erosion;
- loss of genes from old varieties;
- accumulation of harmful residues in the food chains;
- removal of the last shelters for plant and animal species;
- increase in irrigation needs and in desertification processes.

Furthermore, dead ancient olive trees are replaced by "younger" ones of different ecotypes, leading to a reduction of genetic variability thus threatening the whole balance and self supporting ability of agro-ecosystems.

Stipa austroitalica subsp. *austroitalica*
IT9140002 – "Litorale brindisino"

By decoupling direct subsidies to growers and introducing the "single payment scheme", the CAP reform of 2003,probably lead to lower consideration and care of ancient olive groves, which now run the risk of being abandoned, with predictable impacts, considering that AOOs are highly dependent on farming activities. In addition given the low income resulting from the management of ancient olive groves, over the last years ancient large-canopied trees have increasingly been uprooted and marketed for ornamental purposes.

Where management plans of Natura 2000 sites ("Promontorio del Gargano") or plans of protected areas ("Torre Guaceto", Gargano National Park) are present, they set a series of objectives aimed at:

- reducing the impact of agricultural activities on habitats and species of Community interest,
- reducing the use in agriculture of synthetic products (fertilizers and pesticides) by providing incentives to farmers,
- promoting the naturalization of agro-ecosystems and the restoration of their ecological balances,
- encouraging environmentally friendly methods of cultivation (organic farming) and involving local farmers,
- promoting the protection of the AOOs as agro-ecosystems linking the habitats of Community interest.

Plan regulations establish which practices are allowed or encouraged and which are prohibited in the sites and thus :

- changing or altering the cropping system of the AOOs is not allowed
- creation of windbreaks is allowed only using species typical of Mediterranean vegetation
- burning of stubble and residues from pruning is prohibited, while alternative operations that can enrich the soil in organic matter, such as mulching and planting and landfill, are recommended.
- deleting or transforming natural and semi-natural elements characteristic of the agricultural landscape with high ecological value, such as dry stone walls, terraces, tanks, hedges, rows of trees, springs, fountains is prohibited. Ordinary maintenance and recovery activities are permitted.

Measures implemented to address conservation needs, conflicts, etc.

In order to protect and enhance biodiversity of the HNVF of AOOs in the Mediterranean Region, the Mediterranean Agronomic Institute of Bari (MAIB), the Italian Ministry for Environment, the Puglia region and the Mediterranean Agronomic Institute of Chania (MAICh) started in 2009 an international LIFE+ project (LIFE+ Cent.Oli.Med.) on four

AOOs areas in Italy and in one AOO area in Greece (Palaia Roumata, Northern Crete).

The AOO area in the Natural State Reserve Torre Guaceto was selected as the Italian pilot area of the project. One of the institutional purposes of protected areas in Italy is to develop and test, as a "laboratory" for sustainable development, management models to be subsequently transferred in "unprotected" territories. This would facilitate the realisation of the pilot actions: guidelines for AOOs management, plan for socio-economic and environmental development and model of governance (see points 1.e. and 2. below).

Actions carried out to increase biodiversity of the AOOs in the pilot area of Torre Guaceto and ensure their long term conservation financed by LIFE+ include:

1. Renaturalization actions:
   a. 1 km of dry stone walls has been restored/built by using local material and traditional techniques; rubble walls could provide shelter for small vertebrate maintaining humidity useful for Mediterranean shrubs.
   b. 2 km of hedges of local shrubs (lentisc, myrtle, Mediterranean buckthorn, elm-leaved bramble, hawthorn) have been planted along the dry stone walls in order to enhance shrubs and tree habitats biodiversity; ecotypes were selected among species able to host insects useful for olive trees, and providing shelter and food for animals during the winter season. Furthermore carob trees were planted in open fields and along the dry stone walls, in small groups in order to provide valuable shelter for birds, mammals and reptiles.
   c. About 1 hectare of degraded Mediterranean steppe grassland habitat has been recovered by planting local ecotypes of herbaceous species. The aim is to improve the biodiversity of herbaceous plants-covered areas in century-old olive groves by enhancing the propagation of typical species of the grassland habitat.
   d. Guidelines for the management of AOOs have been defined. The Guidelines were prepared with a bottom-up participatory approach involving local farmers, building their capacity to implement farming techniques compatible with the conservation and the improvement of biodiversity in century-old olive orchards.
2. An Integrated Plan for Socio-Economic and Environmental development of the AOOs was drafted, together with an innovative model of Governance shared with local stakeholders to answer to both the need for biodiversity conservation and the need for economic valorisation, income generation and activities diversification.

An additional plan is aimed at preserving and distributing the AOOs germplasm to farmers to restore and re-plant olive trees and to re-introduce in areas with ancient olive trees.

Podarcis sicula. Torre Guaceto

Similar actions have been carried out in the Cretan pilot area. The results of these actions in the Italian and Cretan pilot areas will contribute to a further project action, the drafting of a Euro-Mediterranean Action Plan for the protection and the enhancement of ancient olive groves in the Mediterranean region. The Action Plan will be elaborated through the formulation of concerted common policies with the aim of enforcing the existing legislation and the application of new rules, to be concerted with policy makers of the EU (Italy, Spain, Greece, Portugal) and Non-EU countries (Lebanon and Tunisia).

Guidelines for the management of biodiversity in AOOs of Torre Guaceto

The project included actions aimed at raising awareness and training farmers of the AOOs site in Torre Guaceto. In particular, farmers were fully involved, together with fauna and flora experts, from the very start of the project (trough meetings, guided tours, study days, workshops, questionnaires and interviews), in a participatory process aiming

at defining agreed management criteria and good farming practices that were later on transposed into the Guidelines.

All farmers of the area of Torre Guaceto were present at the meetings. A total of 30 stakeholders were involved.

Since the total management cost of extensive olive groves is higher than the management cost of thickened olive groves, regardless of conduction method (organic/conventional), the challenge in maintaining traditional management is to make it economically competitive. In particular, the guidelines provide recommendations in order to allow a biodiversity friendly and economically efficient management of AOOs: biodiversity protection will engender a reduction of production costs resulting, for example, with a lower application of chemical fertilisers and synthetic plant protection chemicals. The guidelines are to be used as a manual for farmers, defining the approach, methods and behaviours in applying farming practices directly linked to the management of AOOs.

Some good farming practices recommended in the Guidelines for the management of biodiversity in century-old olive groves of Torre Guaceto

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Pruning

Production pruning. In extensive olive groves with 50 plants/ha, it would be ideal to prune 15 to 16 plants/year so as to have a complete pruning interval of 3 years (rotation pruning) and to guarantee a suitable number of plants (2/3) for birds nesting, with also a positive effect on the typical alternate bearing of the species. In the Puglia region this treatment schedule helps complying with the regional decree on cross-compliance issued in 2009 which sets out common rules for direct payment to farmers as established by CAP and compels to prune olive trees at least once every 5 years.

Soil management and fertilization

Cover crops, permanent or temporary. It refers to the association of olive trees with sown or wild herbaceous species (natural cover crop). Cover cropping allows: protecting the soil from water and winding erosion; maintaining or increasing the level of organic matter in the soil (permanent cover crop may supply 3-6 t/ha/year of dry matter which equals 0.6-1.8 t/ha/year of humus); favouring the presence of beneficials which control insect pests; reducing soil compaction due to mechanical means; the development of olive roots in the soil shallow layers; reducing nitrogen loss by leaching and the pollution of deep layers of soil and water table; a better availability of nutrients along the soil profile; providing assimilable nitrogen, if it includes legumes. It has been estimated that the "recovery" of the leached nitrogen may be often enough to pay for the cost of seeds of a temporary cover crop with green manure species.

Incorporating organic matter in the soil:

- Green manuring (green fertilisation). It may be total (incorporation of an herbaceous plant which is grown for that purpose) or partial (incorporation of crop residues grown for other types of production). It is very important when manure or compost are not applicable (not available in the area/high costs of transport). It contributes up to 4-6 t/ha of dry organic matter which correspond to 0.4-1.2 t/ha of humus. It is advisable mixing up several different species.
- Use of organic matter. For reducing external inputs, it is advisable to resort to a fertilisation technique based on olive chain residues such as pruning debris or pomace and vegetation water from olive processing. In general, manure and the other conditioners applied on an annual basis make 60-70% of the nutrients they contain available.

Tillage management. Tillage may be necessary if rainfall is scarce and irrigation not feasible. In such circumstances, the first tillage in the year might be made after harvesting when tillage at a depth of 10-15 cm may be appropriate to turn under organic and mineral fertilisers with a low mobility and favour the penetration of rain water. In spring-summer, some more 2-4 tillage operations can be made at a depth of 5-10 cm for the control of weeds and evaporation reduction. To reduce the drawbacks of tillage, autumn tillage may be replaced with the mowing of weeds so as to have a cover crop from autumn to spring; this helps the movement of machines in the field and reduces erosion in sloping soils.

Irrigation

Water requirements of olives trees are estimated at 600 mm/year (ETc = 600 mm). However, olive trees may survive and produce in conditions of very low rainfall (< 300mm). In the Mediterranean area where rainfall equals 600 mm/year, irrigation can help to improve production and vegetation. Water excess might create conditions favourable to pest attacks. Trickle and drip irrigation systems are advisable as they allow a high efficiency (90-95% of water is really used by plants), maintenance of small wetted area, low nutrient leaching, do not favour pests and weeds, etc.

Pest and pathogen management

It is advisable to maintain a good balance between beneficials and insect pests by making the farms more "complex", that is to say more similar to natural systems. This is made with natural and semi natural areas, such as woods, water ponds, rows of trees, hedges. These are shelters and "production" areas for beneficial insects (predators, parasitoids, alternative preys), mites, birds and other animals (amphibians and small reptiles).

Plants favouring the presence of beneficial insects	**Beneficial insects**	**Insect pests under control**
Sandalwoods *Osyris alba*	*Chelonus eleaphilus* (parasitoid)	Olive moth
Honeylocust *Gleditschia triacanthos*	*Eupelmus urozonus* (parasitoid)	Olive fly
Thumbnail *Inula viscosa*	*Eupelmus urozonus* (parasitoid)	Olive fly
Jujube *Zyziphus sativa*	*Psyttalia concolor* (parasitoid)	Olive fly
Caper *Capparis spinosa*	*Psyttalia concolor* (parasitoid) *Chelonus eleaphilus* (parasitoid)	Olive fly Olive moth
Myrtle *Myrtus communis*	*Scutellista cyanea* (parasitoid)	Olive black scale
Lentisk *Pistacia lentiscus*	*Scutellista cyanea* (parasitoid)	Olive black scale
Mock privet *Phillirea angustifolia*		Olive moth

These areas may be run by the farmer and provide complementary produce such as Mediterranean medlar trees, strawberry madrones and figs or timber and honey. To create groups of trees, shrubs, or hedges, native species shall be chosen. Evergreen species may provide protection and shelter in the wintertime. Pebble walls are also very useful because they favour the presence of reptiles feeding on insects or on small rodents. On the farm, the surface of natural and semi natural areas for maintaining a high level of biodiversity should never be less than 5% of the total area. Meadow should be managed with periodical mowing in alternate areas, so that beneficial insects can migrate.

Olive harvesting

Harvesting methods: it is important to limit the damages on fruits while harvesting as the oil quality is strongly impacted by the olive integrity. The use of machines is suggested whenever possible. Mechanical damages to plants due to the use of machines (debarking and lesions affecting the vegetation) may be reduced by postponing harvesting.

Thickening and replacing dead plants

In AOOs the number of plants/hectare is often low, sometimes even 48-50 plants/ha or less. A moderate thickening in AOOs can be advantageous for biodiversity, but the planting distance must be maintained equal to 10x10m or maximum 8x8m, in order to protect biodiversity. It would be advisable not to have a number of young plants higher than 40% of the total number of plants to avoid the loss of the agricultural landscape heritage. When deciding to thicken a AOOs, it would be better to use plants whose genetic resources derive directly from those of century-old plants in the area, as they are survived over the centuries able to adapt to the environment. Varieties should be chosen on the basis of some main characteristics which allow applying low-impact farming methods: low susceptibility to adverse biotic and abiotic events, small fruit, early colour breaking, early ripening.

The guidelines shared and agreed with local farmers were also the basis for a training course held in the Torre Guaceto premises targeted to young farmers coming from areas characterized by AOOs presence, to induce a change in mentality of stakeholders and farmers, and that could lead to the adoption of environmental friendly cultivation practices. A total of 19 farmers with ages ranging from less than 20 to 50 years attended the training course. Even tough the guidelines have been agreed to last year and they could be fully applied only during 1-2 agricultural years, some of the farming practices are currently applied from 21 growers on more than 13 ha of AOOs, representing all farmers of the target area (small farmers), with the exception of some "landlords" who are however interested and are now considering the management costs. The measures applied are those connected to the improvement of the soil fertility (cover crops), production pruning (rotation pruning), and pest management (increase in functional biodiversity using local ecotypes of herbaceous species, shrubs and trees), as they are easy to apply and in harmony with the traditional peasant culture. These measures are also those having a greater impact on the enhancement of biodiversity. Moreover, renaturalisation, bushes and tree plantation have been applied from other farmers in close areas too. This would lead to a higher complexity of agro-ecosystem and to a consequent increase of fauna and flora biodiversity. Recent data can already confirm an increase in nesting birds and reptiles observations during surveys and an improvement in soil covering and species richness in the interested olive orchards. A better balance in the flora species at field level was also achieved leading to an increased diversity of natural soil covering species and of observed arthropods.

Integrated Plan for Socio-Economic and Environmental development and Governance model of AOOs of Torre Guaceto

Needs and expectations of farmers and of other main stakeholders acting in the area of the AOOs in Torre Guaceto, were also the basis in the definition of the integrated economic-social and environmental enhancement plan. The integrated plan was validated in the framework of specific meetings with the main stakeholders acting in the area of ancient olive groves: site managers, farmers, communities of organic farmers, experts and operators in the olive-oil sector, etc.. The Puglia Region approved and adopted both the Integrated Plan and the Governance Model, with the purpose to extend their application to other regional protected areas with similar agricultural areas.

With the aim to safeguard both 'biodiversity' and 'profitability' of the sustainable management of AOOs of Torre Guaceto, the plan identifies a number of actions addressed at valorising all the components around the AOOs (ecological, landscape, historic, economic, social, institutional, educational, market, touristic, etc.), in the framework of a strategy of territorial system.

The plan activities were defined in order to increase employment opportunities for local people, promote the local economy and ensure fair financial compensation to farmers rewarding their role as "guardians" of biodiversity, landscape and traditional knowledge. Actions foreseen are, for instance: creation of educational and tourist paths and organization of tour packages in AOOs; implementation of laboratories for the production of soaps and cosmetics and recovering of by-products from olive production (low quality olive oil, leaves extracts, dry officinal herbs and extracts); activation of an info-desk for the growers to inform about opportunities provided by the Rural Development Plan on organic farming and/or the recovery of the agricultural landscape elements (stone walls); promotion of the certification of the oil coming from ancient olive trees; promotion of farmers' organizations and farmers' markets. The activities are planned at different time-scale:

- short-medium period, addressed to realize the more urgent activities;
- long period, focused on the implementation in the whole area of synergies between the economic sector linked to agriculture with the environmental system of the Protected Area.

With the purpose of coordinating the different scale actions foreseen in the integrated plan on the agricultural area of Torre Guaceto, the model of governance identifies the stakeholders to be involved in each action and their respective roles under the coordination of the management Authority of the protected area Torre Guaceto. The challenge is to make economically competitive the sustainable management of AOOs, ,and this is related to the ability to organize the available forces in the area of AOOs.

The governance model for the protected area identifies tools and decisional methods, that could facilitate the stakeholders active participation in the governance of their territory.
The several actors to be involved in the participatory process for the governance of the territory are identified at different levels: Region, research institutions, growers, skilled workers, nurserymen, pomace oil extractors, certification authorities for organic farming, points of sale for olive products, tour operators, environmental and cultural associations, etc. They are linked in a network interacting through the coordination, the support, the guide and the incentive provided by the management Authority of Torre Guaceto, which has the following functions: identify the latent resources, listen to local operators, research the needs of the business, identify the expertise available, guarantee the exchange of skills and knowledge, build a network linking operators, catalyze the strategic capacity of the local system.

The management Authority, as coordinator responsible for the implementation of the model, will subscribe a *memorandum of understanding* between all stakeholders involved in the enhancement process for the area, under which a Permanent Consultation Table involving the managing Authority of Torre Guaceto, the Puglia Region and local stakeholders, will be set up in order to ensure the continuation of their commitments over and beyond the duration of the LIFE + project.
The monitoring of the effectiveness of participatory process in managing the area will be able to produce a 'continuous improvement' of the governance model.

The implementation of the integrated plan and its model of governance are currently ongoing, however some activities have already been carried out: the laboratory for the manufacturing of olive oil-based products (soap, essential oils, body creams, etc.), the service centre equipped with an exhibition space, and a walking-path of 3 km length crossing the AOOs and actively used by hikers and cyclists.

The Euro-Mediterranean Action Plan

On the base of the results of the Guidelines for farmers, the integrated socio-economic-environmental plan, its governance model, and the case study related to the decision of the Puglia region to approve a new law (LR 14/2007 - for the protection and enhancement of the landscape of monumental olive trees) with no equivalence in the Mediterranean basin, it was decided to set up a Consultation Table to share results and promote dialogue among the representatives from the relevant ministries of Greece, Italy, Portugal, Spain and the South bank of Mediterranean Basin (Lebanon and Tunisia), in order to agree and validate the contents of the next Euro-Mediterranean action plan.
The Consultation Table meetings have resulted in the definition of AOOs as HNVF and of a document identifying objectives and strategies at national and supra-national level for the promotion and preservation of AOOs in the Euro-Mediterranean area. The document is currently being drafted.

Agreed definition of AOOs as HNVF

The agricultural systems identifiable as HNV ancient olive orchards are agricultural landscapes characterized by a prevalence of ancient olive trees, managed with low impact practices able to support (maintain and enhance) soil and water quality, carbon sequestration and high level of biodiversity, contributing to preserve future cultural and natural heritages.
These systems include low intensive cropping system or high diversity of land cover or semi-natural vegetation with different ecological infrastructures.

The Plan will set the priority actions for the protection of AOGs and will contain:
- measures, norms and rules for protection of the High Nature Value of AOOs (i.e. Regional Law 14/2007 of Apulia Region)
- indications about agricultural practices compatible with biodiversity protection
- identification of forms of financial support in favour of the managers of AOOs
- suggestions/examples for an innovative model of governance at EU-Mediteranean level.

The possible implementation instruments identified at local, national and trans-national level are: Convention on Biological Diversity (CBD); CAP and support police; European Landscape Convention; UNESCO; Policies of cooperation at Euro-Mediterranean level; Rural Development policies and support.

Regional Law n. 14 of 04/06/2007 of Puglia Region concerning the "*protection and valorisation of the landscape of monumental olive trees of Apulia*"

The legislation acknowledges the functional role of ancient olive trees in production, ecological and hydrogeological protection and their peculiarity in the regional history, culture and landscape. It is intended at conciliating their conservation with the enhancement of the living conditions of the local community and with a better enjoyment of the users.

The law rules the criteria (including symbolical and historical-anthropological values) by which the monumental character is assigned both olive trees and olive groves.

In order to protect the monumental olive trees, the law requires that the Region develop the list of the Monumental trees in the Apulia region and the financial resources for their protection and enhancement.
The monumental olive trees in the list are subject to landscape bond and are prohibited to be damaged, cut down, removed and traded. The only land improvement works permitted are the thickening of the olive groves or the cultivation of associated crops. Region and local authorities may use agreements with farmers to protect and maintain monumental olive trees.

The promotion actions for maintaining the production of olive trees with monumental-historical-cultural-environmental value and/or at risk of dropping out include:
- the special mention "Extra virgin oil from century old olive groves of Apulia". The promotion of products with this mention is sustained by the Region.
- the Region promotes the image of the olive trees landscape, supports a specific project to develop tourism, forwards collective actions with the Ministry of Agriculture and Forestry and the European Union, sustains agricultural organizations and operators of the olive sector.
- farmers concerned by monumental olive trees have priority in regional, national and EU funding for maintaining monumental olive trees cultivations, improving product quality, recovery and maintenance of the rural landscape.

Main results and lessons to be learnt from the experience

The olive-groves are of major agricultural importance in the Mediterranean region. In fact, the largest olive-producing countries are located in this region.
The HNV of the AOOs comes from the traditional management practices that preserved the olive groves through the centuries.
The preservation and development of HNV farming systems is an objective of the EU rural development policy and the rural development programmes. However, the RDP and agri-environment schemes do not include the promotion and the maintenance of such traditional practices and their economic convenience. The need to bridge this gap is addressed by the guidelines for the management and the economic-social and environmental enhancement plan of the AOOs of Torre Guaceto and will contribute to the finalization of the future Euro-Mediterranean Action Plan.

The guidelines identify farming practices for a management linking economic viability to biodiversity conservation. However, as the management of extensive olive groves remains economically disadvantageous when compared with intensive olive groves, the identification of sustainable farming techniques is not sufficient to guarantee their implementation and the long term conservation of AOOs. The strategy proposed in the project for maintaining the support of farmers takes into consideration both the environmental and socio-economical benefits/needs. This is the aim of the integrated plan, the tool designed to manage the AOOs as one of the base of the socio-economic development of the rural territory, through a multifunctional approach able to guarantee a suitable profitability to growers for their work in preserving biodiversity.

However, a strategy has to be tailored to local realities. Both documents were defined within a successful participatory process set up from the beginning, allowing to explore problems, needs and expectative from stakeholders (farmers, farmers' organization representative, producers, processors, technicians, scientist, experts of local history, etc.). The aim of improving the income of growers and the profitability of the entire

territorial system of AOOs, helped to gain the collaboration of all farmers and other local actors in elaborating the documents and then in the willing of applying them.

Although the LIFE+ project started in 2009 and both the guidelines and the integrated plan have been validated in 2011, some impacts of their implementation can be already appreciated.

Almost all growers of the target area, mostly under 30 years old, attended the training course on farming practices, and, while it is expected that the full implementation of the guidelines will need 1-2 agricultural years, all small local farmers are already applying the three measures mostly related to biodiversity: cover crops, rotation pruning and planting local herbaceous, bushes and trees species. Also farmers of surrounding areas are carrying out some actions: renaturalisation, bushes and tree plantation. Monitoring data show that fauna and flora biodiversity is increasing. This shows that the active involvement of farmers in the definition of the practices that they themselves should follow, can guarantee not only their commitment in their application, but also their more effective diffusion on the territory.

The integrated territorial plan can be implemented over a longer time frame, but some effects of the new vision to launch a process of sustainable management of AOOs that draws on their environmental, historical, cultural, landscape and productive resources/opportunities are already visible, starting for the existing community of organic farmers. Some of them decided to create a new group of farmers (they call that as "Community") saving and conserving the traditional olive orchards and applying environmental sound practices; this community started to market their own olive oil coming from century old olive orchards under one unique label "Oro dei Giganti" (Giants' Gold), using the same markets' network that put together also cooperatives who cultivate on fields impounded to criminal organizations ("Libera Terra").

The results and experience acquired in the pilot areas in Puglia and in Crete will contribute to find ways to make more economically viable and profitable the AOOs cultivation and to halt social the desertification processes in economically unfavourable farmlands, serving as basis for the elaboration of the Euro-Mediterranean Action Plan for the protection and the enhancement of AOOs in the Mediterranean region. The Plan will aim at meeting the need for supporting with adequate technical, financial and legal tools the planning of rural development in such areas in the Mediterranean Countries. It is expected that trend-lines and actions of the Plan will be included in the national Programs and Plans for Rural Development. The Plan will also transpose at international level the integrated and participatory management system tested in the project area. The Plan is expected to be subscribed by all parties by September 2012.

