Socioeconomic study and evaluation of ecosystem services as a result of the ROLLER – Conservation of the European Roller (Coracias garrulus) in the Carpathian Basin

FINAL REPORT

ACTION D.3.

„Assessment of the socio-economic and ecosystem functions restoration impact of the project"

LIFE13 NAT/HU/000081

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1 Executive Summary

Protected areas around the world are increasingly being recognized for their potential to protect various ecosystem services in addition to biodiversity and ensure their continuous flow. The Roller project improves habitats and their ecosystem services in several ways. The main aim of the Roller LIFE+ project is to:

- Strengthen the European core population in the Carpathian basin and ensure its conservation by the implementation of suitable conservation measures.
- Restore former Roller habitats and demonstrate new or unfamiliar management practices.
- Increase the population size of the Roller by creating new nest sites and by the promotion of bird friendly habitat management of Natura 2000 sites.
- Involve relevant stakeholders into the conservation activity and therefore establish the fundaments of sustainable protection of the species.
- Decrease the mortality of the targeted population by promoting the bird friendly electric pylon designs, insulating the most relevant pylons.
- Identify endangered migratory and roosting sites; make the first steps for their conservation through networking.

The assessment of the ecosystem services was conducted in the context of a LIFE+ project. The main purpose of the study was the determination and valuation of the ecosystem services provided by the project area. For this purpose we use the Toolkit for Ecosystem Service Site-based Assessment (TESSA, Peh et al. 2013) which provides a net benefits framework through applying a set of appropriate methods. The implementation of TESSA Toolkit revealed that the area supports climate regulation services; cultivated goods and recreation and aesthetic benefits. The methodology includes a rapid appraisal to identify the most important habitats, and the services provided by the site.

The project has created a high reach through online, print and radio/television media appearances. From 2015 to 2020 the topic has appeared in 56 online, 19 print and 5 radio/television media. The calculated ad value has been 141,710 EUR. The online and print media has achieved 8,386,124 reach.

2 Introduction - background to ecosystem services

Ecosystem services have been defined differently by many authors (Boyd and Banzhaf, 2007; Fisher and Turner, 2008; Fisher et al., 2009), but always are defined with reference to humans (Chan et al., 2006; Tallis and Polasky, 2009). It is this attribute that distinguishes them from ecosystem functions. Ecosystem functions occur whether or not there are any humans who may benefit from them (Tallis and Polasky, 2009). The main purpose of defining ecosystem services is to allow for a systematic and comprehensive accounting for the environmental benefits people receive from nature (Boyd and Banzhaf, 2007; Fisher and Turner, 2008). Ecosystem services are general classified into supporting, provisioning, regulating and cultural services (MA 2005) although, other classification frameworks are also used (e.g. Haines-Young and Potschin 2013). The supporting services which are necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production, nutrient cycling and water cycling. Provisioning services are material benefits that ecosystems generate, such as food, fresh water or timber products. Regulating services regulate e.g., climate and air quality, hydrological and biochemical cycles and soil processes, and are essential preconditions for other ecosystem services. Cultural services are immaterial benefits that humans obtain from ecosystems, for instance by recreation, health benefits or the accumulation of knowledge (MA 2005).

Until fairly recently, protected areas were seen as the stronghold of biodiversity conservation. Although, safeguarding biodiversity remains their primary aim, protected areas are increasingly considered to play a key role in the maintenance of ecosystem processes and the ecosystem services they provide (Biodiversity Strategy (COM(2011) 244). It is thus vital to assess the extent to which existing protected area systems represent those services.

During this action, we identified and examined the ecosystem services (regulating and cultural) using a) the Toolkit for Ecosystem Service Site-based Assessment (TESSA) and b) an expert-based approach to map the potential/capacity of habitat types. In addition we carried out a survey to assess attitudes and perceptions of conservation activities.