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Case Studies

Improving co-habitation of bears and rural folk in Pindos mountain, Greece

The need to resolve a conflict

The co-habitation of farmers and large carnivores in Europe and notably the Balkans is a sensitive issue that is core to the conservation success of species such as the bear and the wolf as well to the viability of agricultural activities in marginal rural areas. The predatory behaviour of carnivores in particular creates conflicts with human populations, which often turn against those species by illegal means such as poaching, or use of poisoned baits in order to protect their property. Human-induced death is the major threat against carnivores in Greece. In fact, the use of poisoned baits is an indiscriminate measure and as such can have destructive effects on other protected species, such as raptors and vultures, but also on domestic stock.

Though habitat restoration and conservation efforts are under way in many countries, including Greece, in order to ensure that the large carnivores' extensive habitat requirements are met, no such effort may be met with success in terms of positive impact on the species if the issue of human-carnivore conflict remains unresolved. This type of conflict occurs throughout the large carnivore range, which consists of semi-mountainous and mountainous areas, where small-scale agriculture and livestock breeding constitute key activities of the remnant human populations. The exercise of those activities is in any case rendered more difficult by the harsh climatic conditions, the geomorphology, and the limited market support given that they are rather remote areas.

Pindos mountain landscape © Callisto

Key habitats and species and agricultural issues in the area

In Greece, large carnivore presence coincides largely with Less Favoured Areas.

Little does the mountain range of Pindos correspond to the typical landscape image most foreigners have of Greece: this rugged mountain range, which traverses Greece from northwest to south, spans along 250 km and its highest peak reaches 2637 m. Its northern part is covered with well-preserved lush coniferous and deciduous forests, rivers, lakes, meadows and rocky ridges.

The most extensive habitats are the endemic Mediterranean Black Pine forests, which are of conservation priority, and the Common Beech forests. The area hosts a very rich biodiversity, including bear, wolf, wildcat, jackal, roe deer, chamois, otter, many endemic plant species and birds of prey; it also provides important environmental services, such as water to two thirds of the Greek population.

In order to protect the area's remarkable biodiversity three very important protected areas on national level have been created: the Vikos-Aoos rivers National Forest and the Valia-Kalda National Forest were established back in 1973 and 1966 respectively while the Northern Pindos National Park (NPNP), which incorporates those two National Forests, was established in 2005. The NPNP includes 11 Natura 2000 sites and constitutes one of the largest terrestrial protected areas in the Balkans; in terms of ecological value, it is considered as one of the most important areas in Greece.

Northern Pindos is sparsely populated and its inhabitants are involved in livestock breeding which still maintains its nomadic character, small-scale farming, logging and services such as tourism (with focus on eco-tourism the summer and ski tourism in winter). Nomadic pastoralism and extensive agriculture have been historically the main activities of the rural populations in this harsh terrain.

However, an important rural exodus movement started after the Second World War and was intensified up to the 1970s. This led to the abandonment of many villages and to the ageing of the population, with direct implications to the agricultural practices.

Given the presence of dense coniferous and beech forests, and the relatively low disturbance levels related to the rugged terrain, Northern Pindos is one of the two areas still hosting bears in Greece. Currently the species' Greek population, which is the southernmost population in Europe, is estimated to a minimum of 400 individuals, divided in two main sub-populations without connection: Northern Pindos, hosting the majority of the population, and Central Rodopi range, which are about 200 km apart. The bear population used to extend all the way down in the Peloponnese back in the 19th century, but its populations shrunk significantly in the 20th century due to habitat degradation, loss of habitat connectivity, disturbance and killings by man. Killings by man are linked to trophy hunting and mainly to reprisals for damages to human property, despite the existence of a farmer compensation scheme by the National Agricultural Insurance Organisation (ELGA).

Long-term monitoring in Pindos has shown that for the period 1995-2007 the total number of known cases of bear poaching concerned more than 5% of the total minimum bear population. This figure is quite alarming, since it has been estimated that in order for the bear population to be viable, mortality rate should not exceed 4%.

Bears are omnivorous and their feeding sources vary from small and large mammals to fruits, honey, and even plants. They are an opportunistic species, which means that they satisfy their appetite with whatever food opportunity presents itself and that they can adapt their feeding habits. However, in recent decades wild food sources have decreased as a result of excessive hunting, habitat degradation and fragmentation as well as abandonment of traditional farming practices. This has led bears to adapt their feeding behaviour and rely more and more often to domestic sources such as crops, orchards, livestock and beehives thus creating conflicts in three sectors of rural activities: farming, beekeeping, and livestock breeding.

Though damages from bears to livestock, beehives and crops have always occurred in mountainous areas with bear presence, those damages were tolerated in the past and considered as part of the activities' inherent risks. However, modern farmers and livestock owners show much lower tolerance to such incidents, particularly in areas where the bear had disappeared and returned due to natural processes. Modern farming has led to the abandonment of certain practices that were common in the past, such as the presence of a shepherd with the herd, the use of good quality shepherd dogs, the protection of night shelters for animals, and the installation of appropriate fencing.

Measures implemented to address conservation needs and conflicts

In order to decrease the conflict between bears and humans and to ensure that small-scale pastoral and farming practices remain economically viable in mountainous areas, a number of measures, mainly preventive, have been tested and put into use in order to first of all decrease the impact of larger carnivores on human property and, second, to decrease the hostile attitude against the large predators.

The management plan of the Northern Pindos National Park clearly identifies the issue of reduction of bear damage to agriculture as a management priority.

All the preventive activities were initially implemented on pilot level starting back in the late 1990s at the initiative of NGOs such as Arcturos first and Callisto later on, initially in Pindos and then in the second mountain range hosting bear populations, Central Rodopi. The pilot phases were funded mainly through LIFE, and allowed the accumulation of experience and their fine-tuning.

In order to ensure the sustainability of the measures, the two NGOs, in collaboration with others such as Birdlife Greece, undertook extensive consultation processes with the national competent authorities, and mainly the Ministry of Rural Development in order for the financial support of the measures to be included in the Rural Development Program (RDP). A consensus was achieved, and the aforementioned preventive activities were included for the first time in the RDP in 2003.

The promotion of the Greek Shepherd dog, a particular domestic breed which is well known for its excellent performance in livestock protection, involves various steps. First and foremost is the obtention of pure breed animals in order to create a good quality stock; a breeding centre has been set up in Agrapidia village, Florina (owned and operated by the NGO Arcturos), which hosts a permanent stock of about 10 dogs. Another one was recently set up in Grevena in Deskati village, owned and operated by the Development Company of Grevena, aiming at the creation of a stock of about 6 animals.

The second step is the identification of livestock breeders interested in working with improved shepherd dogs; this step involves a large awareness campaign on the importance of good quality shepherd dogs for the proper flock protection. It is followed by training of the interested livestock breeders on the proper care and raising of the Greek Shepherd dog. Those livestock breeders receive the pups, and have in turn the obligation to return pups to the Centre once their dogs produce litter.

Between the years 2000-2002, a total of 38 dogs were provided to shepherds in Grammos, through the support of a LIFE project. Thanks to the lobbying of NGOs, this measure was included as of 2003 in the Rural Development Programme, which foresaw the financial support of livestock breeders for the acquisition of Greek Shepherd dogs (80% of the eligible costs and up to 400 euro per pair of Greek Shepherd dogs). However, the measure was dropped after 2010 due to financial reasons.

Shepherd dog and sheep © Callisto

The installation of electric fences with a photovoltaic source is another very simple yet effective measure aiming at protecting human property such as livestock, crops and beehives from bear attacks. This measure has proven to be 100% effective against attacks under the condition that the provisions for its installation and maintenance are fully respected. Its financial support has been included in the Rural Development Program, which foresees the co-financing of 77,5% of the purchase and installa-

tion costs, which range between 350 to 1000 euro depending on the selected equipment, the remaining being covered by the interested livestock breeders.

The RDP supports these measures in areas that constitute bear habitat, giving priority to beekeepers and then to livestock owners that practice extensive grazing.

A bear being deterred by an electric fence © Callisto

The third preventive measure implemented involves the increase of food sources for bears. Two parallel measures have been implemented.

The first is the planting of fruit trees. In the past, when the villages in Grammos were more populated and economically active, farmers maintained wild orchards in forested areas. This was a food source for bears, but as those orchards were gradually abandoned along with the villages, bears lost an important food source. This measure involves first of all the identification of the most appropriate spots within the bear habitat range, and consequently the planting of fruit trees such as apple and prune trees, the inoculation of existing wild plants and the treating and pruning of wild orchard trees.

This measure has been conducted mainly with LIFE financial support and is implemented by NGOs, such as Arcturos and Callisto. The second parallel measure involves the provision of incentives in order for farmers to leave un-harvested 10% of their production (up to 1 hectare), which must also be non-treated with chemical inputs containing toxic substances. The eligible crops are maize, sunflowers, vines, fruit trees and vegetables. This measure's long-term sustainability is ensured by its inclusion in the RDP, which foresees a per hectare compensation, the per hectare compensation depending on the type of crop and also the geographic location within Greece. The per hectare compensation ranges from 31 euro per hectare of sunflower up to 718 euro per hectare of fruit trees. Those amounts cover 100% of the cost of the unharvested crops.

An accompanying measure aiming to ensure the economic viability of pastoralism and farming in mountainous areas is the improvement of the national compensation system for carnivore damage. Since the 1990s there have been efforts to improve the compensation system; the improvements concerned the applicable conditions, the compensation amounts, and the procedures.

Until 2008, 100% of bear damage was covered, while the percentage for other wild animals, including the wolf was 80%. However, after 2008 the system was modified and is now covering 90% of the damage from all wild animals; furthermore, the condition for minimum kill of 3 animals as requirement for reimbursement has been dropped. Nevertheless, recently a new condition was set, whereby compensation will be given only if the value of losses is superior to 200 euro.

Main results and lessons to be learnt from the experience

The technical implementation of the preventive measures has proven to be very straightforward, simple and effective in deterring damage from carnivores to livestock and agricultural production. The practical experience that has been accumulated since the early 2000s has allowed fine-tuning the technical characteristics, procedures and conditions of all aforementioned measures.

However, long-term monitoring of carnivore populations and the size of damage caused by them is also a prerequisite in order to assess the impact of the measures. This involves a close collaboration and coordination between ELGA, the National Agricultural Insurance Organisation, which holds data on carnivore damage and reimbursements, and conservation bodies, such as NGOs and the Management Bodies of the National Parks, which monitor carnivore populations.

What has proven quite complicated is the long-term financing of the technical measures. Though their inclusion in the Rural Development Program back in 2003 can be hailed as a major success thanks to the substantive efforts of NGOs, the removal of critical measures such as the support of the Greek Shepherd dog as of

2010 has set back the efforts. Furthermore, the number of beneficiaries actually targeted by the RDP has been lower than that expected at the planning phase, due to the inadequate awareness raising of potential beneficiaries, and also due to insufficiencies related to the design of the conditions of participation. This has implied that in certain cases, parts of the funds attributed to the preventive measures have been left unused in the first programming period of the RDP (2003-2007).

Experience has also shown that in areas where the preventive measures are implemented, the existence of abundant alternative food sources is a prerequisite. In case where natural prey is not abundant, the more effective protection of livestock may have a negative impact on carnivores, due to direct mortality (killings from shepherd dogs) or to indirect mortality (decreased food sources, lower reproductive success). It is thus important that the implementation of the preventive measures forms part of a larger conservation strategy.

The efforts so far have been driven mainly by NGOs aiming at carnivore conservation, whereas the roles of other stakeholders have been relatively limited. For example, the Management body of the Northern Pindos National Park has yet to integrate in its management plan the appropriate management measures, and must seek the most adequate funding sources for them. There are also clear margins of improvement concerning the genuine involvement of farmers' organizations in the decision-making process. Though farmers' organizations participate in the Board of Directors of ELGA and of the Northern Pindos Management body, farmers of mountainous areas are underrepresented due to their limited numbers, and lower educational and revenue situation.

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Acknowledgements: Spyros Psaroudas (Callisto)

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Case Studies

Preserving unique steppes, producing macaroni and spaghetti

Dry farming in Belchite, Aragon (Spain)

The steppes of the Ebro Depression

The Ebro Basin hosts steppe ecosystems composed of scattered shrubland on poor, gypsum and locally saline soils. Aragon harbours the best examples of this habitat type and a significant proportion of its total European surface. Steppe habitats are peculiar ecosystems very similar to those found in North African or Asian steppes. Aragon has included 75,000 ha of these habitats within several areas of the Natura 2000 network, including the Belchite steppes, among others.

The Belchite area is characterized by extensive farming systems, especially herbaceous crops on poor and locally saline soils, under hard climate conditions with scarce rain and extreme temperatures. The landscape is a mosaic of small plots of crops, pastures and sparse scrub with endemic species, and some unique natural and semi-natural steppe habitats in the world can be found here. However, not far from this area the river Ebro flows, which is the Spain's largest river in volume, so that irrigation has always been present as a latent option of profound changes for the agricultural and natural systems throughout its area of influence.

El Planerón Reserve (SPA), Belchite, Aragon (J.C. Cirera – SEO/BirdLife)

These unique landscapes make up a mosaic with traditional dry land cutivation that has been carried out since ancient times in these flat or slightly undulating lands. The area also includes saline lagoons, the so-called *saladas*, which are dry over most of the year and are surrounded by halophytic habitats with salt-tolerant plants.

The area hosts a rich biodiversity with endemic species of insects and other arthropods together and a diverse community of steppe birds, including great bustard, little bustard, pin-tailed sandgrouse, black-bellied sandgrouse, stone curlew, lesser kestrel and Dupont's lark among others. Due to this birds community several SPAs have been designated within the Ebro Basin and the Belchite field.

These peculiar environments are *per se* quite fragile and thus vulnerable to several human threats. According to *Eduardo de Juana*, university professor and president of the Spanish Ornithological Society (BirdLife Spanish section), "*The greatest threat for the steppes lies in the progressive uniformity that agriculture currently imposes to the landscape, through a series of interrelated processes that often include*:

- *Land consolidation (larger plots and smaller proportions of boundaries).*
- *Crop specialization (which tends, for example, to stop growing leguminous plants in the cereal countryside).*
- *Reduction in fallow areas (which is possible due to the increased use of fertilizers).*
- *The removal of natural vegetation areas (by ploughing, drainage and reforestation).”*

Some other negative factors should be mentioned, such as: low land productivity (600-800 kg/ha of wheat) and the abandonment of agriculture due to an aging population. Irrigation and alabaster quarries have also been sometimes considered as threats, but nowadays their presence in the area is considered acceptable.

The main strengths and opportunities in this area are the excellent quality of some agricultural products and the easiness to convert traditional agriculture and farming into organic production.

Taking into account the particular features of this steppe region, there have been important initiatives in the Belchite area to promote rural development based on the coexistence of agriculture and conservation of the existing natural values.

Pin-tailed Sandgrouse, *Pterocles alchata* (J.M. Cereza)

Agri-environmental measures in Belchite

Three main types of measures have been applied since 2000 in the Belchite area:

- Maintenance of stubble and fallow.
- Creation of biological corridors through dry-land lucerne planting.
- Organic farming in dry-land herbaceous crops.

Maintenance of stubble and fallow

This measure aims to protect soils against erosion and to improve their conditions (organic matter, microbial activity, water storage) as well as to improve the steppe habitat for wildlife, providing increased food and shelter and avoiding the use of pesticides during the non-crop period.

It also involves keeping the stubble in dry-land herbaceous crops until 31 December every year, in a minimum surface of 5 ha during 5 years, and maintaining an equivalent fallow area (in other words, half of the farm under fallow and the other half with stubble, alternating the following year). It is also necessary to leave the straw on the

ground in at least 50% of the stubble surface, and not to use pesticides during the non-crop period.

An additional and voluntary commitment can also be made for not ploughing the fallow land between 1 April and 30 September. This allows getting a higher premium (from 60 €/ha to 72 €/ha if this additional commitment is made).

This measure has experienced a good reception since it means a supplemental income very attractive to those dryland cereal farmers and, technically speaking, very simple to carry out since what it requires is very similar to the traditional wheat crop in the area. In 2007 the maximum surface for this measure was reached in the Belchite Field, with more than 2000 ha and around 90 requests.

Creation of biological corridors through dryland lucerne planting within Natura 2000

The man goal of this measure is to promote the conservation of steppe birds, and it is mainly applied within SPAs and within the range of those species. The specific objectives of this measure are to enhance feeding resources for wildlife, improve the breeding success of steppe birsd that nest on the ground thanks to the lack of tillage over five years, to fix atmospheric nitrogen, protect the soil and improve its structure, establish connectivity between areas of natural vegetation and control fire risk.

The farmer undertakes to maintain a permanent cover of dry-farmed lucerne for five years, without grazing or ploughing in April, May and June, and also in March if they are applying another sub-measure for "steppe birds". In case of harvesting, it will be carried out after 15 September. The amount of this measure varies from 90 to 120 €/ha, depending on the sub-measure applied.

This has been the measure that has reached the highest uptake, mainly due to economic reasons, since the subsidies are high, but also because it implies a lack of investment over the five years, and the only costs required are those derived from the planting of the lucerne in the first year. Its uptake has increased steadily over the last years and nowadays no new applications can be financed. In 2010 more than 4,400 ha were covered by this measure, with around 165 applications.

This measure has successfully promoted dry farming of a species commonly grown under irrigation in an area with low rainfall. Experts consider that this measure has been very original and innovative in its conception and quite challenging in its implementation. The vegetation cover that is achieved is not very high, but a cover of around 50 or 60% is considered very valuable from the environmental point of view.

Preliminary results of a study by SEO/BirdLife which is evaluating the effectiveness of this type of AE measure for steppe birds in Spain, has revealed that the parcels benefiting from this measure contain up to 65% more birds than those were the measure was not implemented. Moreover, the absence of tillage allows the appearance of wild flora within the clearings among the lucerne, which contributes to the regeneration of the native steppe vegetation.

However, the extraordinary character of this measure, highly adapted to local conditions, also requires that controls are adapted to natural conditions. In this case, it is considered technically unfeasible achieving a full coverage of the ground with the crops and the growing of spontaneous native vegetation (including low-size woody species such as *sisallo*, for example) is unavoidable after two or three years without tillage.

Several disciplinary measures against the farmers, mainly due to their failure to comply with the conditions, since they "allow" the proliferation of perennial plants, have led to disappointment of farmers. Some of them have expressed that "*an inspection especially hard in this matter is causing that many farmers reconsider the possibility of continuing this practice*".

Organic farming in dry-land herbaceous crops

Belchite Field, with a total of 10,000 hectares, has a good representation of organic farming for different kind of crops, particularly for durum wheat with almost 5,000 hectares in 2010 making use of this measure.

With a minimum commitment of 5 ha for 5 years, growing conditions are those laid down within the European Union and the Aragon Region regulations on organic farming and appropriate certificates are required. The amount of the aid to this type of farming is 60 €/ha.

The favourable reception of this measure in the Belchite area is mainly due to the technical ease for its implementation, as the durum wheat has traditionally been grown in this area in a very similar way to the requirements for organic farming, with crop rotation, fallow practice, little or no use of pesticides and chemicals in general and limited use of fertilizers.

Wheat cultivation in Belchite (J.C. Cirera - SEO/BirdLife)

Complementary measures

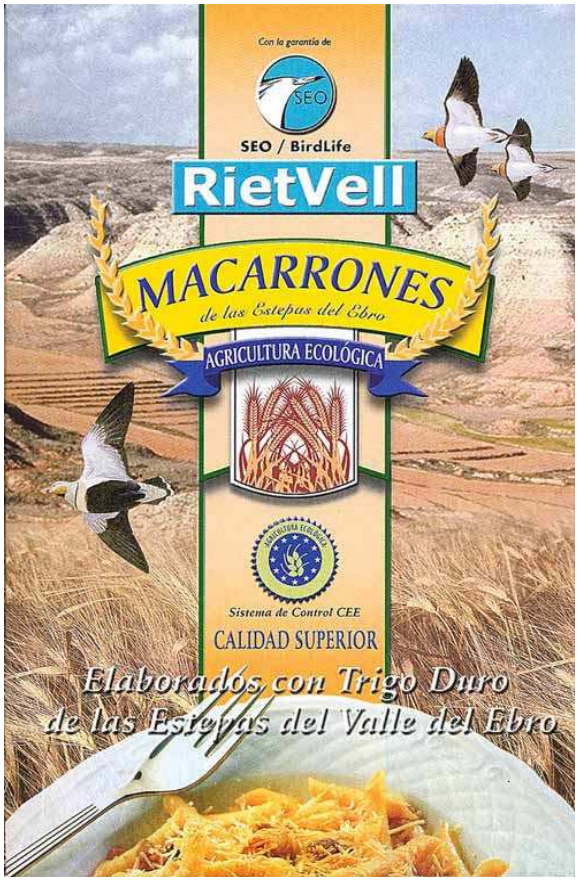
Marketing of pasta: product and origin differentiation

SEO/BirdLife, with financial support from the regional government and the bank *Caja Rural de Aragon*, studied in 2001 the feasibility for the marketing of local organic products from the best steppes of the Ebro Valley in Aragon (Monegros and Belchite) under a quality brand linked to the conservation of steppe birds.

As a result of this study, the company *Riet Vell* was set up with the support of SEO/BirdLife, in order to launch a pioneering initiative that seeks to promote the cultivation of dry land cereal in the main steppe areas of the Ebro valley.

Riet Vell S.A. is a company devoted to the production and marketing of organic products linked to nature conservation. For this purpose, they purchase organic durum wheat from Belchite and Monegros steppe areas, prioritizing those cultivated within Natura 2000 areas, and turn it into macaroni and spaghetti of high quality, thanks to the own characteristics of this local durum wheat.

The marketing of the product is then made using its link to the conservation of steppe birds and habitats. From 2003 until now, *Riet Vell* has sold around 180,000 kg of pasta.



Macaroni produced with organic durum wheat from Belchite (Riet Vell S.A.)

Other business initiatives

Currently there is also a cooperative in the area, *Ecolécera)*, which produces and sells local organic durum wheat, mostly from Natura 2000 sites; another company, *Ecomonegros*, has recovered bakery production and marketing of traditional varieties of organic wheat.

Key aspects to improve

- The implementation of the measures is limited and is still poorly planned. A better planning could extend the positive results.

- The planning and coordination within the whole area should be improved. Overall objectives should be agreed with local stakeholders seeking to optimize every investment or effort, as well as to properly frame the development of any new initiative. Farmers and other stakeholders should play a crucial role in an improved planning and coordination.

- Certain payments can favour the "business as usual", rather than becoming a real engine for rural development. As an example, many aged farmers prefer those payments that mean "doing nothing" on their land, due to the administrative and technical ease, instead of choosing measures that require some effort but bring enhanced production and value. This is usually linked to the education level and the presence of entrepreneurial spirit.

- Organic farming would need higher support in areas outside Natura 2000 that are also important for steppe habitats conservation.

- Farmers have not received proper advice regarding the implementation of the measures. This is essential to youngest farmers, also in order to combat depopulation.

- It is necessary to promote and support traditional grazing.

Lessons learnt

- The definition of measures well adapted to environmental and socioeconomic specific conditions has been successful even in the case of measures that seem to be risky (eg. dry framed lucerne).

- It is important to have an organisation that promotes cooperation and tries to boost the coexistence of agriculture and Natura 2000 network, working on the ground with all relevant stakeholders and with a long-term strategy.

- It is also important to give market value to products that are linked to unique or special conditions, for example creating or supporting brands that acknowledge the link between the product and those conditions.

- The coexistence of agricultural production and Natura 2000 protection can be achieved, but this requires a good understanding of the local conditions (both natural and socio-economic) when defining, implementing and monitoring the measures. According to a local farmer and cooperative manager "*this experience has shown that nature conservation doesn't prevent farmers from producing*".

- The design of agri-environment measures well adapted to the area, including specific and realistic commitments defined with the involvement of all relevant stakeholders (agriculture administration, farmers, nature managers, etc.), as well as proper field monitoring, are key factors for a successful implementation and a good coexistence of agriculture and the Natura 2000 network.

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Case Studies

Involving farmers in the conservation of biodiversity in the Emilia-Romagna region (Italy)

Wetland where whiskered terns nest.

Background/context

Until the second half of the 19th century there were almost 200.000 hectares of freshwater, brackish waters wetlands in the Emilia-Romagna region, but the continued drainage to obtain new land has reduced them to less than 30.000. Freshwater wetlands have almost completely disappeared, replaced by wetlands for fish farms, ponds for fishing and hunting, rice fields, ponds of sugar refineries.

In 1995 the Emilia –Romagna regional administration decided to start a program that for the amplitude of the concerned surfaces and for the results obtained, is considered as a unique experience at national level and one of the most interesting at European level: the re-flooding of reclaimed zones, the restoration and conservation of biodiversity in an area of almost 10.000 ha, spread all over the regional Po plains involving a territory of at least 500.000 ha, with high human pressure, where agricultural activities are characterized by high productive yields.

The measures, involving about 330 farms, included the restoration of several kinds of habitats, mainly freshwater wetlands, for wild fauna and flora on set aside fields, the conservation and restoration of the typical countryside natural and semi-natural elements and features of the agri-ecosystem as hedges, small woods, ancient tree lines supporting vineyards, and ponds. The network of wetlands has become very important for breeding, migrating and wintering birds, especially for threatened and rare species.

The results of the activities, which were activetely monitored by the region until 2004 and maintained by farmers, are now being threatened by the high compensations given to land-owners for producing biomass for fuel and energy, considerably higher than what they get for conserving biodiversity: a strong temptation for local landowners to abandon biodiversity conservation.

The second one, lasting 20 years, has been applied to 5.927 hectares and is aimed at the creation of habitats for the survival and the reproduction of wild flora and fauna. This measure in particular has already given good results from the ecological point of view. Up to the year 2004 the following habitat have been created:
– about 1.100 hectares of permanent wetlands (freshwater marshes having 75 % of their surface permanently submerged) allowing the presence of many waterfowl species, amphibians, reptiles, typical emergent and submerged vegetation;
– about 2.470 hectares of marshy meadows (including temporary and/or seasonal floodplains and meadows) where meadows and ponds flooded at least for 6 months every year and on 50 % of their surface allowing the presence of habitat particularly appreciated by geese, herons and waders both breeding and migrants;
– 2.357 hectares of permanent meadows with scrub patches set in rows or like the spots on a leopard. This kind of habitat is created often close to marshy meadows and/or permanent wetlands and is complementary to the former from the ecological point of view.

The targets of the restoration of habitats, mainly freshwater wetlands, for wild fauna and flora were:
- the creation and subsequent conservation of biotopes which can constitute the habitat of species of wild flora and fauna
- the restoration of wetlands, in particular in those areas which are morphologically depressed condition
- the creation of habitats which contribute to the conservation and the protection of water quality
- achieving the aims of the Habitats directive, in particular the management of the landscape features important for flora and fauna
- to achieve the aims of the Bird directive in particular to guarantee the survival and breeding of bird species included in Annex I.

The targets of the restoration of typical countryside elements were:
- to encourage the restoration and conservation of key features of the traditional agricultural landscape
- to contribute to the protection of soil from erosion.

The creation of new wetlands has had a cost of about 3 million euro. In 2004, the year in which the highest amount of subsidies were paid, financial support to farmers amounted to 8.8 million euro, while in 2011 total subsidies to farmers for these schemes amounted to 6 million euro.

In the last few years there has been an emerging problem connected with higher subsidies being paid to land owners for the production of biomass for fuel and energy, for which they get about €1000 per ha, as compared to 300€/ha for actions aimed at the conservation of biodiversity.
In addition to financing from the rural development funds farmers can benefit also from Green Certificates, after a 1999 decree provided for gradual liberalisation of the Italian electricity market and encouraged generation from renewable sources, including biomass and biogas produced from agriculture, animal raising and forests.
For the larger wetlands created through the project there is a commitment from farmers to continue maintaining the habitats for a period of 20 years, but for the ponds, tree lines and hedgerows the commitment is limited to 5-10 years and are now expiring. In the summer of 2011 there has been a real explosion of requests to produce biomass.

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Main results and lessons learnt from the experience

In 2003-2004, as a direct result of the project, 18 Natura 2000 sites, including SPAs and SCIs have either enlarged or created. Management plans for the new Natura 2000 sites are being completed and will be approved next March.

Many bird species of community interest, included in Annex I of the Birds directive, have been regularly recorded, some also breeding, in the restored habitats. For 13 waterfowl

species the population in restored wetlands range between 20% and 100% of the total population breeding in the entire region. In the case of Collared pratincoles and the Black –tailed godwits, the wetlands created represent the only regional breeding sites.

Monitoring of bird species has revealed that in only a few years a diverse range of bird species of conservation concern have benefited. Populations that have increased on land managed under this project include the purple heron, the black –winged stilt, the lapwing, the great-crested grebe as well as the common tern, the little tern and the whiskered tern.

Restored wetlands close to existing biotopes generated often-complimentary habitat conditions (i.e. marshy meadows with low water level close to permanent marshes with high water level) increasing the overall number of breeding birds.

Overall in the areas that have been monitored after the creation of ponds and wetlands, 152 bird species have been recognized, including 38 nesting species, and 6 species of amphibians and 3 of reptiles.

The restored wetlands play also an important function in the improvement of natural water quality and storage for storm or flood waters.

Data on increase of aquatic plants and animal species as amphibians and reptiles are not yet definitive as they will be significant only at the end of the 20 years duration of the project, as natural colonization is affected by the scarcity of ecological corridors.

There are two main lessons learned from the project:

- important biodiversity targets can be obtained also in intensive agriculture areas, if there is an active involvement of farmers and a long-term commitment by policy makers;
- however there was little co-ordination among the two main regional administrations involved, environment and agriculture, and this created conflicts and misunderstandings. Problems have dealt also with hunter organizations and owners of commercial enterprises (i.e. restaurant owners).
A successful project needs the synergies of all pertinent public administrations and all stakeholders.
--the lack of security of continuation of sufficient subsidies for farmers involved in nature conservation creates does not encourage long-term commitment. There should also be premiums for farmers that show greater involvement and achieve greater results in terms of conservation of biodiversity, just as there are premiums for agricultural productivity.

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Case Studies

Conservation through agricultural use: promoting low cost farming in Luxembourg

Background

Agricultural land makes up around a half of the territory of Luxembourg (55%). The main focus is on beef and milk production rather than on cereal crops. Because of the high cost of living, farmers in Luxembourg tend to have large overheads and investment costs, which affects their competitivity and long term prospects.

Aware of the concern over the increasing cost of farming, the Ministry of Environment launched a scheme which aims to support low cost grazing practices in protected areas, including Natura 2000 sites. Luxembourg has around 13,600 ha of agricultural area and viticultures in Natura 2000. As elsewhere, a significant proportion of that land is dependent on regular management activities, such as low intensity grazing, in order to maintain or restore them to a good conservation condition.

The objective of the scheme called 'Naturschutz durch Nutzung' (conservation through usage) is to promote such activities in an economically viable way, for the benefit of both the farmers and nature conservation. Run by the Ministry of Environment (who is responsible for technical and promotional aspects of the scheme) in close collaboration with the Ministry of Agriculture (responsible for payments and inspections), it aims to encourage farmers in targeted protected areas to convert to low intensity grazing using hardy breeds such as Galloway, Angus, Limousines and Highland cattle.

Local farmer in the Naturschutz durch Nutzung' scheme tending to his hardy cattle,
Photo: Administration de la nature et des forêts, Luxemburg

Starting with an economic analysis of the farm business

Farmers who are interested in joining the scheme are first offered a detailed economic study of their farm. This is carried out by a qualified agronomist employed by the Ministry of Environment. The service is free and there is no obligation on the farmer at this stage to join the scheme. The economic study examines the farmer's existing costs, turnover and profit/loss situation and then looks at how these figures would change were the farmer to convert to low intensity grazing using hardy cattle breeds. As a result the farmer can see immediately the economic consequences of his options.

One of the key advantages of converting to low intensity grazing is that it reduces substantially both the investment costs and the day-to-day running costs of the farm. Because hardy breeds are well adapted to the natural environment they can stay out in the fields all year round. They also require little husbandry or supplementary feeding.

Hardy cattle stay outdoors all year round which helps to reduce costs; photo: Administration de la nature et des forêts, Luxemburg

As a result, the farmer does not need to invest in stables to overwinter the animals or buy specialised equipment (eg for ploughing or haycutting). His overheads in terms of labour costs (hiring staff to manage the animals) and consumables (supplementary feed, pesticides, fertilsers etc…) are also much reduced. The average cost of a stable in Luxembourg is around €2 million, it can take farmers many years, possibility decades, even with the help of subsidies, to work off these initial investments before he can turn a profit. Some farmers may be reluctant to embark on such long term commitments for various reasons but often see no alternative. Instead they find themselves becoming increasingly dependant on state subsidies for ensuring the continued economic viability of their business.

Example of how cost savings are assessed

An economic study is carried out on a dairy farm with 230 ha. The farmer is considering converting to low intensity farming with the hardy breeds on 80 ha (the remaining 150ha will continue to be used for milk cattle). What will be the savings in terms of costs per year:

Labour costs:	*savings of 2100 hours of salary costs equiv to +/1 person*
Fodder etc:	*saving of -/+ 30,000€*
Installations:	*no large-scale investments required (just fencing and small shelters in situ)*
Running costs:	*no drainage, ploughing, fertilisation, haycutting etc…)*

Results in total savings of up 200,000€ a year

By contrast, a farmer who converts to low intensity farming is able to reduce his costs substantially. Of course his income will also be significantly reduced since the average stocking density can be no more than ca 0.5-0.8 LU/ hectare. But, this does not necessarily mean the farm becomes less profitable. On the contrary, many farmers find there is a potential to increase their profit margins since beef from hardy cattle can sell at six times the value of ordinary beef. The economic study is intended to examine whether this is the case for the particular farm under investigation and how best this can be achieved.

Converting to low intensity grazing with hardy breeds

If the farmer agrees to convert to low intensity farming, a five year agreement is drawn up between the farmer and the Ministry which lays down the conditions under which grazing should be carried out. This is based on an analysis of the land's specific conservation needs (eg stocking rates, no use of fertilisers or pesticides, no ploughing, hay cutting unless specified, liming.).

In exchange, the farmer receives an annual 'biodiversity' subsidy from the Ministry of Environment (on top of his normal single area payment) which is intended to compensate for the income foregone resulting from conversion to low intensity grazing (eg slower growth of the animal and lower productivity). It can also pay for any additional conservation orientated management activities the farmer may be asked to carry out. In addition, the farmer receives support from the Ministry of Environment in promoting and marketing his produce (see below).

Since its launch in 2003, the scheme has become increasingly popular with farmers see the benefits of low cost farming. By the beginning of 2012, 42 agreements were in place involving around 50 farmers. The projects vary in size from 200 ha to 10 ha, but the average size is around 30-60 ha. The Ministry tries to focus mainly on farmers who are interested in carrying out a significant conversion of their farm – and not on those who wish merely to adjust their grazing on a small area (eg 2 ha on a 200 ha farm).

The total area covered by the 42 projects is 1,594 ha, which is around 15% of the total potential area in Natura 2000 that could be managed in this way. There is now enough interest amongst the farmers to extend the scheme over a much greater area but the current budget and human resources available to the Ministry of Environment is too limited to allow for this. The total annual budget for the agreements currently stands at ca €1.5 million.

42 agreements have been signed so far under the national scheme photo: A*dministration de la nature et des forêts, Luxemburg*

In the future, the Ministry is hoping to be able to expand the scheme so that it can cover 5000 ha, possibly through the incorporation of the scheme into the next Rural Development Programme for Luxembourg (2014-2020).

This was not done under the existing RDP programme (2007-2013) because both Ministries considered the rules for payment were too inflexible and consequently would involve too great an administrative burden for both the government services and the farmers themselves. But now that the scheme has been tried and tested in the field, its incorporation into the next RDP is looking more probable. The strong cooperation between the two Ministries in the running of the national scheme up to now should also facilitate the transition.

Marketing the meat from hardy breeds

Reducing the investment and running costs of the farm business is one important element in the equation, but there must also be an economic outlet for the meat. Surveys show that in Luxembourg there is an increasing interest in meat from hardy breeds amongst a section of the population (this is for a variety of reasons – see box). As a result, this meat can be sold at a premium (currently almost twice the price of conventional beef).

Interest in meat from hardy breeds of cattle is due to a variety of reasons:

- *For health reasons: the meat is firm with little water and a low total fat content which is better for the heart. Also because the animal feeds only on natural vegetation there are not residues of fertilisers, pesticides etc…*
- *For reasons of taste: the taste of the meat is said to be full of character because the animals have a varied diet (which includes a wide range of grasses, herbs, shoots and buds of scrubs) and are allowed to mature slowly until the age of 3 (rather than 1.5 years for conventional beef cattle). The meat is also hung for a longer period of time which enhances the flavour.*
- *For animal welfare reasons: the animal is allowed to roam freely throughout the year and is slaughter in a much less stressful environment*
- *For nature conservation reasons. Eating meat grown in protected areas helps to conserve these areas for biodiversity.*

In order to tap into this potential interest, the Ministry of Environment does not stop at signing agreements with the farmers over the management of their land but also, very importantly, assists them in marketing and selling their meat through various outlets.

Initially the focus was on selling the meat directly to local restaurants within the vicinity of the farms. Restaurants who agree to put this beef on their menu are also given extra support by the Ministry of Environment, through free advertising flyers, leaflets and regular editorials and press releases for the Luxemburg press. The Ministry may also help develop and enhance local nature trails to promote local tourism. In this case, the names of the participating restaurants would also be included in any publicity material and signs produced for the trail.

In addition, the Ministry helps to coordinate the supply chain between the farmer and the restaurants as regards transport, slaughtering and the cutting up of the carcass. In this way it can ensure that the farmer has a steady outlet his animals at a correct price and the restaurants have a steady supply of meat when they need it.

So far, 20 restaurants are participating in the scheme. Their feedback has been very positive, with many reporting that they get booked out weeks in advance when they advertise that they will be serving a hardy beef menu on a specific day or week.

However, now that the critical mass of hardy cattle ready for sale is starting to grow (there will be around 300 beef cattle ready for slaughter in 2014), the Ministry is starting to explore alternative/ additional outlets for the beef. Already it has negotiated deals with a series of butchers who sell the meat direct to customers – either in the form of 'noble' cuts such as entrecote or filets, or as derived products such as sausages and terrines. It is also preparing a 'certificate of origin' label which will be accompanied by a strong marketing campaign to promote the fact that it comes from nature conservation areas in Luxembourg.

In addition, the Ministry has recently started negotiations with Luxembourg's biggest supermarket chain, Cactus. The supermarket has shown a strong interest in having exclusive rights to the sale of the meat in their stores.

Interestingly, the high price of the meat is not their number one concern. Although it is important to keep costs down, the supermarket is particularly attracted by the fact that the meat is locally sourced in Luxembourg and has an already solid reputation for being a healthy, sustainable, and high quality produce. This fits well with their company ethos. Their surveys show that customers are very keen on purchasing locally sourced food where the origins are easily traced back and that they are willing to pay extra for this facility.

Strengths and weaknesses encountered

Success factors

Several success factors can be identified in this scheme:

- The Ministry of Environment's scheme for low intensity grazing with hardy breeds of cattle aims not just at achieving nature conservation objectives, but also at ensuring such farming practices provide an economically viable source of income for the farmers concerned. This dual approach is paramount to the long term success of the scheme and is already borne out by the fact that 80% of the farming businesses involved in the scheme are now economically viable and profitable. They are neither dependent on subsidies nor weighed down by expensive outlays for investments.

- Carrying out an economic study of the farm business by a qualified agronomist for free and without commitment has been central to the high uptake of the scheme. It not only engages the farmer's interests but also shows that the Ministry of Environment is keen to find sustainable integrated solutions for the long term management of the country's protected areas rather than relying merely on state subsidies and budgets for funding their management.

  The economic analysis also provides the farmer with a clear view of the potential economic consequences of his decision were he to convert to low intensity grazing with hardy cattle, as well as an opportunity to discuss the various options available to him with an experienced agronomist. It comes down to 'talking the same language' and being aware of the farmer's perspective when developing conservation programmes that depend on their active participation.

- The argument used by the Ministry of Environment that farming hardy breeds of cattle in protected areas is much less costly than other types of farming has struck an chord with farmers. This is perhaps especially important in countries like Luxembourg that have a high cost of living index and where salaries and building costs can put an exceptionally heavy burden on the economic viability of the farm business.Low cost farming is attractive precisely because it requires a lower start up capital and has lower running costs. But it does also mean a lower output in terms of cattle (around 0.5 – 0.8 LU / ha) and as a result a lower turnover as well. But the emphasis of the scheme is on improving profitability, not increasing turnover.

- Often it can be difficult to find a market out let for small quantities of a specialised produce such as beef from hardy breeds. But the scheme in Luxembourg appears to have overcome this challenge so far. There are possibly two reasons for this: the first is that there is clearly a market for this kind of meat in Luxembourg which allows the farmer to be able to sell his produce at a premium process. The second is that the Ministry of Environment has been actively involved in creating avenues for the sale of the meat through restaurants and butchers and the public at large. The farmers would have had difficulty taking on this role themselves. The strong support and human resources available at the Ministry to help market the meat, source outlets and generally create strong publicity for its sale has therefore been crucial to the success of the scheme and the economic viability of the farms that participate in it.

- Another important success factor of the scheme is linked to both its flexibility and to the fact that sufficient human resources were deployed to make it work. The Ministry of Environment was able at all times to decide for itself which farmers to target within protected areas and what specific management conditions to include in the agreement (eg in terms of stocking densities, etc…). This ensured that the agreements were correctly orientated towards the conservation objectives of each site *and* compatible with the farmers' interests. The Ministry also didnt just stop at signing contracts with the farmers, it also put sufficiently resources into the schemeto help them find a suitable market outlet for their produce.

Weaknesses

- Although a popular scheme there are still only 1600 ha of protected areas have been covered so far which represents only a small proportion of the total potential area that could benefit from low intensity grazing. To make a greater long term impact it will be necessary for the scheme to be scaled up and extended over a much larger area. It seems the interest of the farmers is there at the moment so it would be important not to loose the momentum and goodwill that has been established todate.

- The scheme is labour intensive, requiring important human resources to carry out all aspects from close liaisons with the farmers, to PR and coordination with market outlets. This may put an extra burden on an already stretched Service within the Ministry of Environment but it is also precisely because sufficient human resources were dedicated to the scheme that it has proven to be as successful as it is;

- Although there has been good cooperation with the Ministry of Agriculture on the scheme there is still an overall reluctance within the farming sector to include the notion of low cost farming in protected areas as an integral element of the overall agricultural policy as it could reduce the overall production capacity of the country and reduce investments – and hence the economic importance – of agriculture to downstream areas. The Ministry of Environment however points out that this kind of farming would only ever be proposed to be carried out on 10-15% of the total agricultural area in Luxembourg and that in addition to delivering nature conservation objectives it also delivers many other societal goods that have an economic value – such as reduced freshwater pollution, increased opportunities for recreation and tourism etc…

Other spin-off effects from the Natura 2000 network

As stated above the promotion of low intensity grazing with hardy cattle in protected areas has a significantly positive spin-off effect on local tourism and recreation in the areas around the farm. The hardy breeds are popular with visiting tourists, which brings an added attraction to the nature reserves and to the regions concerned.

Their high quality beef is also gaining increasing popularity, especially when it is served in local restaurants – thereby enhancing the overall visitorexperience.

Also the fact that the scheme promotes economic activities such as farming in protected areas helps remove the rather old fashioned perception that nature is 'for animals and people' and that only public funds can be used to pay for its protection. The more integrated approach adopted by the scheme is much more in line with the current EU biodiversity Strategy which recognises the ecological value of nature and the role that all elements of society have in protecting it.

Lessons learnt from the experience, and challenges for the future

The scheme has demonstrated that farming in protected areas such as Natura 2000 sites can not only be good for nature but also an economically viable option for the farmer if conducted correctly. The key advantage of the kind of farming proposed by the scheme – involving low intensity grazing using hardy breeds – is that is can be undertaken with minimal initial investments and much lower day to day running costs. But, the low cost farming approach can only work properly (ie without being heavily dependent on subsidies) if there is also sufficient income to offset these low costs and generate a profit for the farmer.

In Luxembourg this is possible because there is clearly an interest in buying meat from hardy breeds and a willingness to pay premium prices for that meat. However, for the moment the interest in mainly focussed on 'prime cuts' such as steaks. In order for the venture to become truly profitable the market needs to be diversified to cover all parts of the animal, be it through the cooking of traditional recipes such as beef broths, stews or pot roasts or through the production of derived products such as salamis, sausages or terrines..

Also it will be important to find additional marketing outlets for the meat now that more and more cattle are reaching maturity under the scheme. If the market does not expand to keep up with production then the interest in the scheme could drop considerably.

Another challenge over the longer term is to find ways to roll out the scheme and this type of farming practice over a larger area so that more areas within protected sites are managed properly. This may require the scheme to be integrated into the next Rural Development Programme but it will be important to ensure that the scheme doesn't then loose the elements that have made it so successful up to now and the payment conditions are no so difficult and restrictive as to act as a serious disincentive for farmers to join.

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Case Studies

Managing natural meadows and pastures of Östergötland under the Swedish rural development programme

Background

Östergötland County (10,605 km^2) consists of four natural geographic regions; the central lowland area with a long tradition of agriculture that can be traced back to permanent settlements from 9000 BC, hilly forest areas in the northern and southern parts of the county, and the archipelago area along coast of the Baltic Sea.

Today, the central area is dominated by large-scale agriculture, while small-scale farming (in combination with forestry) is the main land-use in the more elevated northern and southern parts of the county. With its large diversity of natural and semi-natural habitats, Östergötland is one of the most species-rich counties in Sweden, harbouring more than 1200 plant species, many of which are linked to semi-natural habitats that are dependant on grazing or mowing for their continued existence.

According to the most recent surveys, done in 2002-04, 26,547 ha or around 10 % of the agricultural land in Östergötland is classified as semi-natural habitats (with a large dominance of pastures and only very minor areas of meadows).

Wooded pasture with pollarded trees (Kurt Adolfsson)

The most important areas (ca 170 sites) have been protected as nature reserves and/or Natura 2000 sites. Of the 5,284 ha included in Natura 2000 in Östergötland, 4,112 ha (78 %) is classified as semi-natural habitats.

It is a legal requirement in Sweden that all protected areas, including Natura 2000 sites, have an approved management plan. Draft management plans are communicated with all relevant stakeholders before they gain legal force, and it is often the land-owners who have the main responsibility for, or take an active part in, the management of sites on their land.

Funding for the management of semi-natural habitats in Östergötland County comes primarily from the regional Rural Development Programme but sites can also benefit from financial support from public funds earmarked for the management of protected areas. These funds are administered by the County Administrative Board.

Restoring degraded sites through LIFE

As elsewhere in Europe, traditional grazing and haymaking has decreased or ceased entirely. Without these recurring activities, fields soon become overgrown with scrub and invasive grasses and sedges, and eventually turn into forests. By 2007, most semi-natural habitat types in Sweden which are protected under the Habitats Directive were considered to be in an unfavourable or declining conservation status. Additional problems include the lack of pollarded trees (which provide "mini"-habitats for several species of lichens, fungi and insects), and the poor recruitment of oak trees in wooded meadows.

In 2005, the County Administrative Board of Östergötland launched a strategic four year project, with funding from EU LIFE[1], to restore 41 Natura 2000 sites back to a favourable conservation status within its territory. Collectively these sites harbour around a quarter of all semi-natural habitats included in Natura 2000 in this County (ca 965 ha).

The project deliberately focussed on those priority sites that were not in a good conservation condition but were still capable of being restored because scrub encroachment was not too advanced yet. The objective was to restore them back to a level where grazing and mowing could be re-introduced to ensure their long term conservation.