3 Methods

3.1 Study area

Habitat conservation measures has been carried out in the following Special Protection Areas (SPA):

- HUBN10002 Borsodi Sík SPA
- HUBN10004 Hevesi-sík SPA
- HUBN10005 Kesznyéten SPA
- HUDI10001 Abonyi-kaszálóerdő SPA
- HUDI10004 Jászkarajenői puszták SPA
- HUHN10001 Szatmár-Bereg SPA
- HUHN10002 Hortobágy SPA
- HUHN10003 Bihar SPA
- HUHN10005 Jászság SPA
- HUKM10004 Vásárhely környéki és csanádi-háti puszták SPA
- HUKN10001 Felső-kiskunsági szikes puszták és turjánvidék SPA
- HUKN10002 Kiskunsági szikes tavak and the őrjegi turjánvidék SPA
- HUKN10007 Alsó-Tiszavölgy SPA
- HUKN10008 Balástya–Szatymaz környéki homokvidék SPA
- HUKN30001 Csongrád-bokrosi Sóstó SPA
- HUKN30002 Gátéri Fehér-tó SPA
- HUKN30003 Izsáki Kolon-tó SPA

3.2 Classifying ecosystem services supported by the study area

Following on from the framework proposed by the Millennium Ecosystem Assessment (MA 2005), there are currently many frameworks exist to classify ecosystem services (Wallace 2007; Fisher and Turner 2008; Haines-Young and Potschin 2013). The classification of the most important ecosystem services supported by the project area was based on the Standard List of Ecosystem Services (adapted from CICES available at www.cices.eu). The hierarchical structure of The Common International Classification of Ecosystem Services

(CICES) has been designed so that the categories at each level are non-overlapping and without redundancy. The categories at the lower levels also inherit the properties or characteristics of the levels above. The main categories are:

a. *Provisioning services:* all nutritional, material and energetic outputs from living systems. In the proposed structure a distinction is made between provisioning outputs arising from biological materials (biomass) and water. The consultation confirmed the classification of water as problematic, because it was regarded by some as primarily an abiotic, mineral output. The majority argued, however, that it should be included; convention and wider usage of the notion of an ecosystem services also suggests that it is appropriate to do so. In addition, water bodies of all scales host communities of species that provide ecosystem services themselves.

b. *Regulating and maintenance:* covers all the ways in which living organisms can mediate or moderate the ambient environment that affects human performance. It therefore covers the degradation of wastes and toxic substances by exploiting living processes; by reconnecting waste streams to living processes it is in this sense the opposite of provision. Regulation and maintenance also covers the mediation of flows in solids, liquids and gases that affect people's performance as well as the ways living organisms can regulate the physico-chemical and biological environment of people.

c. *Cultural Services:* cover all the non-material, and normally non-consumptive, outputs of ecosystems that affect physical and mental states of people.

3.3 Ecosystem Services Estimation - TESSA v1.1

For the assessment of the ecosystem services of the project area we used the Toolkit for Ecosystem Service Site-based Assessment (TESSA) (Peh et al., 2013) which provides a net benefits framework through applying a set of appropriate methods. TESSA is designed to help users identify which ecosystem services to assess, what data are needed to measure them, which methods or sources might be used in different contexts, and how the results can then be communicated. For ease of use, decision trees lead the user towards specific methods, providing additional guidance on data collection and analysis. However, because sites vary widely, methods are designed as templates only and users need to adapt the methods according to local conditions. TESSA brings together a selection of accessible, low-cost

methods to identify the important ecosystem services provided by a site, and to evaluate the magnitude and distribution of the benefits that people get from them now, compared with those expected under alternative land-uses.

The methodology includes a rapid appraisal to identify the most important habitats, drivers of land-use change and the services provided by the site. The Rapid Appraisal reveals the dominant habitat types and drivers of change and the broad ecosystem services that are associated with the habitat types at the site based on the Standard List of Ecosystem Services (adapted from CICES available at www.cices.eu).

In order to decide which services to measure, we used the matrix provided by TESSA showing general relationships between habitat-types and ecosystem services.

3.3.1 Methods applied for global climate regulation assessment

By global climate regulation, we mean the exchange of carbon dioxide and other greenhouse gases between the atmosphere and the plants, animals and soil within ecosystems. Different habitats and land uses have different potential influences on the service of global climate regulation. Therefore, we treat each habitat/land use separately in this section of the toolkit, because different measurements and/or methods are appropriate for different habitats. Consequently, for each habitat type identified during Rapid appraisal the following factors were assessed that might affect the global climate regulation:

1. The carbon stored in the plants expressed as above-ground biomass (AGB), and below-ground biomass (BGB), dead organic matter (litter and dead wood) and soil;

2. The carbon sequestered (taken in from the atmosphere) over time by the plants and soil (negative flux);

3. The greenhouse gases (carbon dioxide [CO2], nitrous oxide [N2O], methane [CH4]) emitted by the plants, soil and animals over time (positive flux). This emission can arise from, for example, respiration, burning, decay or other forms of disturbance.