The so-called ROSORIS project covered a representative selection of the following semi-natural habitats present in Östergötland:

- Wet meadows (primarily *Molinia* meadows, 6410, 433 ha). These are primarily located along the shores of Lake Tåkern and Lake Roxen. They are amongst the best sites for breeding and migrating wetland birds in Sweden.

- Fennoscandian wooded pastures and meadows (9070 plus minor areas of 6530, 358 ha), characterised by large-sized oak trees several hundred years old. These large and old trees harbour very species-rich communities of insects, lichens and fungi with several rare or threatened species such as Hermit Beetle (*Osmoderma eremita*), Stag Beetle (*Lucanus cervus*) and the poorly known pseudoscorpion *Anthrenochernes stellae;* all listed in Annex II of the Habitats Directive. Östergötland County is a core area for these habitats in Sweden.

Fennoscandian wooded pastures (habitat type 9070) (Jens Johannesson)

- Dry meadows and grasslands (6210, 6230 and 6270, 25 ha), characterised of species-rich plant and butterfly communities, often on calcareous ground. Some sites harbour up to 40 species of vascular plants per m^2, and single sites harbour up to 35 species of butterflies.

[1] LIFE05NAT/SE/000108, "Natural meadows and pastures in Östergötland - restoration and maintenance"; ROSORIS; (http://www.lansstyrelsen.se/ostergotland/Sv/djur-och-natur/skyddad-natur/projekt/Pages/rosorisenglish.aspx)

- Alkaline fens plus minor areas of tufa springs (7230 and 7220, 16 ha) on calcareous ground and predominantly in the central and western parts of the county. Grazing or mowing is a prerequisite for the long-term maintenance of the species-rich plant communities characteristic for this habitat; often with a rich abundance of orchids.

Cattle grazing (Annika Forslund)

The project sites are located in a region with a rich cultural heritage, which to a large extent is inter-woven with its nature conservation values. Some of the most important wooded pasture sites are associated with a number of large traditional manor houses in the area.

Also the nature values linked to the wet meadows are closely connected to the traditional land-use. As a result, many of the project sites are highly attractive for visitors, locals as well as tourists.

The majority of the project actions took place on privately owned land, and only minor areas were publically owned or belonged to commercial companies. Thus, close cooperation and coordination with the land-owners and other stakeholders was necessary for the successful outcome of the project. All work followed the provisions of the legally adopted management plans, and, for the detailed project work, site-wise restoration plans were drafted and communicated with the land-owners and other stake-holders.

By the end of the project the following had been achieved:

- 81 km of new fences erected at 33 sites to facilitate the re-introduction of grazing;
- Bushes and shrubs cleared away on 435 ha within 39 sites;
- Shoreline/ littoral meadows restored over 252 ha at 4 sites;
- Pollarding resumed at 2 sites;
- 116 young oak trees planted in 3 sites;
- Watering facilities for animals installed at 24 sites;
- Collecting pens built at 6 sites.

Also, various measures were undertaken in order to attract visitors and facilitate access to the sites. The average cost of this restoration work was around 2000€/ha.

Supporting the maintenance and re-introduction of recurring agricultural practices

Having restored the sites to a more favourable conservation status, it was important to ensure that they remained in this state over the long term. This can only be achieved through regular management activities such as grazing, mowing and pollarding etc... Two financial mechanisms have been developed to support farmers and other land managers who are agree to undertake (or re-introduce) such activities.

The first, and most important, support mechanism takes the form of a dedicated agri-environmental agreement scheme under Sweden's Rural Development Programme 2007-2012. The second source of funding comes from State funds for the maintenance and management of nature reserves and Natura 2000 sites which can pay for complimentary measures that are not applicable under RDP.

The RDP agri-environment scheme has been specifically developed to support the management of semi-natural habitats and to promote '*biodiversity and cultural heritage in semi-natural grazing lands, mown meadowlands and wetlands'*. It aims to encourage farmers and other land managers to use agricultural production methods which promote the protection and improvement of biodiversity, landscape and its features.

The programme is open to all semi-natural habitats that qualify for support – i.e. ca 500,000ha of land plus ca 230 mountain holdings (the national inventory of semi-natural grazing land and mown meadowland is used to assist in the selection of the sites for the scheme). It is therefore not restricted to semi-natural habitats within Natura 2000. But Natura 2000 sites are given special consideration since one of the targets is to ensure that

80% of the semi-natural grasslands and mown meadows designated under Natura 2000 are covered by agri-environment payments.

The scheme lays down a number of management obligations. These are essentially linked to managing the pastures and meadows in a way that prevents the accumulation of harmful litter or encroaching shrub. It does not however pay for the restoration of sites that have already become overgrown or for any other initial investment costs such as fencing etc (which is why these were included in the LIFE ROSARIS project - nevertheless the cost of fence maintenance and continued removal of encroaching vegetation has been factored to the payment/ha offered).

The scheme also offers extra payments for supplementary measures linked to pollarding, scythe mowing and post mowing grazing:

Payment			
Semi-natural grazing land	1	Semi-natural grazing land of general value	SEK 1 100 (€ 122,2)/hectare
	2	Semi-natural grazing land of particular value Supplementary payment for pollarding for leaf fodder¤	SEK 2 500 (€ 277,8)/hectare SEK 100 (€ 11,1) each, but max SEK 2 000 (€ 222,2)/hectare
	3	Woodland pasture	SEK 1 800 (€ 200)/hectare
	4	Limestone pasture	SEK 850 (€ 94,4)/hectare
	5	Mountain pasture Mountain holding in use	SEK 700 (€ 66,7)/hectare SEK 3 000 (€ 333)/hectare
Mown meadowland	6	Mown meadowland of general value	SEK 1 100 (€ 122,2)/hectare
	7	Mown meadowland of particular value Supplementary payment** for - Pollarding for leaf fodder¤ - Post-mowing grazing¤ - Scything¤	SEK 3 500 (€ 277,8)/hectare - SEK 100 (€ 11,1) each, but max SEK 2 000/tree (€ 222,2)/hectare - SEK 700 (€ 77,8)/hectare - SEK 7 000 (€ 777,8)/hectare
Wetlands *	8	Wetland on arable land Supplementary payment for income loss due to loss of high yield harvests	SEK 3 000 (€ 333,3)/hectare SEK 1 000 (€ 111,1)/hectare
	9	Wetland on grazing land	SEK 1 500 (€ 166,7)/hectare

*Payment for this type of management is also granted in the case of areas of wetlands managed as semi-natural grazing land or mown meadowland.

** The three types of supplementary payment on mown meadows are possible to combine on the same parcel.

¤ Top-up notification.

Table from "Rural Development Programme for Sweden – the period 2007-2013"[2]

By end of 2009; 451,519 ha of semi-natural habitats in Sweden were being managed with the help of agri-environmental subsidies. A bit more than 70,000 ha were located inside the Natura 2000 Network. In Östergötland County, approximately 55,000 ha of semi-natural habitats were included in the agri-environmental scheme. This includes a large proportion of the 4122 ha of semi-natural habitats protected under Natura 2000 and almost all of the sites restored under the ROSARIS project.

[2] http://www.regeringen.se/content/1/c6/08/27/31/de111eed.pdf

At present (January 2012) the average compensation level for grazing is around 400 €/ha, and is as high as 1000 €/ha for mowing.

Strengths and weaknesses encountered

Success factors

The approach adopted in this case study highlight a number of key success factors that could be replicated elsewhere:

- The existence of a dedicated agri-environment scheme for the management of semi-natural habitats provides a vital lifeline for the farmers owning semi-natural habitats. Although of both high natural and cultural value, their management is for the most part no longer economically viable so additional support is essential. The scheme is not exclusively focused on semi-natural habitats within Natura 2000 but the fact that a specific target has been set for them ensures they are given a special focus. The scheme aims to cover 80% of the semi-natural habitats that are protected under Natura 2000 eligible for the agri-environmental payments. This should go a long way to ensuring the appropriate management of these valuable habitats.

- The payment levels are also sufficient to attract the farmers.

- The use of EU LIFE funds to carry out a programme of restoration works across a suite of Natura 2000 sites in order bring them up to a level where they become eligible for agri-environment schemes is a very effective one. Their restoration would otherwise have been a very lengthy process taking many years. It is quite likely that several sites would have deteriorated beyond repair whilst waiting for national funds to become available to restore them.

- The LIFE project was also instrumental in providing sufficient human resources to forge good relations with local private landowners and encourage them to join the agri-environment scheme. Such preliminary contacts and discussions are often vital for the successful uptake of an agri-environment scheme. A prerequisite for the ROSORIS project was that the landowners concerned were informed and engaged already during the drafting of the

application. With this proactive approach it was possible to implement the project actions as planned. The necessary cooperation and coordination with the land-owners has proceeded without serious frictions also after the end of the project.

The legal requirement to have detailed management plans for all Natura 2000 sites also facilitates the process of identifying the kind of grazing/mowing regimes that should be implemented on each of the sites and has helped to plan the type of measures that are funded under the agri-environment scheme.

Weaknesses

There are however also a number of weaknesses which have been identified.

- From the experience gained in Östergötland, one of the main problems with the RDP is that its rules are not sufficiently flexible to be adapted to the management requirements of individual sites which can vary in terms of both grazing pressure and the timing of the grazing. For instance, there are situations where the optimal grazing pressure is below the level to qualify for subsidies. At several sites the timing of grazing also needs to be better adjusted to the flowering season of the typical plant species of the habitat, with grazing not starting until after the flowering and seeding period. The regulations do leave open possibilities for site-wise adjustments, but this requires very cumbersome and time-demanding administrative procedures.

- Another obstacle to the effective management of the sites is the general rule concerning the number and density of trees allowed per site, i.e. maximum 60 trees/ha. This restriction makes the appropriate management of habitats such as wooded pastures (9070) very difficult. In order to qualify for subsidies a land-owner may be required to cut down scrub and medium-sized trees, which could not only make the recruitment of large-sized oak trees very difficult (as the 'young' trees of 'only' 100 years ago may be cut) but also removes those features that are important for different stages in the life-cycle of species characteristic of these wooded pastures.[3]

- The long term prospect for these semi-natural habitats also remains at risk because their management is no longer economically viable and so they must rely on continuous financial support from the State - be it through RDP or other funds. The main reason is the receding profitability of cattle husbandry.

- The agri-environment schemes are also voluntary which means that any changes to existing schemes however small could have serious consequences for the habitats if they discourage farmers from (re)-applying. This is already being seen today. With the increasing complexity of the RDP system and the frequent changes in the details of the rules there are now signs that land-owners are finding the system increasingly unattractive and several are already considering not re-applying for the scheme after the five years are up.

  This is not because farmers do not care about the management of the semi-natural habitats on their land, but because administrative paper-work is becoming too complicated and time-demanding and changes in the regulation make any long-term planning on how to run the farming difficult. And with fewer farmers keeping fewer cattle, it will also be increasingly difficult to organise the management of semi-natural habitats that are dependent upon continued grazing unless new outlets or niche markets are found to make such farming practices more profitable.

Another important group of stake-holders are the entrepreneurs that are contracted to carry out the various kinds of restoration and management work. The ROSORIS project, as well as some other LIFE Nature projects, has provided a significant source of income for local entrepreneurs with the adequate competence for the management of the semi-natural habitats locally or region-wise. This also helped to make the projects accepted in the local societies. But with a more strict application of the rules for public tendering, it nowadays happens that the responsible authorities sometimes are forced to engage contractors from elsewhere. This may make it more difficult to assure the management of the sites with the best competence and local expertise, and a source of in-

[3] Some of the rare or threatened beetle species dependant on large-sized trees have very limited dispersal distances, e.g. just a few hundred meters for the Hermit Beetle (*Osmoderma eremita*) Thus, any removal of trees in wooded pastures may also negatively affect the long-term conservation status of species linked to the large-sized trees.

come for the local society may be lost. What was initially a "win-win situation" both for nature conservation and the local society may turn to the opposite.

Other spin-off effects from the Natura 2000 network

The concentration of several sites with high nature and cultural heritage values in the western part of Östergötland County, i.e. the region around Lake Tåkern and Omberg, attracts a large number of locals as well as visiting tourists. There are no precise estimates, but the number of visitors has been assessed to exceed 100,000 on an annual basis.

The arrangements done for visitors at the best nature sites, and to some extent within the ROSORIS project, have definitely helped to make the region attractive, and further investments are now done in a new visitors' centre at Lake Tåkern. However, so far it has been more difficult to get the enough customer potential for making nature guiding and related activities profitable.

Main results and lessons learnt from the experience, and challenges for the future

The nature and cultural heritage values linked to various semi-natural habitats are the result of a traditional land-use that has evolved over many hundred years. But during the 20th century a long and continuous cultivation tradition came to an abrupt end. Nevertheless, continuous grazing and/or mowing, adjusted to the habitat and species characteristics of each particular site, is the main prerequisite for the long-term maintenance of the values under threat.

Today, there are hardly any economic incentives or outlets for this kind of traditional land-use, unless a work-effective and easily administrated system of subsidies is put in place to ensure the long-term and sustainable planning of the management of these sites. It should also be remembered that many farmers entering the scheme consider that 'nature conservation' is their business and such public services to society should be properly acknowledged and supported – for instance through the subsidies from the RDP.

A main overriding problem is that semi-natural habitats with high conservation often, and to an increasing extent, remain as small fragments in the landscape. It may be very difficult to maintain the nature values and species richness at these sites over the long term if there is no longer any active agriculture in the surrounding areas. This relates both to the maintenance of "green corridors" between sites with semi-natural habitats, and the possibility to find the competence, such as professional farmers and entrepreneurs, that can be engaged for the management.

Another main challenge for the future is to find the animals for the grazing. The number of farmers keeping cattle is steadily declining, and solutions to come around this problem have turned out to be necessary. For instance agreements can be made between landowners, so that land owners who have stopped cattle husbandry, can still have their land grazed by animals which have been transported from elsewhere.

In order to get these agreements to work, it is often necessary to give financial support for various kinds of infrastructures, such as fences and pens. The staff at the regional nature conservation authorities in particular has come to play an important coordinating role in contacts between landowners, and in finding ways to finance various kinds of investments in order to assure the continuous management.

Looking for birds at restored wet meadows at Lake Tåkern (Lars Gezelius)

For the time being, the management of semi-natural habitats in Östergötland County can be arranged and maintained on an acceptable level, also for the ROSORIS project sites, but there are constraints that may make the future and long-term maintenance of the conservation status difficult.

The continuous good cooperation with landowners and other stakeholders would be facili-

tated if some constraints could be handled, for instance:

- Avoiding short-term changes to the RDP rules, in order to facilitate the long-term planning and implementation of relevant management measures.
- Reducing the level of bureaucracy linked to the implementation of the RDP measures which should help to make the work more cost effective, both for the farmers and the administrative staff at the responsible local and regional authorities
- Allowing for more flexible grazing regimes that are better adjusted to the site-wise management needs for specific habitats and species.
- Avoiding inflexible rules, such as the maximum number of trees in wooded pastures, in order to avoid that habitats fall out of the RDP system.
- Using public tendering rules that recognise the contractors with the best competence for the site- and habitat-specific management, having in mind that this often requires local knowledge and experience.

Ensuring the favourable conservation status of semi-natural habitats protected under the Habitats Directive over the longer term is not only a question of the best management practices and techniques, but is primarily down to finding the right incentives to make cattle husbandry attractive enough to deliver a steady income for the farmer.

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Case Studies

Restoring and Managing Wet Meadows for Threatened Wetland Butterflies

Wetland butterflies project in Poland

Phengaris nausithous (Maculinea nausithous) female ovipositioning on Sanguisorba officinalis (Poland). *Wikimedia*

Natura 2000 key habitats and species in Poland

Poland hosts a large proportion of Europe's biodiverse permanent grasslands recognized as of Community interest, including 23497 km^2 *Molinia* meadows (habitat 6410), 4143 km^2 alluvial meadows (habitat 6440), 7054 km^2 of lowland hay meadows (habitat 6510), 1200 km^2 mountain hay meadows (habitat 6520), and 6067 km^2 calcareous fens (habitat 7210) (EEA 2011a). In all, Poland has designated a fifth of its land area as Natura 2000 since its accession to the EU in 2004 (EEA 2011b).

Many of these grassland areas are semi-natural wet meadows that provide habitat for rare butterflies, including *Phengaris (Maculinea) teleius* (modraszek telejus), *Phengaris nausithous* (modraszek nausitous), *Lycaena helle* (czerwończyk fioletek), *Lycaena dispar* (czerwończyk nieparek), *Coenonympha oedippus* (strzępotek edypus), and *Euphydryas aurinia* (przeplatka aurinia).

All these species are dependent on continued extensive maintenance of wet meadows that support their host plant species, and the two *Phengaris* species have particularly specific life cycle requirements, involving ant species, which are very sensitive to change. *Coenonympha oedippus* occurs mainly in alkaline fens (7230), *Lycaena helle* in Calthion meadows, whilst the other 4 species are mainly dependent on *Molinia* meadows (6410). Bird species of special European interest in wet meadows include the crane (*Grus grus*), white stork (*Ciconia ciconia*), marsh harrier (*Circus aeruginosus*), and corncrake (*Crex crex*).

These habitats were created by traditional extensive management, with late mowing for hay and low intensity grazing after hay cutting, carried out by Poland's small-scale mixed peasant farms.

Agricultural change and threats to biodiverse wet grassland management

Economic transformations in Poland's rural economy and agriculture since the end of the Soviet period and Poland's accession to the EU have led to huge changes in farming, resulting in both abandonment and intensification of agriculture in different areas.

On wet grassland, intensification has resulted in:

- drainage of wet grassland and decomposition of peat soils,
- a homogenization of the landscape, for example clearance of midfield shrubs that provided wind shelter and nectar resources,
- eutrophication from increased use of agro-chemicals and fertilizer,
- early and repeated mowing that destroys butterfly eggs, larvae and food plants,
- attempts to cultivate meadows as arable land.

The abandonment of extensive management of wet meadows has resulted in:

- overgrowth with scrub, especially willow and birch, and
- changes in plant species dominance towards tall, dense perennial grass and sedge species.

These changes have resulted in the disappearance of the food plants and host ant species of these butterfly species. Cultivation and drainage followed by peat decomposition results in significant impoverishment of vegetation diversity. The impacts of abandonment are often slower, but some meadows have been abandoned for over a decade and have become severely overgrown. As a result, the populations of these butterflies of Community interest have declined rapidly (van Swaay et al 2010).

The lack of support for good management practice, and a lack of awareness and communication among stakeholders in Natura 2000 sites (e.g. Grodzinska-Jurczak & Cent 2011) mean that little or inadequate action has been taken so far to conserve butterflies.

Wetland Butterflies project objectives and measures

The "Wetland Butterflies" LIFE project (LIFE06 NAT/PL/000100) lasted three and a half years, from 2006 to 2010[1]. The project aimed to improve the quality of the six target butterfly species habitats and secure the best possible habitat condition. The project also aimed to set up appropriate agri-environment schemes that would fund long-term management of the sites. The main measures involved habitat restoration and the re-establishment of good hydrological status and regular management by mowing. The project also included public awareness, education and training activities.

Project areas

The The LIFE project covered four Natura 2000 areas (Gatkowski 2010, EEA 2011b):

- Puszcza Kampinoska SCI and SPA (PLC140001) with total area 380 km^2 consists of 38km^2 of dunes and marshland habitat that coincides to a large extent with the boundaries of the Kampinos National Park. Habitats include alkaline fens (7230), lowland hay meadows (6510), *Molinia* meadows (6410), as well as xeric sand grasslands (6120), woods, bogs and mires. Species of special European interest include the butterflies *Phengaris teleius*, *Lycaena dispar* and *Euphydryas aurinia*, and many bird species.
- The Bagno Całowanie Fen SCI (PLH140001) on 42km2 still has substantial areas of wet hay meadows (6510) and Molinia meadows (6410) despite fen drainage. It hosts populations of Lycaena dispar, Lycaena helle and Phengaris teleius. Most of the land is in private ownership, and some of it is within a Landscape Park.
-
- Torfowiska Chełmskie SCI (PLH060023), an area of over 21km2, includes three fens (Brzeźno, Bagno Serebryskie and Roskosz) made up of Molinia meadows (6410), calcareous fens (7210) and alkaline fens (7230). Patches of thermophilous calcareous grasslands (6210) between the fen areas contribute to the abundance and diversity of species. It hosts one of the most valuable Euphydryas aurinia populations in Poland, as well as Phengaris teleius, Phengaris nausithous, Lycaena helle, and Lycaena dispar. The area is protected partly as a national nature reserve and partly as a Landscape Park.
- Torfowisko Sobowice SCI (PLH060024) on 1.7km2 also features Molinia meadows (6410) and alkaline fens (7230) adjacent to meadow habitats (6510) with thermophilous calcareous grasslands (6210). This area is especially valuable for a large Coenonympha oedippus population, as well as Phengaris teleius, Phengaris nausithous, Lycaena helle,

[1] http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=3219

Lycaena dispar, and Euphydryas aurinia. Part of the area is protected as a national nature reserve.

Main results and lessons learnt from the experience

Project measures implemented and project successes (Gatkowski 2010, EC LIFE+ programme 2010)

Project partners and contractors have gained valuable experience and capacity in large-scale habitat restoration (e.g. Klimkowska et al 2010a, Klimkowska et al 2010b), and have acquired equipment and experience with techniques.

- Removal of shrubs and/or regrowth was undertaken on 383 ha. The biomass, mainly branches and tree trunks, was ground to chips on-site and either removed for burning in local heating systems, or burnt on-site where this was not possible (subject to the environmental permits). Regrowth was removed using mechanical or manual mowers. The larger rootstocks were milled - cut down to ground level and fragmented - to hinder regrowth and to prevent them from damaging the mowing machinery.
- First mowing was carried out on 249 ha of long-term abandoned meadows. The restoration of mowing on meadows that have been abandoned for many years is difficult and labour-consuming owing to clumps of vegetation, young bushes, and the uneven surface, often the result of wild boar disturbance. The first mowing often had to be preceded or followed by surface levelling with an inversed harrow (so it did not break the surface).
- Restoration of proper hydrological conditions in the meadows was undertaken on 150 ha. Water damming equipment was made or repaired.
- More intensive restoration measures were carried out on 82 ha that had been destroyed by drainage and fertilisation. Deep ploughing was carried out on Bagno Serebryskie. Deep ploughing lowers soil fertility by burying the nutrient-enriched surface soil layer beneath lower fertility subsoil, and deactivates the shallow seed bank by burying seeds too deep in the soil profile for them to germinate. This improves the chances for restoring the desired vegetation. On Całowanie Fen 30-40 cm of surface soil was removed using mechanical diggers. Where peat soils have been drained for a number of years, the surface soil layer has decomposed from peat into peat earth or moorsh. This dried and destroyed peat has lost its characteristic ability to absorb and keep water, which means that simply raising the water level would not restore the habitat. Because natural colonization of restored meadows by plants is very slow, these restored areas were spread with hay containing plant seeds sourced from places where the vegetation species composition is appropriate for the development of butterfly populations.
- Additional sowing with locally obtained sowing material was carried out on other restored meadow areas to assist colonization by the food plant species of the target butterflies. The seeds were collected from the meadows that are currently the best habitats for the project butterflies.

Initiation of habitat management measures

Regular mowing was introduced on a total area of 428 ha in the Natura 2000 areas, and the hay is now collected and used by local farmers. A biomass reception and utilisation system was established on the project sites. At least 15% of the meadow is left unmown each year, and on *Molinia* meadows only 50% is mown each year (but see comment about monitoring below). Each year a different fragment is left unmown, but it is most effective to leave the meadow patches with the biggest host plant populations. None of the sites are grazed.

Establishment of agri-environment schemes

Over 300 ha are now being managed by farmers under agri-environment schemes that are suitable for the requirements of the target butterfly species (see box for details). Agri-environment contracts with private farmers are particularly important for continued management in the Bagno Całowanie Fen because most of the land is under private ownership. The project trained 90 agri-environment advisers and organised agri-environment trainings for 50 farmers, and as a result, 30 agri-environment contracts were set up.