The importance of these factors to climate regulation varies between different habitats or land uses. Furthermore, different levels of human intervention or management within a habitat may also alter their relative importance. Therefore, we must define both habitat types and,

within these, different degree of disturbance (if present) and use these as the individual units for service assessment.

3.4 Perceptions, attitudes and level of awareness

We have carried out a multi-annual survey among farmers based on the surveys carried out earlier in events organised with MME partner Bükk National Park, before the current project.

We have carried out a multi-annual survey among farmers during the traditional spring cattle driving festival from 2014 to 2019. The surveys have investigated farmer's perception and attitude toward agri-environmental schemes. In 2020 event participation was not possible due to the Covid-19 pandemic, and we have carried out qualitative phone intervirews.

- *Knowledge and awareness*. Regarding levels of awareness, a set of questions sought to evaluate the knowledge of the respondents regarding agri-environmental practices and their impact.

- *Perceptions.* The questionnaire attempted to evaluate issues of farmers' perceptions related to on nature conservation, employment and economic sustainability.

4 Results

4.1 Determination of the most important habitat types

Because many (but not all) ecosystem services are delivered at the habitat level and are associated directly with particular land cover types, in order to valuate ecosystem services there was a need to identify the main habitat type at the study area. Identifying the area occupied by each land cover/land use or habitat type can therefore guide us in assessing and quantifying the ecosystem services delivered at that site. Table 1 shows the main habitat types of the project area along with their extent and the corresponding habitat classification proposed by TESSA toolkit.

Table 1: Main habitat types of the project are, the corresponding habitat classification proposed by the TESSA toolkit and their extent in hectares

	TESSA Habitat Classification	Area (ha)
Grass Dominated Habitats	Temperate grassland	382
Tree Dominated Habitats	Temperate woodland	105

4.2 Identification of the most important ecosystem services

We first conducted an initial Identification of the potential ecosystem services provided by the project area. We included all the benefits which have been reported to that are delivered by this site in the Table 2.

In the first column, the benefits are scored from 0-5; where 0 means “not relevant”; and 5 “highly important”. In order to characterise an ecosystem service as ‘Important’ we took into account the number of people benefitting and the contribution of the benefit to economic (the ability to earn an income and to have assets), human (health, education, nutrition, clean

water, and shelter), socio-cultural (sense of place, spiritual wellbeing, recreation) and protective values (ability to withstand economic and external shocks).

Table 2: Potential ecosystem services at the project area

Benefits		**Importance (score 0-5, 5 = highly important)**	**Top five services**
Global climate regulation	e.g. carbon storage	2	√
Local climate and air quality regulation	Providing shade, removing pollutants, influence, rainfall	1	
Water related services	Water for human use	0	
	Water flow regulation	1	
	Water quality improvement	1	
Erosion control	Avoiding landslides	1	
Harvesting wild goods	Foods	0	
	Fibre	0	
	Natural medicines	0	
	Energy	0	

Benefits		**Importance (score 0-5, 5 = highly important)**	**Top five services**
Cultivated goods	Food	5	√
	Fibre	1	
	Energy	3	√
Biodiversity		2	√
Cultural/intellectual and representative interactions	Scientific	4	
	Educational		√
	Entertainment		
	Aesthetic		

According to the results from the Rapid Appraisal analysis the five priority ecosystem services provided by the study area are: Scientific, Educational, Biodiversity, Food and Energy. Scientific and Educational services are included in the broad category of Cultural/intellectual and representative interactions and Food and Energy referred to the Cultivated goods.