Monitoring of butterflies and impact of agri-environment schemes established

Monitoring of butterfly populations on Torfowiska Chełmskie Landscape Park is being carried out by the Institute of Technology and Life Sciences (ITP, formerly IMUZ)[2], a project partner **(**EC LIFE+ programme 2010). This will include monitoring of the impact of the agri-environment measures. Monitoring on Bagno Całowanie has been established by the Polish NGO Wetland Conservation Center (CMok)[3], a project partner, in collaboration with Warsaw University Faculty of Biology[4]. As no further conservation measures are planned in Torfowisko Sobowice, monitoring will provide the basis for decisions on whether further active conservation measures are needed. The Kampinoski National Park already has an established butterfly and vegetation monitoring programme with Warsaw University Faculty of Biology.

It is important to note that monitoring of the impact of *Molinia* meadow management is showing that these habitats are still degrading, populations of butterfly host plants are shrinking, and invasive species are increasing. It may therefore become necessary to mow the meadows in June to maintain their condition, even though this results in some damage to butterfly larvae. This was in fact the historical management regime on some *Molinia* meadows, for example in Bohemia (Poschlod et al, 2009).

Local community engagement and awareness and acceptance of Natura 2000

The project produced publicity materials, trained local teachers, organised school excursions, and constructed nature trails. It is worth noting that local residents of areas around the sites were employed for both nature management actions and preparation of the educational trail infrastructure.

Weaknesses & constraints of the project

Project funding

The project was accepted for 50% financing of planned expenses by the European Commission under LIFE in 2006, but much more energy and time than expected were needed to find the other 50%. This caused a delay of over a year and compressed the time period for the management work from three years to two. In the end, the Polish EcoFund Foundation supported a large part of the costs of the management actions[5]. Funds were also obtained from the Global Environmental Facility Small Grants Program (GEF/SGP), which was crucial in enabling starting of project actions to start on time, plus partners' own funds.

Changes in project partners and Polish environmental governance system

Of the seven different organisations involved in the project, four changed during the project implementation period. Changes in the Polish environmental protection governance system affected the management of Landscape Parks. Moreover, there were changes in personnel that hindered project management. Nevertheless, the project was successfully managed by the Polish office of the regional NGO Regional Environmental Centre for Central and Eastern Europe (REC)[6].

Challenges faced during restoration work

Shrub regrowth (particularly willow and birch) was more difficult to control than expected. Various techniques were tried, the most successful being milling of the rootstocks. Herbicide treatment of rootstocks on Całowanie Fen has not given the expected results, and further trials are being carried out, also taking into account changes in the restrictions on glyphosate use. The shrub removal work was planned for winter periods of frozen soil that would enable the use of heavy machinery on the wet sites. Unfortunately, the winters of

2 http://www.itep.edu.pl/english/activities/index.php

3 http://bagna.pl/cmok/

4 Dr. Viktor Kotowski, Department of Plant Ecology and Environmental Protection, Warsaw University

5 This foundation was established to manage funds allocated from Government-secured debt for the purpose of environmental protection. The fund has now been terminated. http://www.ekofundusz.org.pl/us/index.htm

6 http://rec.org/office.php?id=12

the project period were very mild, and workers often had to wade in water to do their work, which considerably extended the time needed. Work was also delayed by the wet summer of 2009. These problems called for a high level of dedication from the workers to get the work completed on time.

Opportunities for wider influence

Strengthened environmental management of wet meadows in protected areas

Project partners have gained experience and capacity for management of butterfly habitats, and the wet meadow habitats are being restored and better protected. The new Regional Directorates for Environmental Protection (RDOŚ) in Poland have taken over the competence for the management of Landscape Parks, and both RDOŚ Warszawa and RDOŚ Lublin became involved in the project from their founding in 2008. Management plans have been elaborated for Bagno Całowanie SCI and Torfowiska Sobowice SCI[7], and will be approved by the relevant RDOŚ soon. RDOŚ Lublin does not plan to establish a management plan for Torfowiska Chełmskie SCI before 2014, but has obtained funds for further restoration work (EC LIFE+ programme 2010). The Wetland Conservation Center (CMok) is implementing agri-environment schemes on Bagno Całowanie and continues co-operation with local farmers, and continues the monitoring of project sites together with the Faculty of Biology at Warsaw University.

Kampinoski National Park[8], a partner in the project from the beginning, has allocated funds for regular management of the restored areas within the park and has also obtained another LIFE+ project[9] (LIFE10NAT/PL/655) that includes funding for marshland restoration, re-establishment of mowing, control of intensive farming activities causing water pollution, and public awareness-raising, from 2011 to 2015.

A similar project for the same wetland butterfly species and their habitats is being professionally implemented in south-west Poland, financed by the European Regional Development Fund under Priority Axis V, the Operational Programme Infrastructure and Environment 2007-2013 and the National Fund for Environmental Protection and Water Management[10]. The project aims to restore and establish management for butterflies on a total of 950 ha in 10 different Natura 2000 sites associated with three Landscape Parks[11].

Influence on management plans for other Natura 2000 sites in Poland

Poland has decided that simplified management plans shall be drawn up within the next three years for at least half of its N2000 sites (EEB 2011), and the project partner CMok is contributing to plans for other Natura 2000 sites where wetland butterflies occur, in order to include butterflies' needs and ensure appropriate management of their habitats.

Threats and challenges

Continued abandonment of extensive agricultural management of hay meadows

The low economic viability of extensive livestock, the depopulation of rural areas and migration to cities and abroad, and the ageing of Poland's remaining rural population is driving on-going abandonment of the extensively managed wet meadows, particularly the areas which are degraded or overgrown and have low productivity. Improving the uptake and levels of direct payments, agri-environment payments and other measures can partly counter this situation, and agri-environment schemes are already having an important impact on high nature value farmland in Poland.

Improving uptake of agri-environment schemes for wet meadow management in Natura 2000 areas

Up to the end of June 2012 about 20,000 farmers in Poland have signed up to package 5 "Protection of endangered bird species and natural habitats in Natura 2000 areas" (see

[7] Both plans were prepared under the Operational Programme Infrastructure and Environment of Polish Structural Funding

[8] http://kampinoski-pn.gov.pl/

[9] http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=4059

[10] http://www.motyle.natura2000.pl/

[11] Bóbr Valley, Rudawski, & Przemkowskie

box for details). Most of these farmers have chosen variant 5.1 for the protection of bird breeding habitats, but a significant proportion have chosen variants for semi–natural wet meadow management (variant 5.6) or semi–natural mesic meadow management (variant 5.7). The agri-environment package is available for these habitats both inside and outside the Natura 2000 network, and half of the farmers are outside Natura 2000 sites on 108,000 ha, whilst 108,000 ha inside Natura 2000 sites are covered.

However, the number of farmers managing wet meadow habitats is still insufficient for their conservation, when considering the area of habitat that needs management, and when considering that the package 5 farmers are only 9% of all farmers in Poland who are in some type of agri-environment programme, and a tiny fraction of the 1.5 million farmers in Poland supported by direct payments. In some regions such as Biebrza National Park and Ujscie Warty National Park there is a higher level of interest in the package 5 scheme variants, but overall, farmer participation is still limited by the small size of farms, lack of agri-environmental advisors and botanists, and lack of awareness of farmers. In addition, there is need for a much wider promotion of agri-environmental schemes, and training and workshops for farmers.

In order to encourage more farmers in Poland to sign up to agri-environment schemes, especially package 5 related to protection of endangered and protected habitats and birds species, it will be essential to simplify the application procedure, and develop a simple package for small farms. Currently farmers need to find an ornithologist or botanist expert to carry out an inventory on the field and prepare documentation, and an agri-environment advisor who prepares the 5 year action plan for the farm. The farmer then has to wait 1.5 years after submission of the application before receiving the first payment. The whole procedure is financially attractive and cost-effective only for bigger farms (above 20 ha). There needs to be a simple package for small farms that does not require an obligatory inventory or documentation. The payment levels also need to be updated to reflect current costs and prices.

The Polish Ministry of Agriculture and Rural Development has already opened the discussion about the new agri-environment programme for 2014-2020, and the project team is currently involved in consultations (EC, 2012). The draft of the new agri-environment programme is expected at the end of 2012.

Lack of funding for habitat restoration

Properly funded agri-environment schemes can support the maintenance of appropriate management. However, restoration is much more difficult and expensive, and is usually undertaken only by national or regional nature protection services and ecological NGOs from funds dedicated to nature conservation. Restoration of wet meadow habitats with high water levels and low productivity is a particular challenge, so the habitats are susceptible to intensification or abandonment. In common with other parts of Europe Poland has fewer people willing to work in agriculture, and farmers are getting older and have little money and little awareness of biodiversity protection.

Conclusions: demonstration value for other areas and countries

Nearly 5 years of collaboration between many organisations and environmental protection institutions has created valuable habitats for endangered butterfly species, and experience in how to protect them. The project partners hope that the good contacts with nature conservation bodies that have big influence on planning nature conservation in Poland (e.g. the RDOŚ), and the communication of lessons learned from the project, will ensure that butterflies are more often taken into account in planning conservation measures in Poland.

BOX POLISH AGRI-ENVIRONMENT SCHEME FOR NATURA 2000 HABITATS

Sources: Polish RDP 2007-2013 Annex 11 Statutory requirements for the Agri-environmental Programme[12] and 2009 agri-environment regulation[13]

Package 5. Protection of endangered bird species and natural habitats in Natura 2000 areas

Requirements:

- Environmental documentation detailing the package requirements and specifying treatment to restore or preserve proper condition of the habitat
- Prohibition on ploughing, rolling, undersowing, levelling in the period from 1 April to 1 September
- Prohibition on the use of sewage and sewage sludge
- Prohibition on application of plant protection products
- Maintenance of permanent grassland areas and landscape elements not used for agricultural purposes in the agricultural holding area

Variant 5.1. Protection of endangered bird species in Natura 2000 areas (*Calidris alpina schinzii, Cirus pygargus, Vanellus vanellus, Crex crex, Gallinago media, Tringa tetanus, Numenius arquata, Gallinago gallinago, Limosa limosa, Acrocephalus paludicola*)

- Mowing in period 1 August – 30 September, mowing from the outside to the centre of the field is prohibited
- Leaving a part of land unmown or mowing less frequently than once a year on 5-10% of land (except for habitats of *Acrocephalus paludicola* – 50%)
- Removal or stacking the cut biomass within a period no longer than 2 weeks after mowing
- Fertilization prohibited
- Grazing is limited

Variant 5.2. Small sedge-moss communities (habitat types 7230 alkaline fen and 7140 transition mires & quaking bogs, apart from 7150 *Rhynchosporion* and 7210 subtype *Caricion davallianae* communities):

- Grazing prohibited, fertilization prohibited
- Mowing during period from mid-July to end September, 50% of land must be left unmown in any one year, removal or stacking the cut biomass within a period no longer than 2 weeks after mowing

Variant 5.3. Tall sedge swamps (habitat type 7210 calcareous fens apart from subtype *Caricion davallianae*):

- Grazing - limited stocking, fertilization prohibited
- Mowing during period from mid-July to end September, 20% of land must be left unmown in any one year, removal or stacking the cut biomass within a period no longer than 2 weeks after mowing

Variant 5.4. Litter meadows *Molinion* and *Cnidion* (habitat types 6410 and 6440)

- Grazing prohibited, fertilization prohibited
- Mowing during period from mid-September to end October, 50% of land must be left unmown in any one year, removal or stacking the cut biomass within a period no longer than 2 weeks after mowing

Variant 5.5. Xerothermic grass (habitat types 6120 xeric sand calcareous grassland, 6210 dry calcareous grassland, hay meadow subtype 6510-4):

- Grazing - limited stocking, fertilization prohibited
- Mowing during period from mid-July to end September, 15-20% of land must be left unmown in any one year, removal or stacking the cut biomass within a period no longer than 2 weeks after mowing

Variant 5.6. Semi–natural wet meadows (habitat type 6510 or other *Calthion* meadows) and Variant 5.7. Semi–natural mesic meadows (upland hay meadows 6520,

12 http://www.minrol.gov.pl/eng/content/view/full/18575

13 Regulation of Minister of Agriculture and Rural Development from 26 February 2009 on detailed conditions and procedures for the granting of financial assistance under the measure "Agri-environmental Program" Development of the Programme Rural Areas for 2007-2013 (in Polish only) http://www.minrol.gov.pl/pol/Wsparcie-rolnictwa-i-rybolowstwa/PROW-2007-2013/Dzialania-PROW-2007-2013/Os-2-Poprawa-srodowiska-naturalnego-i-obszarow-wiejskich/Program-rolnosrodowiskowy-Platnosci-rolnosrodowiskowe/Legislacja

lowland hay meadows 6510 apart from subtype 6510-4)

- Grazing - limited stocking
- Mowing during period from mid-June to end September, 10% of land must be left unmown in any one year, removal or stacking the cut biomass within a period no longer than 2 weeks after mowing
- Mowing from the outside to the centre of the field is prohibited
- Fertilization only under 60 kg N per year

Variant 5.8. Species-rich Nardion grasslands (*Nardetalia,* 6230)

- Fertilization prohibited
- Only grazing permitted, from 1st May to mid-October in lowlands and from 20th May to 1st October with 0,5 – 1 LU/ha

Variant 4.9. Salt marshes (1310, 1330, 1340)

- Limited grazing and moving permitted
- Moving period from 1st July
- Removal or stacking the cut biomass within a period no longer than 2 weeks after mowing
- Fertilization prohibited

Variant 4.10. Natural lands (7110, 7120, 7140, 7150, 7230, 2330, 4030, 4010)

- Natural land maintenance
- Rubbish removal
- Fertilization prohibited
- No drainage, no sand digging
- Mowing not later than 31st of October (if necessary)

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Case Studies

Grassland management in Kemeri National Park, Latvia

Background

The area of semi-natural grasslands has decreased significantly in Latvia over the last decades through the combined effects of agricultural intensification and land abandonment. In the past, many agricultural plots were drained and ameliorated to make way for arable farming and other intensive farming practices, especially during the Soviet Era when there was a strong drive to establish large farming collectives.

Nowadays, there are just 65 000 ha of 'biologically valuable' grasslands (BVG) left in Latvia (about 1 % of the territory or 0.5 % of agricultural lands), around 39% of which is found within Natura 2000 (Gustiņa et al., 2012).

Kemeri National Park – a model for grassland restoration and management

Kemeri National Park is a vast complex of raised bogs, swamp forests, coastal dunes, lakes, fens, rivers, and floodplain grasslands that extends over 38 165 ha. Located between the coast and the capital city, it provides an important refuge for migrating birds and acts as a natural corridor across the intensive agricultural region of the Zemgale lowland and the urbanised region around Riga city.

Grazing management at Lielupe floodplain complex. Photo: A. Liepa

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Semi-natural grassland communities are still well represented in Ķemeri National Park, albeit in relatively small patches. At the end of the 20th century the total area of semi-natural and ameliorated grasslands covered around 6.4 % (ca 2480 ha) of the Park; just over half is considered to be biologically valuable. By the year 2000, less than a quarter of the meadows and pastures were still in use. But in the last 5-6 years the area of grassland under management has significantly increased thanks to a combination of concerted habitat restoration efforts and the re-introduction of regular management.
One of the most significant remaining grassland areas in the Park is located in a remote southern part along the Slampe and Skudrupite rivers (Figure 1).

These grasslands are surrounded by vast forests and are an ideal feeding and breeding place for many threatened bird species, including the corncrake *Crex crex*, black stork *Ciconia nigra*, lesser spotted eagle *Aquila pomarina*, crane *Grus grus*. It is also an important resting place for thousands of geese, ducks and swans during migration.

The second large area of grassland is found on the eastern edge of the park along the Lielupe river. These wet floodplain meadows are not only important for corncrakes but also for lesser spotted eagle, Montagu's harrier *Circus pygargus*, hen harrier *C. cyaneus*, marsh harrier *C. aeruginosus*, barred warbler *Sylvia nisos.*

The other remaining grasslands in the park tend to be scattered in tiny patches or are located in poldered areas that have long since been abandoned, ameliorated or converted to residential areas.

Restoration and management at Slampe

Having drawn up a management plan for the newly created National Park (founded in 1997), the authorities successfully applied to the EU LIFE Fund to help kick start its implementation. One of the main activities of the project, which started in 2002, was to restore and then re-establish mowing and grazing around the Slampe River.

Remeandering Slampe River

At the start of the project, the authorities already owned 130 ha of corncrake meadows at Slampe but, with additional LIFE funds, they were able to purchase a further 163 ha to make a larger more coherent management unit. This also opened up the possibility of restoring the hydrological regime within the area.

The River Slampe had been straightened in the 1970s in order to drain the surrounding meadows and make them more suitable for agriculture (Figure 2). The LIFE project set out to reverse this process. A 2.1 km stretch of the

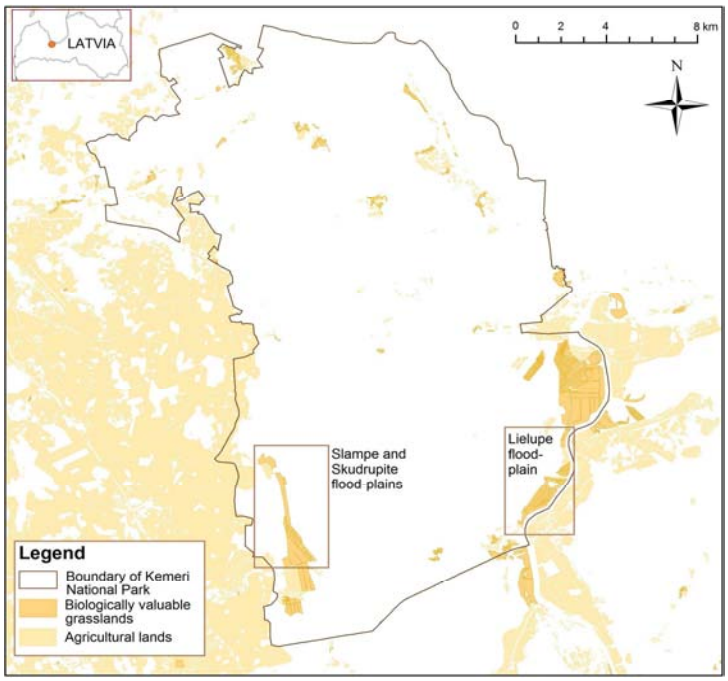

Figure 1 Map of agricultural lands including BVG in Kemeri National Park. Complex of Slampe and Skudrupite Rivers' floodplains and Lielupe floodplain are marked with frames. Data sources: Rural Support Service and Nature Conservation Agency.

channelized river was dug up and relocated into a series of meandering bends, thereby doubling its length to 4.6 km. The natural floodplain system was also restored by raising the water level in the river by 1 m, which in turn helped to raise the groundwater in the surrounding grasslands.

Thanks to these activities the meadows immediately flanking the re-meandered river were once again flooded during the spring flood season, providing good resting conditions for migrating waterfowl. Flooding is also an important precondition for the regeneration of floodplain meadows (6450 Northern alluvial meadows) in the formerly cultivated grasslands and fallows.

Figure 2 The channelized Slampe River, straightened in the 1970's draining the floodplain with abandoned grassland, photo taken in 2004 before the restoration activities. Photo: G. Pāvils.

Re-introducing grazing and mowing

Once the restoration work was complete, the next challenge was to ensure the long-term management of the grasslands through regular mowing and grazing. Thanks to a good cooperation with one of the biggest farmers in the area, part of the Park land at Slampe could be rented out to him so that he could apply for funding under the new agri-environment scheme (AES) for biologically valuable grasslands within the Latvian Rural Development Programme.

The Park authorities also decided to gradually re-introduce grazing using hardy breeds such as Heck Cattle and Konik horses which require little day to day management. The aim was to create a more self-sustaining management system so that, as the herd grew, grazing could eventually take over from mowing as the main management method. By the end of the project in 2006, 15 heck cattle and 10 Konik horses had been introduced into a fenced area of 156 ha at Slampe (Figure 3).

Figure 3 Konik horses in Slampe grassland area at the end of spring floods in 2012. Animals graze throughout the year (120 ha open &grassland). Photo: A. Priede.

After LIFE

By 2011, the entire grassland area in Slampe floodplain was being managed thanks to a combination of Pillar I payments, Natura 2000 payments and AES payments. The herd of Heck cattle and Konik horses had also grown big enough to remove the need for mowing. By the end of 2012, there were 30 cattle and 60 horses grazing the area throughout the year using a variety of grazing intensities which helped to restore the biological diversity of the grasslands.

The conservation effects of these actions are also now increasingly visible, thanks to regular monitoring that has been in place since 2003. There have been significant positive changes to both grassland structure and species composition since the re-establishment of management. The former nitrophilous tall herb vegetation is gradually turning into floodplain grassland with a more diverse and natural species composition.

Extensive grazing management has also caused a patchy structure, thus increasing the diversity at community level. The local population of corncrakes, though fluctuating, is also showing a general increase in numbers (Figure 4).

Restoration and management along Lielupe River

At Lielupe, the meadow restoration activities proved to be much more complex. The Park owned ca 140 ha of the wet meadows in total but the rest (ca 200 ha) was all in private hands.

The Park authorities tried to encourage the private landowners to sign up to the new agri-environmental schemes but few were interested. The low interest was due to the need for large investments to bring the land up to a level where it would qualify for the AES scheme. Also many land owners had long ago abandoned farming in this inaccessible area and saw little economic interest in restarting under such difficult conditions.

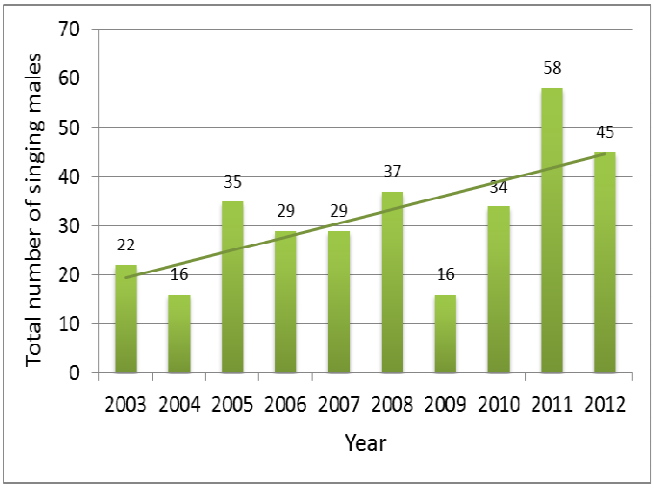

Figure 4 Changes in corncrake population in Slampe grassland area 2003-2012. Data: Jānis Ķuze

In view of the general lack of interest amongst land owners to mow the area, it was decided to introduce grazing here too. Following an intensive period of scrub clearance and fencing, 26 Konik horses and 5 Heck cattle were brought in to graze the meadows. By 2012 the number of animals had grown to 30 horses and 27 cattle and the area being grazed had increased to 260 ha.

About 30 ha is still being mowed every year (the hay meadows are closed for pasture animals at the beginning of summer and opened again after hay cutting), but this remains small scale. Both the state owned and some private lands are managed using agri-environmental and Natura 2000 payments.

Thanks to the introduction of extensive grazing throughout the year (since 2006) there is a gradual increase of open grassland patches at Lielupe which is slowly replacing the dominant reed stands and shrubs (Figure 5).

This too is creating suitable habitats for numerous bird species linked to floodplain meadows such as corncrake and great snipe *Gallinago media*. Great snipe re-appeared the year after grazing was re-introduced to the area.

Figure 5. Lielupe floodplain in Kemeri National Park. Photo: A. Liepa.

Combination of management methods and support schemes

A combination of Pillar I payments, Natura 2000 payments and AES schemes is currently being used to manage the grasslands that are eligible under the RDP/CAP scheme within the Park. Around half of the managed grassland area is being mowed, whilst the other half is being grazed.

The grasslands in public ownership are managed by an organisation called the Fund of Kemeri National Park. This NGO has taken over the management because of the lack of farmers interested in farming the grassland areas in the Park and the fact that few of them had any experience of managing rustic herds of cattle and horses. By renting out the public land to the NGO, the latter can apply for RDP/CAP payments to cover their management costs. Moreover, because it is a 'not for profit' organization, any surplus made from farming the Kemeri grasslands are immediately ploughed back in to restoring and managing other BVG in the Park so that they too can become eligible for RDP schemes.

In this way, the area of BVG being brought into management continues to expand, albeit slowly. But more substantial grassland restoration and management initiatives within the Park are still dependent upon being able to access outside funding.

People's lifestyle in and around the Park has changed significantly over the last two decades. Many non-forested areas have become more residential or recreational with few agricultural activities. Therefore the 'natural cycle' of grassland management involving livestock grazing and hay cutting is no longer interesting or economically viable for local farmers. This is a common problem not only in Kemeri National

Park, but in many other coastal and suburban areas around the capital.

Strengths and weaknesses of the approach taken

The actions undertaken at Kemeri National Park illustrate how important areas of grasslands can be restored and brought back under some form of self sustaining management through a combination of large-scale restoration activities, the use of hardy livestock for grazing and good cooperation between the governmental bodies, NGOs and farmers.

The LIFE project was a vital first step to re-establishing grazing and mowing in the Park. It enabled the Park authorities to buy key grassland areas which not only ensured that they would be managed with conservation in mind but also enabled them to carry out major restoration works that would probably not have been acceptable on privately owned land (eg the re-meandering of the river and re-flooding of the surrounding meadows as well as the large scale clearance of invading scrub and bushes).

Once these initial investments were made, the authorities were reasonably successful in involving an NGO and a few local farmers in longer term management of the grasslands with funding from various schemes under Latvia's RDP (2007-2012). Also, the use of hardy breeds of cattle which require little maintenance and can stay out all year on the land helps to overcome the general lack of interest amongst local farmers to manage these grasslands.

There are however also a number of weaknesses to this approach. It is highly dependent on outside sources of funding, eg LIFE, which means that several grassland areas within the park are likely to remain in a poor state of conservation until funding can be found to restore them and re-introduce regular management. Purchasing land in order to introduce conservation orientated management is also generally not a viable option for managing BVG areas, although it can be very useful in specific cases where major restoration works are required and where there are no farmers interested in managing such difficult and inaccessible grasslands.

In general, biologically valuable grasslands in Latvia face a number of major obstacles which need to be overcome if they are not to be lost completely from the landscape in the next decade or so. One of the key problems is linked to the fact that most (unlike those few large floodplains in Kemeri) are small and highly scattered which makes them uneconomical to manage without financial support from the RDP.

Many semi-natural grasslands have already been abandoned and have become overgrown, especially in the more urbanized and coastal areas where there are other competing interests for the land and where farmers have stopped farming due to high market value of lands in new residential areas. In more remote rural areas there is still a strong interest in maintaining traditional farming practices, even on small farmland patches, but the lack of economic incentives and financial support makes it increasingly difficult for farmers to continue farming their grasslands as before.

Latvia's current agricultural policy is generally not supportive of small land units and small-scale farmers. Axis II only receives ca 28 % of the RDP budget, and a high proportion of that money is earmarked for organic farming. Nevertheless, an agri-environment scheme has been introduced to 'maintain biodiversity in grasslands' (both within and outside Natura 2000). It is available to farmers, in pre-identified BVG, who are willing to delay their mowing until after the 1st August and/or maintain low intensity grazing on their land (0.4-0.9 livestock units per ha).

So far the scheme has managed to cover ca 55% of the ca 65 000 ha of targeted BVG areas, (figures in 2011, data from Rural Support Service, prepared by the Latvian State Institute for Agrarian Economics). But its contribution to the long term conservation of these valuable grasslands, especially outside Natura 2000 sites, is still relatively limited due to a number of factors:

- the grant is only available to farmers who perform an agricultural activity on more than 1 ha of eligible UAA (consisting of plots of not smaller than 0.3 ha). As a result many small scale farmers are not eligible even though their grasslands have been identified as biologically valuable. Often it is the small grassland patches that harbour the most threatened habitat types and species.
- Also there are no schemes currently available to help farmers clear their land of scrub and bushes or to restore the hydrological regime so that they can become eligible for support. In many sites initial habitat restoration is essential but there is currently no system in place to help fund this.
- The payment rate of the 123 €/ha is generally not sufficient to cover the extra

management costs of mowing or grazing, especially in areas that are more remote and inaccessible (which is often the case for grasslands in Natura 2000). Many farmers who would in principle have been interested in the scheme have therefore not joined it. It remains cheaper to simply abandon the land or to use combination of support for other means of land use (eg ploughing the BVG and conversion to arable lands which ensures higher support rates). Especially as there are no restrictions for other land use in areas identified as BVG, eg if the land manager has not applied for the payments targeted at BVG, the lands can be transformed into other land use types, eg arable lands, forest plantations etc. The same applies to most of the Natura 2000 sites if the restrictions are not specified in individual regulations.

- The late mowing date of 1st August is also a problem for farmers since it means they can no longer use their hay as winter fodder. The loss of income and the extra cost of buying hay from elsewhere are not factored into the RDP payment rate. According to the questionnaire data by Latvian State Institute of Agrarian Economics (www.lvaei.lv, 2011), about 1/3 of farmers are mulching the cut grass and leaving it on field, because they see it as the only solution. At the same time they acknowledge that if other solutions would be available (eg use of biomass), they would prefer removal of hay.
- Leaving the cut grass on the field is also a major problem for conservation since it leads to an accumulation of dead litter and organic matter which in turn causes a significant drop in species diversity. The current scheme may be beneficial for corncrake but it is generally not appropriate for maintaining the species diversity and habitat properties of many BVG areas, particularly as regards plant diversity which is closely related to traditional management (mowing around midsummer). A compromise would be to introduce flexible mowing dates (the farmer can choose him/herself) or provide higher payment rates for late mowing with hay removal as the motivating measure. Innovative methods for use of grass biomass would also solve the problem of hay being left on the field.
- The criteria for defining the good performance of grassland management under the RDP scheme have also led to problems of eligibility. Numerous damp species-rich grassland patches have lost their status of land blocks because of the wetness of the terrain and/or density and presence of shrubs/trees which are nevertheless a significant component of the mosaic like diverse landscape (Fig. 6). Over the last 6 years about 6000 ha or 8 % of BVG have been declared ineligible for RDP payments) because of the interpretation of the national regulation on eligibility of UAA. The regulation says that only BVG with less than 50 trees/ha, without invasive hogweeds, and without presence of bulrushes (indicator of wetness), and which are not wetlands covered with water between the 15th May and 15th September are eligible under the AES scheme.
- The BVG scheme does not include monitoring of the conservation status of habitats, therefore the actual impact of management (or sometimes mismanagement) for the areas in the scheme at country scale is not known. According to rough estimations, most probably the management of 55 % of BVG covers mostly moderately moist grasslands with large proportion of cultivated grasslands, while the highly diverse semi-natural grasslands habitats are generally not covered and so continue to decline, especially outside Natura 2000 sites (Gustiņa et al., 2012).
- In Latvia a high proportion of the land (over 90 %) for corncrake, lesser spotted eagle and white stork and large areas of habitat types included in the Habitats Directive currently lie outside Natura 2000 sites, and all of them depend on open extensively management grassland habitats. The RDP is therefore critically important for the conservation of these species but at the moment, in many cases, it is more economically profitable to use BVG for other purposes, eg as arable lands or forest plantations.

Fig. 6 An abandoned calcareous forest meadow – still extremely rich in threatened species, e.g. numerous wild orchids,. But due to patchiness and scattered junipers it is a tricky case for a manager. It is also not eligible for RDP payments and therefore, will most probablyrevert to forest. Photo: A. Priede.

- LFA payments were also an important factor in preventing abandonment of important grassland habitats however in 2007 changes were made to the regulations which reduced significantly the area of grassland covered by LFA because it was being mown rather than grazed. This in turn caused many farmers to abandon their land as they do not have sufficient livestock to revert to grazing (the cattle sector is now small in Latvia).

Conclusions

The plight of Latvia's remaining grasslands remains very precarious despite various attempts, such as the one undertaken in Kemeri, to counter their decline as well as the current AES scheme. The current CAP and RDP measures do not sufficiently recognize the value of these grasslands or the importance of continuing to support small scale farmers. It is not realistic to expect the remaining grasslands to be maintained through ad hoc actions under LIFE or national conservation funds, especially as many are very small and scattered, and located outside Natura 2000.

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Case study prepared by: Kerstin Sundseth (Ecosystems LTD, Brussels) and Agnese Priede (Nature Conservation Agency, Latvia)

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Case Studies

Turnhouts vennengebied: Adopting an integrated approach to nature development

Background

Located a few kilometers north of Turnhout, close to the border with the Netherlands, the nature area 'Turnhouts vennengebied' is one of the most valuable heathland complexes in Flanders and a last remnant of a unique landscape that once covered the entire region.

Lying on a sandy plateau underlain by a thick clay layer barely a few meters deep, the site is situated in the watershed between the Meuse and Scheldt rivers. Due to the shallow clay layer the ground is naturally very wet, which explains why it developed into a vast network of fens and moorlands. Here and there patches of dry nutrient-poor sandy soils, relicts of ancient inland dunes, occur as well, which add to the complexity of the area.

The site has been designated as a Natura 2000 site (BE 2100024) in view of the fact that it contains an important mosaic of heathlands (habitat types 2310, 2330, 4010, 4030), oligotrophic ponds (habitat types 3110, 3130), species-rich nardus grasslands (habitat types 6230) and peaty depressions (habitat type 7150). Together these habitats host a range of rare and specialized species that are also of European importance and protected under the two EU Nature Directives.

Fen and heathland around Zwart water. Photo: Mario De Block

Until the 1930s agriculture was generally small scale because of the poor quality of the soils, and was located close to the villages away from the 'wild lands'. But the introduction of fertilizers led to its rapid expansion and intensification. Today it is the dominant land use for the area, focusing mainly on intensive stock breeding farms for dairy cattle and the production of arable crops such as maize. In recent years, there has also been a surge in biofuel and greenhouses to grow fruit and vegetables.

An integrated nature development initiative

By the 1990s, only 2% of the valuable natural and semi-natural habitats remained. This was also fast disappearing through the combined effects of desiccation, changing land uses leading to further habitat fragmentation, as well as severe eutrophication and acid deposition resulting from decades of high fertilizer use and intensifying livestock farming.

Recognising the unique value of these habitats, the Flemish Land Society and the Agency for Nature and Forest (both public bodies) decided in 1999 to launch a large scale 'Land development for Nature' (LDN) project called 'Turnhouts Vennengebied-West', covering altogether 541 ha.

The justification for this came from a new law adopted in 1997, which, amongst others, called for the development of a Flemish Ecological Network (VEN). Turnhouts Vennengebied- West was identified, within the Structural Plan, as one of the most valuable and sensitive nature areas in Flanders where nature conservation and nature development should be given priority.

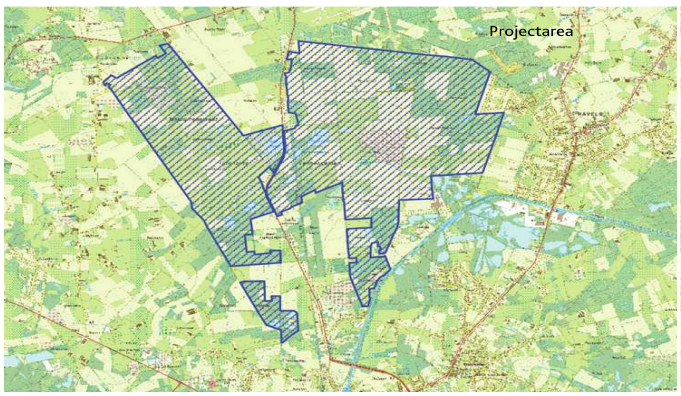
The next phase was to negotiate a multi-phased execution plan for the Land Development for Nature project. Considering the very divergent land use interests in the area (by 2000 around half of the Natura 2000 area was being intensively used by some 415 farms), and the former years of conflicts between nature and farming, the authorities gave particular attention to developing an integrated approach to land management which aimed to bring on board, and take account of, all interests be it for nature development, agriculture, forests or other.

A special Nature Development Commission was set up which included local representatives, local users and a few thematic experts. Their task was to provide feedback and advice on the draft plans for the nature development project to the Project Committee, which is the decision making body made up of different administrations in the region.

During this period, every effort was also made to consult the wider public in the region in order to inform them of the proposed actions and obtain their feedback on the various proposals through a series of public enquiries.

During this period, every effort was also made to consult the wider public in the region in order to inform them of the proposed actions and obtain their feedback on the various proposals through a series of public enquiries.

By 2003 a first partial project was started, restoring a park-like complex of humid meadows, brushland and Alnus forests, as well as a series of oligo- to mesotrophic ponds. This was followed by the restoration of about 12 ha of wet heathland surrounding two oligotrophic ponds in the core of Turnhouts Vennengebied, and the plan to build a watchtower, strategically located within the core of the pond complex.



Map of area targeted for the nature development (blue) and LIFE project (red).

Large scale restoration with help of LIFE Funding

By 2006, with the help of LIFE-Nature funds, a larger-scale restoration project (covering circa 1150 ha) was launched through a partnership made up of the NGO, Natuurpunt, and two public bodies, Agentschap voor Natuur en Bos and Vlaamse Landmaatschappij, from the Flemish government.

Thus, for five years (2006-2011) the LIFE and Land Development for Nature projects joined forces to restore habitats, being able to negotiate with farmers as a structural budget further enabled the acquisition of land and land leases. As for the LDN project, every effort was made under the LIFE project to take account of the different land users when carrying out the various actions and to ensure the local community remained up to date and informed about its conservation objectives.

The following actions were undertaken under the LIFE project (total foreseen cost of €4.2 million (excl LDN budget)):

- An extra 64 ha of land was acquired and on a further 26 ha the landlease was acquired. The law governing nature development projects also allows the authority to carry out land swaps and offer farms within the project area the opportunity to exchange their land in favour of agricultural land outside. An additional 30 ha was exchanged in this way to the mutual benefit of both the farmer and the nature development project. This all helped to create larger, more connected nature areas, which by then had reached a total of ca 500 ha. As such it not only helped to counter the effects of habitat fragmentation but also made it easier to introduce appropriate management regimes in accordance with the various needs of the different habitat types and to buffer the polluting effects of the surrounding intensively managed farmland.

- Four large ponds covering a total area of ca 17 ha were restored to encourage the regeneration of typical pond and shoreline vege-tation. This involved remov-ing some 8400m³ of sludge;

- Plantations and young forests were cut down on approximately 50 ha to assist in the re-generation of wet heath and dry heaths as well as species-rich Nardus grasslands.

- A 16 km of fences were also erected to allow grazing management in the project area.

One major challenge of the project was to neutralize the effects of historical fertilizer seepage and eutrophication which was rife in the area. This could only be achieved efficiently and rapidly by removing top soil and sod cutting on former agricultural land.

Sludge removal at Kleine Klotteraard in 2011
Photo: Mario De Block

Such a major activity required careful planning to determine the depth to which the top soil should to be removed in order to obtain nutrient poor habitat conditions. This was carried out on the basis of detailed soil analyses, along with a science-based decision making scheme. Altogether, approximately 67,000 m³ of soil were excavated and removed to farmland outside the Natura 2000 site. A further 18,000 m³ of sods were removed to restore the heathlands.

The removed material contained large quantities of valuable nutrients which had accumulated over the years. This created a small but still relevant win-win situation as the farmers in the nearby Land Consolidation project were very interested in re-using the excavated material on their land in order to ameliorate the soil structure and soil carbon content. In this way a by-product of the nature conservation project became a resource for agriculture.

Re-introducing nature friendly management regimes

Once the restoration works were completed, it was important to ensure that the restored habitats would be managed sustainably in the long term. The investment in fences made it possible to introduce appropriate management regimes on the project land.
This involved using a combination of the NGO's own herd of hardy cattle (Galloways), cattle from local farmers as well as sheep, goats and donkeys.

By the end of the LIFE project, agreements had been signed with 15 farmers to ensure the

long term grazing of some 140 ha within the project area.

The project also placed strong emphasis on public awareness and creating additional opportunities for the local community to enjoy their largely extended nature reserve. Information panels were set up to explain how the habitats were being restored. An observation tower and lookout points were also established to enable people to enjoy the views. A series of newly marked hiking trails were installed (30 kms in total) and regular guided walks and talks were held around the restoration area.
Orchid rich meadows in Turnhouts Vennengebied, Photo:Mario De Block

Strengths and weaknesses

Strengths

This project illustrates that, even in an area of very intensive agricultural activity, it is possible to find ways for nature and agriculture to co-exist. The key to success in this case was due to several factors:

- The nature development initiative was strategically selected and framed by law. Thanks to the prioritization of this area as a nature development area within the Flemish Structural Plan, it received an important political (and financial) impetus and support. But at the same time, the law is sufficiently flexible to enable the details of the project to be developed in close communication and dialogue with the key land users and stakeholders in the area.

- This made it possible to adopt a more integrated management approach which took into consideration the needs of all sectors. The authorities responsible – be they the Flemish Land Agency or the Agency for Nature and Forests – could then take on the role as 'honest brokers'.

- Communication and dialogue with and between all sectors and the local community, combined with a sufficient project budget, was central to winning acceptance for the objectives of the project and for adjusting the proposed actions in function of what is considered feasible in practice. Thus, the aim was to build up the project little by little through feedback from the stakeholders (backed also by sufficient financial support), rather than to come with a pre-conceived detailed project plan from the start.

- This also helped the project find socially and economically sustainable ways of carrying out its actions, as illustrated for instance by the scheme for land swaps and land purchase and the user agreements with local farmers for grazing management in the nature reserves, all of which were done on a voluntary basis. It also help to create a sense of pride and interest amongst the local community and local authorities who saw in this project an opportunity for further economic diversification (e.g. into farm tourism, sale of farm products) and for increasing the overall quality of life for its citizens;

However it has to be recognised that an integrated management approach as presented in this case study takes time, especially when there are such strongly contrasting land uses in force. The project is still ongoing and will take an estimated fifteen years to complete. But, without an integrated management approach, it is doubtful that anything could have been done to save these remaining habitats.

Weaknesses

The The project was not able to make any use of the CAP and RDP measures to assist in the implementation of the project or to help reorientate the long term management of the (renaturalised) areas. Because the land is so highly productive and intensively used the emphasis is very much on maintaining and expanding these intensive activities, which is reflected also in the strong emphasis and usage of Pillar I measures in Flanders in general and in this area in particular.

Nature orientated measures under Pillar II are also very limited. For instance, compensation measures within and outside Natura 2000 sites are just focused on paying farmers ca 150€/ha to cover the loss resulting from the legally imposed fertilization ban in vulnerable natural areas. The scheme for creating a 6-12 m wide buffer area between agricultural land and vulnerable nature areas is also of very limited conservation value since the farmer can convert that land back into agricultural land once the scheme is completed.

Despite the good communication work done under the project, there remains a strong reluctance on the part of farmers to be included in a Natura 2000 site. This is

because the land prices vary so significantly depending on whether the plot is in or out of the designated area. In 2011, the average price of land outside Natura 2000 was ca €50,000 /ha but this could go up to €80,000/ha for potential greenhouse and biomass land. The land inside Natura 2000 was valued at half of that due to the restrictions imposed on the use of the land.

Conclusions

This case study illustrates that, even in a highly intensive agricultural landscape, it is possible to win support for nature development projects, provided that these are done using a highly integrated, transparent and flexible approach that enables local stakeholders to express their views and influence the process, and which is supported by a strategic policy framework and adequate funding.

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Grote Klotteraard and surrounds after restoration. Photo: Mario De Block

Case Studies

Conservation of semi-natural grasslands within SPAs in Bulgaria

High Nature Farmland in Bulgaria

Bulgaria retains a substantial area of high nature value (HNV) grassland. It is estimated that a third (ca 1.8 million ha) of the total Utilized Agricultural Area (UAA) is permanent grassland. Of this, 1,138,981 ha have been identified as HNV farmland (Bulgarian NRDP, 2007).

These HNV grasslands are essential for a wide range of rare and threatened species and habitat types of EU importance, including globally threatened birds such as the Imperial Eagle (*Aquila heliaca*), Saker Falcon (*Falco cherrug*), and European Roller (*Coracias garrulus*), amongst others. Significant areas of grassland are now also included in N2000 in view of their high biodiversity value.

Today, most of the farming on HNV grasslands continues to be done on a subsistence or semi-subsistence basis. The average plot size tends to be small or then very large. According to the Bulgarian NRDP, in 2003, around 75% of all agricultural holdings cultivate areas of 1 ha or less. Small-scale farmers are also the ones holding most of the livestock (61%). At the other end of the spectrum, farmers having more than 50 ha account for less than 0.8% of all agricultural holdings, but together they manage 78% of all UAA in Bulgaria.

The main threats facing Bulgaria's HNV grasslands come from both land abandonment and land conversion. Land abandonment has led to a sharp drop in livestock numbers during the 1990s and the subsequent overgrowth of grasslands. Since the country's entry into the EU, farmers have also begun to transform large areas of grassland into arable land, vineyards or orchards, spurred on by generous EU agricultural subsidies under Pillar 1 of the CAP.

A pilot project for preparing HNV agri-environment schemes

After joining the EU, Bulgaria began to reformulate its agricultural policy in accordance with EU Regulations. Axis 2 of the National Rural Development Programme (NRDP) gave recognition to the importance of HNV farmland. Five separate schemes (later expanded to 8) were foreseen for HNV farmland under the Agri-Environment Measures, along with a specific scheme for Natura 2000 payments.

In order to assist in the preparation of these RDP schemes, the Bulgarian Society for the Protection of Birds (BSPB) began a GEF/UNDP project in 2007 on HNV semi-natural grasslands, with the support of the Bulgarian Ministries of Agriculture and Environment. The project's objective was to assist the government partners in preparing for the implementation of the anticipated Agri-environment schemes (AES) and Natura 2000 payments in HNV farmland. Until then, Bulgaria had no practical experience in the running of such schemes (The first pilot SAPARD agri-environment scheme only opened to farmers in late 2006 after many years of delays).

It included 4 types of measures.

a) Natura 2000 payments - to compensate farmers for extensive grazing and mowing in semi-natural pastures that are not eligible for direct single area payments under Axis 1;
b) Agri-environment payments – for farmers who implement specific management prescriptions, such as transforming arable land into pastures and ensuring their extensive maintenance,
c) Non-productive investments –investments that do not increase the farmer's income but are beneficial to biodiversity, such as planting trees, installing nesting poles, building ponds, clearing areas of invasive alien species,
- Productive investments –aimed at assisting farmers to improve their facilities and livelihoods, thus encouraging them to increase their livestock and the area managed, as well as improving their ability to benefit from other NRDP measures.

The scheme was tested in two demonstration areas: Ponor Mountains (SPA BG0002005, 31,380 ha) and Bessaparski Hills (SPA BG0002057,14,765ha). Both are designated Natura 2000 in view of their importance for various grassland habitat types (eg 6110*, 6210, 6220, 6240*, 62A0, 6410, 6430, 6520) as well as for a large number of species protected under the Habitats and Birds Directives.
The scheme proved to be very popular with local farmers in both regions and demand far exceeded initial expectations. The success of the scheme can be put down to a number of factors: its careful preparation (the scheme was underpinned by good scientific data on the grasslands), the strong efforts made to involve farmers and help them access the scheme, as well as the open and transparent way in which the scheme was managed.

Relations with the farmers in both sites were especially important. The project team not only held regular information sessions for local stakeholders to explain the scheme's purpose, eligibility criteria and management measures but also met personally with most of the farmers to discuss the management options available to them and to ask for their feedback on the proposed scheme. This helped stimulate an interest in the scheme as well as providing useful pointers for further refining it in a way that is best adapted to the needs and constraints of small scale farmers.