4.3 Estimation of the most important ecosystem services

4.3.1 Global Climate Regulation

For each habitat type identified during Rapid appraisal, 3 factors were assessed that might affect the global climate regulation. These are 1) The *carbon stored in the plants* (above-

ground biomass, AGB, and below-ground biomass, BGB), dead organic matter (litter and dead wood) and soil; 2. The *carbon sequestered* (taken in from the atmosphere) over time by the plants and soil (negative flux); 3. The *greenhouse gases* (carbon dioxide [CO_2], nitrous oxide [N_2O], methane [CH_4]) emitted by the plants, soil and animals over time (positive flux). This emission can arise from, for example, respiration, burning, decay or other forms of disturbance.

We used TESSA Climate Method 2 to estimate above ground live biomass carbon stock using IPCC tier 1 estimates, by matching a site's existing habitat types to the habitat classes, in our case temperate crop and grass dominated. TESSA Climate Method 5 was used to estimate below ground biomass (BGB) carbon stock using also IPCC conversion factors. Dead organic matter carbon stock was estimated using TESSA Climate Method 6 and finally, estimation of soil organic carbon stock was performed using Climate Method 7.

4.3.1.1 Estimation of the greenhouse gases (carbon dioxide [CO2], nitrous oxide [N2O], methane [CH4]) emitted by the plants, soil and animals over time (positive flux).

4.3.1.1.1 Estimating Carbon Dioxide (CO_2) emissions from soil Using Climate Method 9

Habitats Carbon stored in soils, especially organic soils, can decompose, releasing CO_2 to the atmosphere when drained. The degree to which this is compensated by CO_2 sequestration from the atmosphere into plants, and hence soils, will vary depending on the circumstances. Drainage is a common practice in agriculture and forestry, to improve site condition for plant growth, and can enhance aerobic decomposition of organic soil carbon. In this case, losses of CO_2 may outweigh sequestration, leading to a net emission of CO_2. Thus, estimating soil carbon emission could be an important component of biomass surveys of croplands and forestry plantations. Rapid estimation of CO_2 emissions could not be easily obtained from field measurements because the methodologies involved are too laborious and may be expensive. You should use any data on CO_2 emissions at the site, if they exist. Otherwise, this section provides information on where to find the existing estimates derived from IPCC

(2006). This section covers tree-dominated, grassland-dominated and crop-dominated habitats, where drainage is practiced at the site.

4.3.1.1.2 Estimating Methane emissions using Climate Section 10

Methane emissions from the area can be considered insignificant because it has no significant grazing.

4.3.1.1.3 Estimating Nitrous oxide emissions using Climate Section 11

Nitrous oxide (N_2O), the most important non-carbon greenhouse gas, is emitted from some types of drained peatland and agricultural systems where nitrogen fertilisation is applied. N_2O is produced by bacteria in soils of these habitats through the processes of nitrification (aerobic microbial oxidation of ammonium to nitrate) and denitrification (anaerobic microbial reduction of nitrate to nitrogen gas). It leaks from microbial cells into the soils and then ultimately is released to the atmosphere. Rapid estimation of N_2O emissions could not be easily obtained from field measurements because the methodologies involved are too laborious and may be expensive. Therefore, the TESSA methodology provides information on how to calculate N_2O emission rates following the tier 1 methods from IPCC (2006). Nitrous oxide emissions from the site can be considered insignificant because project area has limited fertilisers added, is not a drained peatland and is not grazed significantly.

4.3.1.2 The carbon stored in the plants [Above-Ground Biomass (AGB), Below-Ground Biomass (BGB), Dead Organic Matter (litter and dead wood) and Soil].

4.3.1.2.1 Estimating Above-Ground live Biomass (AGB) carbon stock using IPCC tier 1– Method climate method 2:

To estimate the storage of carbon (C) in above-ground biomass (AGB) we used data reference to the Inter-governmental Panel on Climate Change (IPCC) tier 1 database (IPCC, 2006) and the appendices of TESSA toolkit. The project area was first classified based on the existing vegetation types according to the definitions given to the Appendix 2 of TESSA toolkit. To calculate the total above-ground live biomass of each habitat type at the site, we multiply the **above-ground live biomass by the area (ha)** of the habitat and to calculate the total above-ground live biomass **carbon stock** (t C) of each habitat we multiply the total

above-ground live biomass by a conversion factor of 0.5 for perennial crop dominated habitatas, or by 0.47 for grass dominated habitats. We estimated the C stocks in ABG for two habitat classes: 1) Temperate woodland (TW) and 2) Temperate grassland (TG).

$$AGB_{TW} = 105 \text{ ha X } 63 \text{ X } 0.5 = 3\,307 \text{ t C}$$

$$AGB_{TG} = 382 \text{ ha X } 2.3 \text{ X } 0.47 = 413 \text{ t C}$$

Altogether the above-ground live biomass carbon stock is 3 720 t C.