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The project also set up two Mobile Advisory Units (MACs) to further support its implementation. The MACs were responsible, amongst others, for advising farmers on the pilot scheme and helping then to fill in the application forms. By the end of the two year trial period the MACs had managed to build up a good reputation for the pilot scheme at both national and regional level, particularly amongst the farmers.

Another key element of the project's success was that, before its launch, detailed field surveys were carried out to identify, map and assess the distribution and conservation status of key grassland habitats in both Ponor and Bessaparski Hills. This was integrated into a structured GIS database which could then be used to help orientate the pilot scheme towards the most appropriate grassland areas and subsequently monitor individual agreements with farmers.

The project also developed comprehensive guidelines on grassland management, based on the best scientific expertise available in Bulgaria which would be a valuable source of information for further developing the nationwide HNV schemes under the National RDP.

LIFE project for conservation of raptors

Building on the success of the UNDP project, BSPB launched a series of further projects in 2009 – this time with EU LIFE funding - to continue to help with the development of suitable HNV schemes for semi-natural grasslands (and Natura 2000 payment measures) under the NRDP and to demonstrate how these could be effectively implemented on the ground.

One of the projects focuses on the conservation of the imperial eagle and saker falcon in Bulgaria. It is working to secure the conservation of their core habitats within 10 SPAs across Bulgaria. Together, these SPAs cover around 20% of the Natura 2000 Network and host a very significant proportion of the HNV grasslands in Bulgaria. As elsewhere, many of these grasslands are under threat from a lack of management, as well as large-scale conversion to arable land (and other developments such as solar panels, wind farms, afforestation etc..).

Several of the successful actions that were tried out in the UNDP project are now being replicated through the ten LIFE project sites. Detailed field surveys are underway to map the distribution of grasslands within each site and to assess their conservation status. The results are then combined with other uptodate spatial data regarding current agricultural use, land ownership, livestock numbers etc where they exist (eg using recent satellite images, LPIS...).

The resulting GIS database provides an invaluable source of integrated and up-to-date information on grassland habitat distribution, conservation requirements and land usage in all ten SPAs. Such a tool is not only useful for the LIFE project work but should also greatly facilitate the Ministry of Agriculture's task of identifying suitable areas for implementing the HNV agri-environment schemes and Natura 2000 payments within each of these sites (especially in view of current problems caused by out of date and inconsistent official data – see further below).

The LIFE project is also continuing to raise awareness amongst farmers of the RDP schemes for HNV grasslands and Natura 2000 payments. Local support groups are helping

farmers to fill in the necessary application forms, prepare final reports, complete field checks, etc.. and generally providing advice and support wherever possible. So far BSPB has provided consultations and support to over 100 farmers within the project sites, and a further 300 farmers on a nationwide level.

In addition, the LIFE project is carrying out various demonstration activities to illustrate how grassland management can be undertaken in a way that supports both the local farmers and the nature conservation interests of Natura 2000. Two model farms have been set up which have already been showcased to around 500 farmers nationwide. A model is also being development for the sustainable management of upland pastures.

As with the UNDP project, the LIFE project team has remained in continuous dialogue with the Ministries of Agriculture and Environment in order to lend its support to the development and practical application of the various HNV agri-environment schemes and Natura 2000 payment measures under the NRDP programme. In addition to offering technical advice and feedback on the national schemes based on its own observations and experiences it also submits detailed recommendations for improving the performance of the existing measures, addressing implementation problems and introducing additional HNV schemes as foreseen in the RDP.

The RDP's HNV and Natura 2000 payments: experiences so far

As the previous sections illustrate, the NGO projects have succeeded in developing a wealth of good practice experiences as regards the design and implementation of RDP schemes for HNV grasslands. In principle this should have greatly facilitated the task of the Ministry of Agriculture in preparing well designed schemes under the NRDP for HNV grasslands and Natura 2000 sites, and ensured their efficient and effective implementation.

Unfortunately, despite the projects' best efforts, the government schemes remain fraught with problems, delays and incompatibilities. According to the Mid Term Review the uptake of Axis 2 was extremely low – only 4.6%. By 2009 only 20,337 ha of HNV pastures had been authorised for payment under the AES scheme for restoration and management of grasslands, which represents just 1.8 % of the total HNV permanent grassland identified in 2007.

The following key problems that have been cited for this exceptionally low uptake:

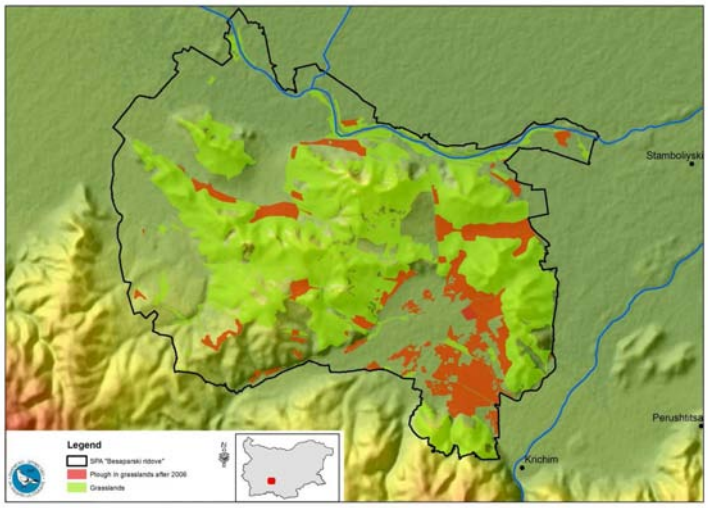
- <u>Poorly formulated cross compliance rules and GAEC standards for HNV grassland.</u> During the preparation of NRDP in 2007, the total area of permanent pasture identified as HNV farmland was estimated at 1,138,981 ha (cf Attachment 4 to the 214 measure in the annex 5 of the NRDP). However in a subsequent statement, the Ministry of Agriculture announced (in 2009) that the area of permanent pastures defined as being in good agricultural and environmental condition (GAEC) was only 435,597 ha, meaning that over 700,000 ha of permanent grassland failed to meet the requirements for Single Area Payments.

  The reason why such a large area of grassland was excluded seems to be because the Ministry of Agriculture decided that only permanent pastures or meadows 'that are cleared of unwanted bushes' qualify as being in Good Agricultural and Environmental Condition and are therefore eligible for Single Area Payments (following EC guidelines). The standard does not consider the fact that, in Bulgaria as elsewhere, a significant proportion of the valuable HNV grasslands contain bushes, shrubs and even trees which are an integral part of the grassland ecosystem and a vital feature for the conservation of many rare and threatened species that use grasslands as their main foraging or breeding habitat.

After much discussion, the GAEC standard was eventually adjusted in 2010 and split into two, with a new separate standard introduced specifically for HNV farmland schemes, Natura 2000 payments and other protected areas. This allows farmers entering the AES contracts and applying for Natura 2000 payments to retain scattered single tress or coppices, shrubs, hedgerows covering up to 25% of the overall grassy area. However this new GAEC standard does not apply to Single Area Payments (SAPs) and other area based support payments under Pillar I. Instead the original standard of requiring permanent pastures and measures to be cleared of unwanted bushes remains in place.

This double standard has had a very negative impact on HNV grasslands in Bulgaria. Because of the lack of recognition for the value of their HNV farmland, farmers that were initially

excluded from receiving SAPs have been encouraged to clear their grasslands of valuable bushes and scrub and convert them to arable land in order to qualify for the lucrative SAPs, even in Natura 2000 sites where such activities are normally prohibited according to the N2000 designation orders. It is estimated that in Sakar and Besaparski Hills SPAs 19% and 17% respectively of HNV grassland has been ploughed over between 2007 and 2010 already.



Ploughing of grasslands and pastures in BG0002057 Besaparski Hills SPA, *Source: BSPB Bulgaria, 2011*

- Low payment rates for AES schemes: The difference in standards for GAEC has also had a negative impact on the uptake of agri-environment schemes for HNV grasslands. The payment rates for these AES schemes do not take into account the loss of income from not being eligible for SAP payments (due to differing standards) nor does it take sufficient account of the opportunity costs of prohibiting new drainage and ploughing and fertilisers use, or the need for new and specialized equipment (and other investments) to carry out extensive grazing or mowing.

  Payments rates for the restoration and management of grazing or mowing on grasslands currently offers rates of 151€/ha. Faced with a choice between the easy-to-access SAPs to convert their HNV grasslands to arable and the complicated payment schemes for maintaining HNV grassland, many farmers, understandably choose the former. The procedures for obtaining these payments are far easier and there is little control, unlike for the HNV payments which are far more complex and constraining on the farmer. As a result, the SAP payments have become a major driving force behind the conversion of pastures into arable land.

- Administrative problems with the implementation of AES schemes: According to the mid term review of the NRDP, the implementation of the AES schemes is also severely hampered by administrative problems, poor implementation and delays which has led to a significant loss of interest and even suspicion amongst farmers. There have been long delays, sometimes over a year, in the processing of applications and payments which created timing and planning problems for farmers. The application procedures have also been criticized for being overcomplicated and not sufficiently transparent which has, in turn, lead to a large proportion of the applications being rejected.

Start of ploughing in HNV site close to imperial eagle nest within Sakar Hills SPA. Photo: K Sundseth

The criteria for eligibility were also changed during the course of the agreement which meant that many farmers who had applied in good faith and carried out the works in accordance with their AES contracts finally received no payments because in 2010 Ministry of Agriculture and Food excluded certain lands, mainly low productive pastures, from the land eligible for agricultural subsidies. These changes were done based on aerial photo images and distance checks and not on the spot field checks which would have reflected the real situation.

Also apart from the work done by the NGOs through the LIFE and UNDP projects there was little publicity and almost no support or advice to farmers to guide them in applying for the various HNV schemes.

- Incomplete and out of date information on grassland distribution and agricultural land use. The implementation of agricultural payments under Pillars I and II is strongly dependent on the existence of various registers which should contain reliable information on the types of agricultural land. According to the Mid Term Review this should function properly and contain information representing the *actual situation* on the farms.

  However, it became clear early on in the process that the IACS and Land Parcel Identification Systems which are used by the MAF and SAF to determine the eligibility of land for agricultural subsidies, especially for grasslands often contain out of date information. When this is used by the State Fund Agriculture to control payments it gives a misleading picture of the condition of the grasslands. As a result, there have been numerous reports of errors where plots should have been classified as arable land instead of grassland, or vice versa. This has not only caused long delays in processing AES applications but has also led to some farmers unfairly receiving heavy penalties for 'over-declaring' their land.

- Delays and conflicting rules regarding Natura 2000 sites: In Bulgaria, All Natura 2000 must have Designation Orders in place which are approved by the MOEW. These Designation Orders should specify the conservation objectives of the site, the species and habitat types of EU importance for which it is protected, and, where appropriate, any restrictions on, or compulsory activities within the site. The designation orders for some of the ten SPAs of the LIFE project for instance include important management prescriptions such as a ban on ploughing of pastures, the conversion of grassland to arable land or forestry, a ban on the use of rodenticides and cutting / removing of hedges etc…

  However, these are often very succinct and do not provide sufficient information as to when and where such activities are prohibited. They are not always underpinned by precise and up-to-date information and maps on the distribution, current state of conservation and land use of the EU protected habitat types and species present (although this information is to a certain extent available in summary form in the Standard Data Forms for each site). Nor are they supported by more detailed management plans since the Ministry of Environment has decided not to develop such plans for individual Natura 2000 sites unless they are also National Parks.

  As a result, it is very difficult to control illegal activities that contravene the restrictions imposed in the Designation Orders. Within the ten LIFE project SPAs, there have been numerous cases of valuable grasslands (even within a 5 km radius of an imperial eagle nest site, or core areas for the European souslik) being ploughed up and converted to arable land, or cleared of scrubs and bushes, in order to qualify for SAPs, even though such activities are prohibited by the Designation Orders.

  The NGOs have submitted complaints with documentary evidence, based on their own uptodate field surveys and on the spot inspections, to the MOEW in order to bring attention to these problems. But so far no sanctions have been taken.

  According to MOEW the plots in question are identified in the land cadastre as arable land and are therefore not subject to the same restrictions as for grasslands. The fact that the land cadastre is often very old and out of date and no longer reflects the current situation is not taken into account, nor is the fact that many arable plots have in the meantime reverted back to grassland which is why they were included in Natura 2000 in the first place. The continuing differences between the MOEW and MAF land control system are having a serious impact on all AES measures as well as on the Natura 2000 payments.

The Designation Orders also needed to be in place before the Natura 2000 payment scheme under the NRDP could be launched as it is the basis for determining the compensation and extra management costs for farmers of being in Natura 2000. The scheme was finally launched in 2011 but uptake so far has also been exceptionally poor. According to the feedback received by the LIFE project, local farmers in the ten SPAs are unwilling to enter into the scheme because of uncertainties over the eligibility of their land and the poor rate of payment which does not take sufficient account of the loss of opportunity costs resulting from a ban on ploughing or hedge cutting etc.

Strengths and weaknesses encountered

Success factors

The pilot scheme for supporting HNV farmland, funded through the UNDP/LIFE projects, proved to be very popular with farmers and helped to demonstrate the viability of rural development schemes for the management and restoration of HNV grasslands in Bulgaria. The experiences gained from the pilot scheme and the lessons learnt should in theory have greatly facilitated the task of the Ministry of Agriculture in preparing similar schemes for HNV grasslands at national level, as foreseen under Bulgaria's NRDP (2007-2013).

The following key success factors have been identified from pilot scheme:

- The use of accurate up-to-date spatial data on the distribution and status of grasslands within the two pilot SPAs, as well as on existing land uses was vital for underpinning the scheme and orientating it towards the most appropriate HNV grassland areas;
- The development of comprehensive guidelines on grassland management, based on best scientific expertise available, also helped to guide the type of management measures to be included in the grant scheme and to calculate the appropriate payment rates according to RDP rules;
- There was strong public participation and dialogue with local farmers, involving not only information sessions and publicity campaigns but also practical assistance and individualized support to farmers wishing to apply;
- There was close cooperation and dialogue with the Ministries of Agriculture and Environment to pass on good practice experiences in the running of the scheme and to share any lessons learnt.

The fact that Bulgaria's first NRDP gave particular emphasis to the value of HNV grasslands and foresaw a series of specific agri-environment measures for HNV farmland can also be considered an important strength factor since it lays down the framework for ensuring the long-term sustainable management of a significant part of the valuable semi-natural grasslands in Bulgaria.

Weaknesses

The AES schemes and Natura 2000 payments represented the most significant opportunity for the conservation of HNV grasslands in Bulgaria, but the implementation of these measures was not smooth and included many delays, with the result that the interest in the scheme from farmers remains extremely low. Paradoxically, instead of supporting HNV grassland management – the current measures under Pillar I and II are causing their large scale destruction.

Many of the problems and delays (listed above) can be put down to:

- The use of inappropriate and inconsistent GAEC standards which has led to the exclusion of over 60% of all HNV grassland areas identified in the original NRDP of 2007. The change in the GAEC standard for Pillar II measures in 2010 has not resolved the issue since Pillar I continues to require clearance of all shrubs and bushes in order to be considered in GAEC and qualify for SAPs;

- The lack of recognition of the cost of the restrictions imposed on Natura 2000 sites in the payment rates for HNV farmland and Natura 2000 agreements;

- The lack of consistent, accurate and up-to-date information within the LPIS database reflecting the actual situation on the farms and the continuing differences between the MOEW and MAF land control systems;

- The poor capacity within the institutions responsible for the scheme to manage them in an efficient, transparent and timely manner;

- The low level of communication and dialogue with farmers about the schemes. Currently, only the National Agriculture Advisory Service is formally responsible for providing support on AES at national level.

- The lack of cooperation between the Ministries of Agriculture and Environment over the management of HNV farmland and Natura 2000, and inconsistent rules regarding management requirements and restrictions within Natura 2000.

Sakar Hills HNV grassland. Photo: K Sundseth

Next steps and future challenges

The government authorities and NGOs are currently looking at ways to improve the existing schemes and overcome the difficulties encountered so far. In particular, efforts are being made to ensure that the LPIS system is improved so that it contains accurate, uptodate information on agricultural use etc.. The Axis 2 working group within MAF is also considering a proposal to include a separate GIS layer for permanent grasslands within the LPIS, using data from the detailed field studies carried under LIFE and UNDP projects.

New HNV measures have also been introduced in the 6th modification of the RDP in 2010 and were launched for the first time this year (2012). One of the schemes, which BSPB helped to develop, is to support farmers who want to convert arable land back to grassland. If the scheme is used to its fullest capacity it has the potential to convert large areas of arable land back to grassland (paradoxically this may include converting arable lands that were only recently ploughed in order to receive SAPs).

Unfortunately, in its first year, the deadline given by the Ministry for receiving applications was extremely short (less than one month) and, as a result, only 9 applications were received largely thanks to the efforts of the LIFEproject team. But, provided the farmers are informed well and given sufficient time to submit their applications, it is expected that the uptake in the 2nd year may be substantially greater since the scheme has captured the interest of many farmers in the SPAs in particular.

Nevertheless, the overall problem regarding the conflicting GAEC standards will continue to incite the degradation and destruction of valuable grasslands until it is resolved. Until then it is quite possible that the new RDP/CAP schemes will do more harm than good to HNV farmland and valuable grasslands in N2000 sites.

References and sources of further information

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Case Studies

Restoration and management of dry grasslands in Denmark

Background

Dry grasslands are one of the most species rich types of habitat in Denmark. They once constituted a significant part of the Danish landscape. It is estimated that, at the beginning of the last century, dry grasslands constituted approx. 3% of the total area of Denmark. Since then much has been cultivated, developed or converted to forests. By 1992 they had been reduced to just 0.6% of the territory by 1992.

As elsewhere in the EU, these areas were under constant pressure from a lack of grazing or inappropriate grazing regimes, overgrowth from bushes and trees, as well as fragmentation leading to increasing isolation. The extent of the problem was confirmed by the national evaluation undertaken of the conservation status of dry grassland habitats types in Denmark, which concluded that all had an unfavourable conservation status.

Mols Bjerge, site of one of the largest remaining areas of dry grasslands in Denmark. Photo: K Sundseth

A National strategy to restore and manage dry grasslands in Natura 2000

In response, the Danish Forest and Nature Agency[1] launched a national strategy to restore key grassland sites in Natura 2000 and secure their long term management. In 2004, it successfully applied for a €4.2 million LIFE-Nature project.

11 Natura 2000 sites were targeted under the project. Together, they represent around 70% of the xeric and calcareous grasslands (habitat type 6120*), 25% of semi-natural dry grasslands with important orchid sites (habitat type 6210) and 20% of species-rich Nardus grasslands (habitat type 6230*) present in Denmark. The total area of these habitats remaining in Denmark is ca 3432 ha.

The main objective of this four-year LIFE project was to increase the area of Annex I dry grasslands from 715 ha to 983 ha and so contribute significantly to improving their overall conservation status in Denmark.

Dense scrub removal on old grassland sites, Photo: Soren Rasmusse

Actions included:

- The clearance of dense overgrowth and tree encroach-ment on ca 900 ha of dry grassland. A significant part of the clear-ance effort was targeted at the removal of *Rosa rugosa* and broom, both of which are tenacious invasive plants that require re-peated efforts to get rid of them;
- The removal of plantations and the recon-version of arable and other lands. Areas adjacent, or close to, existing grassland areas and which used to be priority habi-tats were preferentially selected for nature restoration in order to maximize their chances of re-establishing themselves and countering habitat fragmentation;
- The renewal of ca 116 km of fences and the installation of corrals, shelters and wa-ter supplies for livestock in order to make it possible to re-introduce long term graz-ing. In some larger areas, like at Mols Bjerge where most of the land is publicly owned, the aim was to create large con-tinuous enclosures so that the animals could roam freely between existing dry grassland areas and newly cleared areas, thereby improving seed dispersal. Enlarg-ing the enclosure also improves extensive grazing economics on semi-natural dry grassland areas.

In parallel, the Danish Forest and Nature Agency bought a key forest plantation area (94 ha) in the heart of one of the largest sites for grasslands in the country, at Mol Bjerge in order to revert it back to grassland. This in turn helped to reconnect some of the areas being restored under the LIFE project in this site as well.

At the start of the project, detailed Action Plans were developed and adopted for each project site in close dialogue with the landowners, local communities and authorities. This not only helped to decide who, how and where the restoration and management measures would be undertaken but also greatly facilitated the acceptance of the proposed measures on both public and privately owned land.

Contracts were negotiated with the local farmers to carry out the restoration works as foreseen in the project. In the case of privately owned land, which made up about half of the total area of grassland targeted under the project, voluntary agreements were drawn up with each individual farmer. These laid down the terms and conditions as well as the payment rates in function of the local context and the level of restoration effort required at each site.

Once all the restoration work had been com-pleted, appropriate grazing regimes were re-established on the new sites, once again using management agreements with local landowers and farmers wherever possible.

[1] From 2011 The Danish Nature Agency

Providing the basic infrastructure to enable grazing to be re-introduced was a vital precursor to persuading farmers to enter into these longer term grazing agreements.

By the end of the project almost 2000 ha of grasslands were being grazed across the 11 sites. Funding for the grazing agreements came mainly from the Danish Forest and Nature Agency's own budget for nature reserves, although some sites were also managed with the help of a Danish Agri-Environment scheme for grasslands.

Some of the grasslands were also managed directly by the Danish Forest and Nature Agency using their own herd of cattle and other livestock. Because many of the remaining grassland areas are situated in remote or inaccessible areas, there is often a lack of livestock farmers to do the grazing/mowing work.

The Agency has therefore decided, on occasion, to invest in its own herd of cattle and operate the grazing regimes on public land as a not-for-profit scheme.

This is being done on a large scale at the Mols Bjerge site, which is almost entirely owned by the State. The Agency employed its own farmer to manage its 300 strong head of cattle (mainly hardy breeds, like Galloways) and 200 goats. This was considered to be the most cost effective solution for ensuring the long term grazing of the grasslands in view of the general lack of interest amongst local farmers in such low key grazing practices. It also meant that there would be a constant stock of animals to graze the land, even during the winter months.

Grasslands being managed by the Danish Forest and Nature Agency's own herd of cattle at Mols Bjerge .
Photo: K Sundseth

A follow up LIFE project

Stimulated by the success of the first nationwide grassland restoration project, the Danish Forest and Nature Agency launched a second project in 2009 to tackle Annex I grassland habitats in a further six sites (habitat types 6210, 6230*, 2130*, 2140*, 4030, 6120*) . The project, which cost €2.162.000 million, was also co-financed by the EU LIFE-Nature Fund.

As in the previous project, the main objective was to restore and re-introduce grazing in order to increase the area of dry grassland in six new sites. The same techniques and management approaches were used as those which had been successfully applied under the previous LIFE project.

Strengths and weaknesses

The approach taken in the two projects has contributed significantly to the restoration of Annex I dry grasslands in Denmark. The following are some of its key strengths:

- The focus was placed first and foremost on restoring core sites in order to help increase the overall area of valuable grassland habitats. This was considered to be the only way to be able to secure their favourable conservation status over the long term. Without large scale restoration, the few small patches of grassland that remain would have become increasing isolated and unviable.

- A strategic multi-site approach was taken which received a substantial initial injection of funds (both LIFE and national budget). This made it possible to restore a significant area of grassland in a relatively short space of time. Without the two LIFE projects, it would probably have only been possible to do restoration works in a piecemeal fashion and over a much longer time frame, depending on the availability of funds;

- A close dialogue was established from the outset with relevant stakeholders, especially farmers, to actively engage them in the management of grasslands in Natura 2000 wherever possible. The two LIFE projects were generally well received as most of the restoration work was contracted out to farmers and local contractors, thereby generating valuable income and employment. Also the Danish Forest and Nature Agency staff made every effort to discuss with each farmer individually and help them to apply for agri-environment or nature conservation funds to manage their grassland, where appropria.

- The restoration and re-introduction of grazing also contributed to enhancing the aesthetic values of many of the sites. Public acceptance was particularly notable in Mols Bjerge which has recently been proposed as a National Park. The unique character of the site has been greatly enhanced thanks to the restoration work and the introduction of hardy cattle in the area. This has not only boosted local tourism but also increased the real estate value of the surrounding area.

Stakeholder dialogue and public awareness raising were key elements of the project. Photo: Soren Rasmusse

- The project has helped to increasing our understanding of how to restore and manage Annex I dry grasslands in the most cost efficient manner. These best practice experiences have widely disseminated to others eg management staff at municipality level State forest districts, scientific specialists, NGOs and farmer organizations.

- The use of the National Forest and Nature Agency's own financial resources for grassland restoration and management provided the necessary flexibility to allow the measures to be adapted to best suit the local conditions on each site as well as the capacity and interest of local famers. It also made it possible to introduce cost efficient grazing regimes on public land where there is a lack of livestock farmers willing to undertake the work and an unreliable supply of grazing animals. In such cases, the public nature authority could keep its management costs down by acquiring its own herd of hardy livestock breeds, and hiring a farmer to manage the public land.

In several sites, local farmers are focused on intensive agricultural activities and are not interested in carry out low key grazing on dry grasslands. Photo; K Sundseth

Weaknesses

There are however also a number of weaknesses to this approach:

- It is highly dependent on the availability of nature conservation funds and other outside sources of funding (eg LIFE) and places a heavy administrative burden on the nature authorities themselves to ensuring that the grassland sites are appropriately managed over the longer term and new sites restored wherever possible.

- The current agri-environment scheme 'for conservation by grazing or cutting on pasture and natural areas' under the National Rural Development Programme has so far not been popular with farmers. Many consider it administratively cumbersome and inflexible compared to the potential economic benefit it could offer. The scheme is intended to assist in conserving around 98,000 ha of agricultural and natural areas of high national value. Priority is given to designated Natura 2000 areas as well as other areas registered by the environmental authorities, such as particularly valuable and inaccessible grassland. However, it has been of only limited value in securing the long term grazing of valuable grasslands in Natura 2000 sites so far.

- The Single Area Payments offer 2000 kr/ha whereas the payment for changing to extensive grazing only offers 1400kr/ha so there is no incentive to change, especially as the 1400kr is considered not to cover the full cost of managing the cattle all year around (eg supplementary feeding needed in winter).

- Considering that Denmark is still very much orientated towards intensive farming activities, the long term grazing of valuable grasslands within Natura 2000 is likely to remain heavily reliant on State nature funds for the foreseeable future. Such grazing activities are currently not economically viable and are unlikely to continue without state support. Nevertheless the increasing interest in 'meadow meat' and farming for conservation as a side business may work in favour of grassland management in the longer term.

Looking to the future

The long term perspectives for valuable annex I grasslands within Natura 2000 looks somewhat more hopeful compared to ten years ago. Thanks to concerted action, significant areas have been restored in a relatively short space of

time and are now being managed extensively through various grazing regimes.

There is also now a clear legislative framework in place to support the management of Natura 2000 sites. Individual conservation orders have been established for all sites and this is being followed up by the development of legally binding management plans for each site which are being negotiated in close cooperation with the local landowners, farmers and other stakeholders.

These management plans offer stakeholders a clear view of the conservation objectives and type of management actions needed at each site. They also create a better mechanism for securing State Funds to continue restoring and grazing grassland areas in Natura 2000.

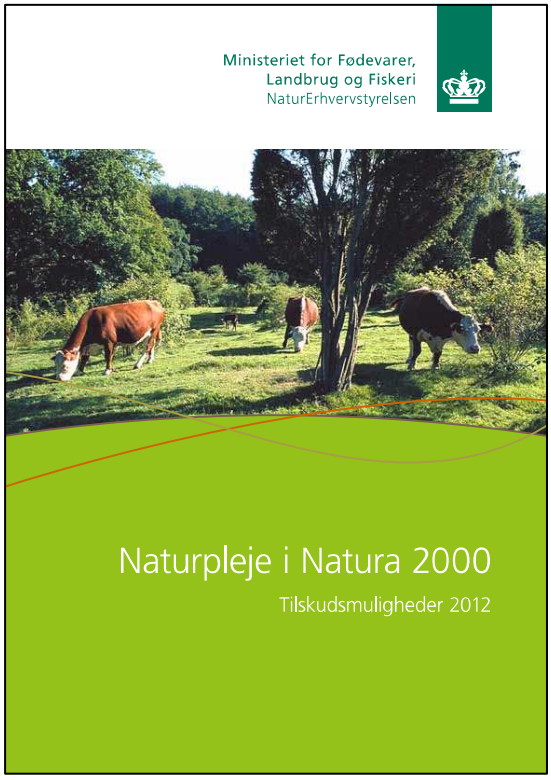
There are now also much better opportunities for using RDP measures to support grazing and restoration of grasslands. The following changes were made in 2012:

- everal changes have been made to the AES scheme for maintaining grazing and nature within Natura 2000 sites (5 year agreements). They include an increase in payment rates to better reflect the loss of income and the extra costs of grazing. The rates are now 2,000 kr. / ha of land cultivated with cutting. 1,000 kr. / Ha of land cultivated with forage and 3,350 kr. / Ha for areas identified as particularly valuable and inaccessible pasture and natural areas. There is also a premium of 600 kr. / Ha for areas located in areas designated for particular bird friendly operation. The measures that are required to be undertaken in order to received AES payments have also become a bit more flexible which should make the scheme more attractive and accessible to farmers

- Two new measures targeted at Natura 2000 sites have been introduced in the RDP:
  - Measures to help clear overgrown grassland areas and prepare the land for grazing (eg repair of fences, installation of water facilities, corrals etc…)
  - Measures to restore natural hydrological conditions

  These are very similar to the measures that were previously funded through the LIFE projects and national nature management funding, but which are now integrated into the RDP.

The scheme identifies ca 34,000 ha of grasslands and other valuable habitats that are need of clearance to improve their conservation status and another 11.000 ha of agricultural land that are in need of restoration of natural hydrological conditions. The RDP offers to cover 100% of the costs of carrying out such measures (provided certain conditions are respected) Areas with restored natural hydrology also are entitled to an annual compensation for a period of 20 years, which is also covered by RDP.



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Case Studies

Farming boreal baltic coastal meadows in Estonia using agri-environment support

Background

Estonia's flat coastline is rising steadily out of the sea through a process known as land upheaval. This creates an ideal environment for the development of Boreal Baltic coastal meadows which are unique to this part of the world, and protected as a priority habitat under the Habitats Directive. They are characterised by a particularly complex and intricate mix of plants, tolerant of varying degrees of salinity, which cohabit side by side.

Their already rich biodiversity has been further enhanced by regular grazing and mowing. Estonia's coastal meadows were extensively used as pastures and hay fields for centuries and this practice continued right up until the 1960s when still 40% of coastal farmers owned their own livestock and grazed their meadows.

Thereafter, soviet style collective farms dominated Estonia's agricultural landscape and the keeping of private cattle and other livestock for grazing and mowing became uneconomical. Large areas of coastal meadows were abandoned and became invaded with scrub as well as reeds and other nitrophilous plants which grew at an exponential rate due to the indiscriminate use of fertilisers and pesticides during the Soviet era.

In fifty years the total area of managed coastal meadows had decreased dramatically.

Boreal Baltic coastal meadows at Voste (Mati Kose)

A national programme for coastal meadows

In 2001, the Estonian Ministry of Environment launched a national scheme for the restoration and management of the Baltic coastal meadows. One of the first projects was undertaken with the help of EU LIFE funding. It focussed on 16 key sites along the coast, which collectively represented a range of conditions and states of degradation. Some were still being managed to a limited degree, whilst others, especially on the islands, had been completely abandoned and were heavily overgrown.

The first step was to restore these meadows to a level where they could once again be regularly grazed and mowed. This involved the purchase of suitable equipment (which could be used after the project on other areas as well) and the removal of invading scrub and reeds on ca 1700 ha.

In addition, ca 40 km of fences was erected and various management measures were taken to improve the living conditions for a range of endangered species living in the coastal meadows (eg natterjack toads, meadow birds, rare plants, etc).

Removing scrub and reeds is very labour intensive (Mati Kose)

The restoration work was mainly done by local landowners and farmers who entered into management contracts with the Ministry of Environment. The Ministry provided the farmers with payments in exchange for doing the restoration work and for re-introducing the appropriate grazing/mowing regimes on their land according to the Ministry's specifications.

The management contract also sometimes covered the cost of initial investments such as new fencing, etc. Keeping dairy cattle had become unprofitable and switching over to beef cattle or sheep required capital investments that the local farmers could simply not afford.

To overcome the chronic lack of grazing animals, the Ministry of Environment bought, as part of the LIFE project, its own herd of 113 beef cattle and some sheep)[1]. The animals were then loaned out to local farmers for a period of ca 5 years to graze their coastal meadows. At the end of the 5 years, the animals were passed onto a second farmer and the process was repeated, but the first farmer could keep all of the offspring, which helped ensure he would continue to graze his meadows. In this way, the farmers were able to build up their livestock without major investment costs.

By 2006, the original cattle herd had increased fivefold to over 500 animals. The cattle loaning scheme is still in operation today and remains very popular with the farmers, even though several other solutions have also now been found for putting livestock out on the meadows over the summer (see below).

The LIFE project was instrumental in helping to rekindle people's interest and awareness in Boreal coastal meadows which are an important part of Estonia's cultural heritage (and landscape quality). It also did a lot to win the support and participation of the local farmers and landowners in the restoration of these valuable habitats. As the project progressed, the number of people interested in the coastal meadow management increased steadily.

The project is said to have happened 'just in time', only a decade after Estonia had gained independence and the Soviet market for agricultural products had collapsed. Farmers were still present along the coast and many were willing to join new schemes that helped them to farm once again, especially when it did not require a major capital investment on their part. Had the project come a few years later, it is quite possible that many of these farmers and landowners would have lost the interest to farm or had to leave the area in search of employment elsewhere.

[1] These were mainly hardy breeds such as Highland, Angus, Hereford and Estonian brown cows that are more suited to coastal meadow grazing as they do not need daily care and can be left on a coastal meadow for a longer period.

Hardy cattle were re-introduced to manage the coastal meadows under the Ministry's scheme (Kerstin Sundseth)

Thanks to the initial pump priming of the LIFE project, the Ministry of Environment's scheme for the restoration and management of semi-natural habitats (including coastal meadows) is now well established and is still in operation today. So far, around 3000ha of coastal meadows has been restored.

Supporting the farming of coastal meadows through RDP

By 2004, at the time of Estonia's entry into the EU, the part of the Ministry of Environment's coastal meadow scheme that involved management contracts for grazing and mowing was transferred to the Ministry of Agriculture, and a few years later it became part of a dedicated agri-environment scheme for semi-natural habitats under Estonia's new RDP Programme (2007-2013). Many of the farmers who had started with the Ministry of Environment's scheme subsequently joined the RDP scheme. Instead of annual contracts they could now sign up to five year contracts which provided them with better medium term security.

The agri-environment scheme also targeted a much larger area than before and covered not just Baltic coastal meadows, but also other types of semi-natural habitats such as wet meadows, wooded meadows, wooded pastures, alvar habitats, flooded meadows and fen meadows, juniper thickets, heaths and grasslands on mineral soil – all of which are habitats of high nature value and protected under the Habitats Directive.

The target of the agri-environment scheme is to cover 35,000 ha of semi-natural habitats located in Natura 2000 sites (which is over half of all the semi-natural habitats in Natura 2000). The total budget available for this is 26.8 million €.

Payment rates are ca 238.07€/ha/yr for wooded pastures (target: 3000 ha) and 185.98€/ha/yr for the other semi-natural habitats (target 32,000ha).

Although managed by the Ministry of Agriculture, the scheme is run in close cooperation with the State Nature Conservation Centre (Environmental Board) which comments on, and approves, each agri-environment application. The Centre will often visit farmers beforehand to discuss the proposed management requirements for the site and check that the conditions are as described.

It also issues applicants with detailed guidelines for the maintenance of semi naturals, especially where, in addition to the requirements arising from legislation, individual suggestions concerning the maintenance of specific areas are described (eg specific n° of animals per ha, mowing dates etc…). This introduces a certain degree of flexibility that allows minor adjustments to be made in the agri-environment contract to reflect the individual needs of different sites. In order to receive support, farmers must also participate in training programmes for the maintenance of semi natural habitats (ca 900 farmers have participated in these training events so far).

In parallel, the Ministry of Environment continues to run its national programme to restore semi-natural habitats up to a level where they can enter the agri-environment scheme or to pay for management activities that cannot be covered by the RDP. The close cooperation of the two ministries and the complimentarity of the two funds is one of the key strengths of this initiative.

As far as coastal meadows are concerned, 10,000 ha have been included in the agri-environment scheme so far which represents around half of all coastal meadows in the country. Around 950 management agreements have been established so far:

- 72% are with agricultural holdings where agriculture is their primary activity (ie companies)
- 22% are with individual farmers
- 6% are with NGOs

The agri-environment support forms around 40% of the manager's income in the case of grazing and 90% in the case of mowing. The payment rate is sufficient to cover the cost of maintaining the livestock.

A separate payment scheme is now available also to cover the transportation costs for moving young heifers from large dairy enterprises to

graze in the coastal meadows during the summer months (from 2 May to 31 August). This not only helps to enlarge the area of coastal meadow that can be grazed but also provides the dairy farmer with a free supply of fodder (outdoor grazing also seems to improve the quality of the dairy cattle).

According to the RDP's mid term evaluation, the agri-environment scheme is proving to be popular with farmers and the number of applicants continues to rise. Those that own semi-natural habitats outside Natura 2000 sites are now also requesting that the scheme be extended to cover their land as well.

Strengths and weaknesses encountered

Success factors

Several elements have contributed to the success of this case study:

- The timely launch in 2001 of a nationwide scheme for the restoration and management of coastal meadows, supported by a strategic LIFE project involving a whole suite of sites, was instrumental in raising interest and support in coastal meadow management amongst the local farmers and the public at large at a time when farming in Estonia was going through a difficult transition phase and coastal meadows were considered to be no more than 'wasteland'.

- The national scheme generated a lot of expertise and experience in terms of cooperating with and engaging farmers, winning their interest and trust, and identifying the right conservation measures for ensuring the long term management of these valuable habitats.

- It also succeeded in overcoming many of the obstacles that would otherwise have prevented coastal farmers from re-introducing grazing and management on their coastal areas – namely the lack of money for major investments such as fencing and reed cutting/scrub removal, and the chronic shortage of cattle. The innovative scheme of loaning beef cattle out to farmers and allowing them to keep the offspring, in particular, helped to address the problem of too few grazing animals.

- The important baseline of experience gained by this initial scheme run by the Ministry of Environment also helped to pave the way for a much larger agri-environment scheme focussing on the management of a range of semi-natural habitats within Natura 2000.

- The fact that the agri-environment scheme has as its objective the maintenance of semi-natural habitats to ensure their favourable conservation status in Natura 2000 areas is also a key point. All too often agri-environment schemes are not sufficiently targeted towards Natura 2000 objectives and promote management measures that are either too general or too poorly adapted to the needs of the protected habitats and species concerned. As a result they are of limited or no effect in terms of their conservation management.

  By contrast this agri-environment scheme is specifically designed to ensure the favourable conservation status of the habitats in Natura 2000. As such it can and does make a major contribution to their long term conservation status. Estonia has around 75,000 ha of semi-natural habitats included in Natura 2000. The agri-environment scheme for semi-natural habitats aims to around 60,000 ha by 2020 (and 35,000ha by 2013).

  If this target is reached then the management the semi-natural habitats in Natura 2000 that are dependent on farming will be largely secured thanks to the RDP. This scheme is therefore central to ensuring the long term FCS of this habitat type in Estonia.

- The complementarity of the restoration scheme run by the Ministry of Environment and the agri-environment scheme run by the Ministry of Agriculture is also a key element of success. The Ministry of Environment's scheme helps to restore sites to a level when they can be managed under the agri-environment scheme. It also helps to pay for management actions that cannot be covered by the RDP (eg transporting animals on to the small coastal islands). Having both funds helps overcome the problem that some semi-natural habitats in Natura 2000, although dependent on regular farming management activities, are not eligible for RDP funding (and are not considered as UAA[2]). Those areas that are not eligible can still be managed with the help of the Ministry of Environment's scheme (at least in principle although

[2] ca 55,000 ha of land included in Natura 2000 is considered to be UAA, representing ca 8% of the total agricultural land in Estonia

in practice this is limited by the small funds available).

- The close cooperation of the two Ministries is a major element of success – the Ministry of Agriculture actively engages the State Nature Conservation Centre in helping to manage the agri-environment scheme and to dialogue with farmers on the management needs of these habitats. In this way, farmers receive a lot of targeted help and advice on how to ensure their management are conform to RDP rules *and* well adapted to the needs of the habitats themselves.

- This close cooperation between the Ministries and the farmers has helped to build up an important level of trust between the different parties which is reflected in the continuing popularity of the scheme even in the light of increasingly strict and intransigent controls and audits on the part of the payment agencies.

- The involvement of the State Nature Conservation Centre in the drafting of individual agri-environment agreements also brings in a certain degree of flexibility to the scheme which allows for the specific management prescriptions to be adjusted to better suit the needs of the individual sites whilst remaining in line with RDP funding rules (eg in terms of high or lower grazing pressure or different timings for mowing operations).

  This adaptability which is enshrined in the criteria for eligibility for the agri-environment scheme recognises that different sites may require slightly different management practices by law to ensure they reach a favourable condition. The description of the agri-environment measure in the RDP makes a provision for this by stating in the eligibility rules that: *'1) semi-natural habitat must be mowed at least once before 1 October using the methods of from-center-to-apart or from edge- to-edge or must be grazed. Mowing is allowed from the 10 July if not provided otherwise in protection rules, in the management plan, in the species action plan or in the regulation'.*

- The rate of payment for grazing contracts is sufficient to cover the farmer's additional costs in having beef cattle. For many, the scheme is seen as an important 'lifeline' for maintaining the viability of their business. Coastal meadows are considered poor quality agricultural lands and do not lend themselves easily to other more lucrative farming practices.

Weaknesses

The present case study does however also flag up a number of weaknesses and challenges:

- Although the management of coastal meadows keeps many small scale farming businesses alive, this type of farming would probably not be economically viable without the additional financial support from the agri-environment scheme. The lack of economic interest in farming coastal meadows and the lack of long term planning leaves farmers in an uncertainty about the future. It also raises a doubt about the long term sustainable management of coastal meadows.

- Part of the problem lies in the fact that there is not a tradition of eating beef in Estonia (the staple is porc) which means the demand for beef, and especially 'meadow' beef is still relatively limited. There is also currently no economic outlet for other by products of coastal meadow management such as hay and wool.

  A new labeling scheme for marketing of meadow meat has been launched and has received a lot of interest from outside Estonia, but the local market is still too small to generate sufficient business volume for the coastal meadow farmers to cover their costs *and* make a profit. Many are also concerned that because their cattle feed on poor quality land, the animals are not as 'productive' (but it is precisely this income-forgone that the agri-environment compensates for).

- The nature conservation rules are sometimes difficult for farmers to meet (farmers would prefer to mow earlier before the hay looses its value as animal fodder, also the more environmentally friendly way of mowing costs more in terms of time and petrol consumption.

- There can also be difficulties in making sure that the management prescriptions meet both the requirements of the habitat in question and the increasingly strict audits carried out by the inspection authorities (eg as regards visual markings of the area that is under AE and the placing of fences on the shore. This can act as a major disincentive to farming businesses to join the scheme which are after all only voluntary.

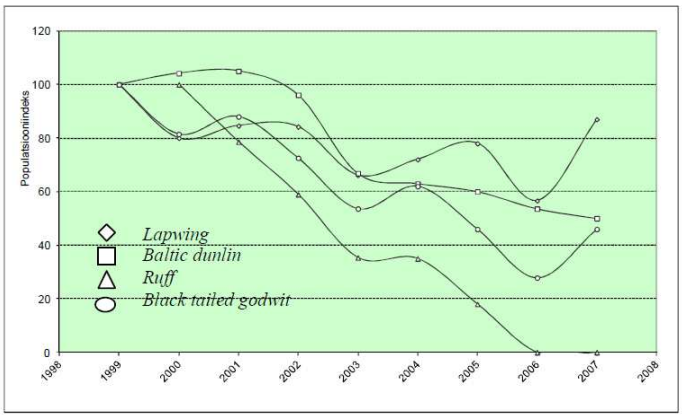
- The role of the State Nature Conservation Centre has been crucial to the success of this

initiative – but normally the work they do in dialoguing with individual farmers, organizing training workshops etc should be undertaken by a dedicated advisory service with greater human and financial resources. Currently there is no such advisory service for semi-natural habitats in Estonia.

- There is a national monitoring system in place for semi-natural habitats but the there is no observing one area over the years. That means there is no time-line data and no way of telling if this work is actually giving results. There is quite good data about birds from one area and plants from other but no systematic approach for all habitat types.

- Nevertheless, surveys have shown that, whilst the current agri-environment scheme is appropriate for the conservation of the habitat type in its own right, other important protected species that live on the coastal meadows, such black tailed godwit, or Baltic dunlin, and natterjack toads are still declining in number despite the fact that their habitats are now protected.

The current agri-environment scheme lacks the fine tuning elements needed to address the conservation needs of these species as well.



Graph showing the decline in some species that live on the coastal meadows. (Source: Keskkonnaamet)

Other spin-off effects from the Natura 2000 network

The Boreal Baltic coastal meadows are located right along the Baltic coast of Estonia and, as such, offer a highly attractive, open landscape. They are also a magnet for hundreds of thousands of migrating birds that stop-over along the coast every year during the spring and autumn months. The high aesthetic appeal and exceptional biodiversity of these coastal meadows is increasingly recognised in Estonia and internationally.

This in turn creates new opportunities for diversifying rural business opportunities through rural tourism (e.g. accommodation, nature watching, horse-riding, restaurants serving local food, etc). This can be an important additional source of income for those farmers and businesses that are currently using the coastal meadows to graze their livestock.

The management and restoration of coastal meadows has also proven to be popular with local inhabitants for other reasons. In particular, the large scale clearance of the choking reeds has won support not only because it opens up the landscape and restores the aesthetic value of the coastline but also because it removes a major fire hazard. In the summer, dry reed beds can catch fire and cause major damage to property and businesses, especially in the more populated areas like Pärnu.

Lessons learnt from the experience, and challenges for the future

The experiences from this initiative in Estonia are largely positive and encouraging. The farming community has responded positively to the re-introduction of grazing and hay cutting on coastal meadows, to the extent that more than half of the habitat included in Natura 2000 is now being managed effectively with the support of agri-environment payments. The close cooperation of the Ministries of Environment and Agriculture and the focussed approach to ensuring the favourable conservation status of EU protected habitats within Natura 2000 via RDP is central to its success.

However, the low economic returns generated from farming coastal and other semi-natural habitats puts a question mark over the long term viability of the initiative, which is after all based solely on voluntary agreements with farmers. A key element for the future will therefore be to find new profitable economic outlets for the products derived semi-natural farming, e.g. use of hay in biofuel plants, greater promotion of 'meadow' meat in rural and nature based tourism, etc.

Also the agri-environment scheme, whilst vital for maintaining the semi-natural habitats in a good condition, are not helping to improve the conservation status of the other key protected species that live in these habitats. Recognising

this, the two Ministries are already discussing the possibility of introducing a series of top up payments for additional fine tuning measures for certain species under the next RDP programme. A pilot field study is underway to see what kind of new management measures might be funded through this top up scheme.

In addition, it will be important to develop detailed practical management plans for each Natura 2000 site in order to bring further clarity and transparency over their management needs and to encourage better long term planning. The plans should not just list (passive) restrictions in each site but should outline the (active) management measures needed to bring the site up to an optimal conservation state.

Finally, it will be useful to find additional added value products, and outlets for these products, from semi-natural areas in order to increase the economic interest in grazing these habitats.

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