4.3.1.2.2 Estimating Below-Ground Biomass (BGB) carbon stock using IPCC conversion factors – Climate Method 5:

Estimating below-ground live biomass is an important component of biomass surveys. However, field measurements are difficult and not possible here due to restrictions of data and resources. The below-ground biomass is estimated by using a below-ground biomass to above-ground biomass ratio (conversion factor) from IPCC (2006). Below-ground biomass carbon stock was estimated using a ratio of below ground-ground biomass to above ground biomass (R) for particular vegetation types (IPCC 2006): Steppe/tundra/prairie grassland (TG; 4.0), Temperate woodland (TW: 0.46).

$$BGB_{TW} = 105 \text{ ha X } 63 \text{ x } 0.46 \text{ X } 0.5 = 1\,521 \text{ t C}$$

$$BGB_{TG} = 382 \text{ ha X } 2.3 \text{ X } 4.0 \text{ X } 0.47 = 1\,652 \text{ t C}$$

Altogether the below-ground live biomass carbon stock is 3 173 t C.

4.3.1.2.3 Estimating dead organic matter carbon stock using IPCC tier 1 estimates- Climate Method 6:

Estimating dead organic matter, consisting of litter and dead wood, is not significant in grass and crop habitats.

4.3.2 Nature-based recreation

The project area with high nature value is on average economically less developed. Rollers inhabit this unfavourable regions where industry, commerce and profit oriented sectors are less active. The restoration of biodiversity function of such habitats and the development of the traditional agriculture through agricultural policies may help to stabilize the economic viability of these regions through creating nature-based recreational opportunities. These impacts may appear as a result of longer term management practices in line with consistent regional development practices.

4.3.3 Biodiversity

Rollers are top predators of small vertebrates and various invertebrate taxa. The viability of roller population can be used as general indicators of agro-biodiversity of these habitats. The project has demonstrated sustainable agricultural methods to conserve a semi natural agricultural landscape. These objectives serve the benefit of several other sympatric species of international conservation concern of the Pannon-ecoregion. The targeted habitat restorations and management also provide example for the sustainable farming and a more natural human living and the lessons learned can be used for the EU Environmental Action Programmes.

Direct conservation actions included the creation of nesting sites with 2280 nextboxes. The Farmers for Rollers action with 106 farmers has carried out tree plantings, and placement of nextboxes and T-polls. The farmers have participated on 12 forums, and received a birding manual for cropland birds.

Besides those general measures on all sites, direct habitat reconstruction has been carried out by KNPI on a 205 ha cropland area (Alsó-Tisza-völgy SPA HUKN10007), by BNPI on a 177 ha woody grassland (Borsodi-Mezőség SPA HUBN10002) as well as by Dalerd Zrt. on a 105 ha floodplain forest (Alsó-Tiszavölgy SPA HUKN10007).

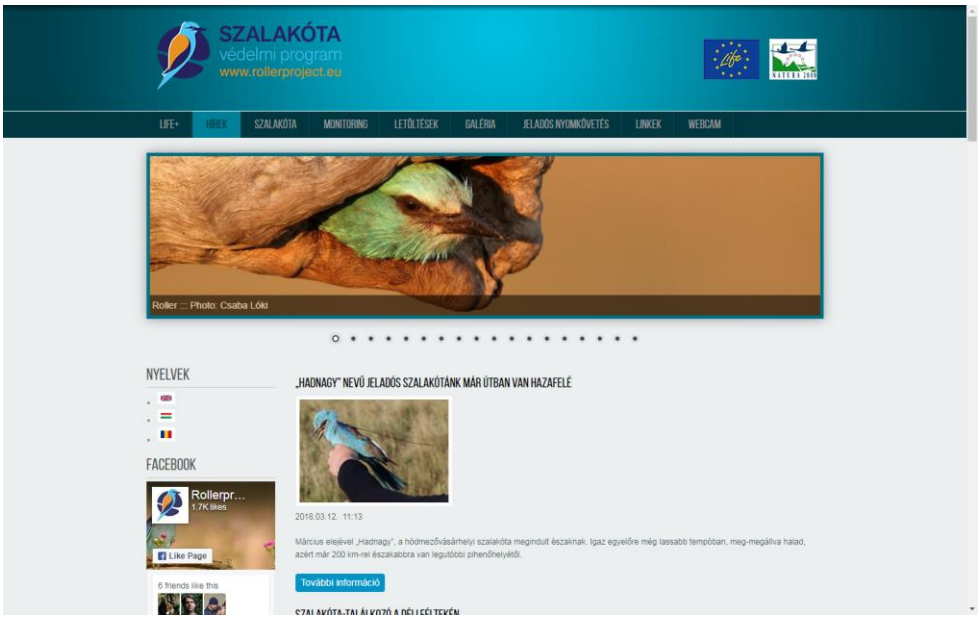
4.4 Perceptions and attitudes towards conservation measures

The project has created a high reach through online, print and radio/television media appearances. From 2015 to 2020 the topic has appeared in 56 online, 19 print and 5 radio/television media. The calculated ad value has been 141,710 EUR. The online and print media has achieved 8,386,124 reach.

Table 3: List of media reporting on the project

Online	Print	radio/television
alfoldiregiomagazin.hu	Blikk	Class FM
bacsmegye.hu	Bogárd és Vidéke	Info Rádió
bajaitelevizio.hu	Dunaújvárosi Hírlap	Jazzy Rádió
baon.hu	Dunántúli Napló	Klub Rádió
blikk.hu	Észak-Magyarország	m1
csongradmegyei-hirhata..	Fejér Megyei Hírlap	
dehir.hu	Hajdú-Bihari Napló	
delmagyar.hu	Heves Megyei Hírlap	
erdon.ro	Kelet-Magyarország	
feeds.pecsujsag.hu	Lokál	
forestpress.hu	Magyar Hírlap	
foter.ro	Magyar Idők	
greenfo.hu	Magyar Mezőgazdaság	
halasinfo.hu	Népszava	
heol.hu	Nógrád Megyei Hírlap	
hir.ma	Petőfi Népe	
hirado.hu	Szabad Föld	
hirek.sk	Trade magazin	
hiros.hu	Vásárhelyi híradó	
hvg.hu		
index.hu		
infodebrecen.hu		
infotatabanya.hu		
keol.hu		
kisalfold.hu		

Online	Print	radio/television
lokal.hu		
ma.hu		
magyarhirlap.hu		
magyarmezogazdasag.hu		
magyarszo.com		
minap.hu		
mixonline.hu		
nepszava.hu		
nlcafe.hu		
objektivhir.hu		
orientpress.hu		
origo.hu		
promenad.hu		
radioeger.hu		
ringmagazin.hu		
sikerado.hu		
sokszinuvidek.hu		
stop.hu		
szabadfold.hu		
szabadsag.ro		
168ora.hu		
szegedma.hu		
travelo.hu		
tudomanyplaza.hu		
vaol.hu		
vasarhely24.hu		
vasindex.hu		
vilagvege2012.hu		
wabererstema.hu		
webradio.hu		
24.hu		
53	**18**	**5**



The project has also direct readership through its website and social media:

Besides passive reaches the project has been presented at a number of events managing to promote its topic in an interactive way, such as FeHoVa, OMÉK, Tatai Vadlúd Sokadalom, and AgroMash. All of these events had participant numbers above 10 thousand.

We have carried out a multi-annual survey among farmers based on the surveys carried out with MME partner, Bükk National Park, before the current project. We have carried out a multi-annual survey among farmers during the traditional spring cattle driving festival from 2014 to 2019. In 2020, due to Covid, qualitative phone interviews have been carried out. The surveys have investigated farmer's perception and attitude toward agri-environmental schemes.

Fig 1: The distribution of land owned by surveyed farmers by size. Bar sizes are proportional to land area

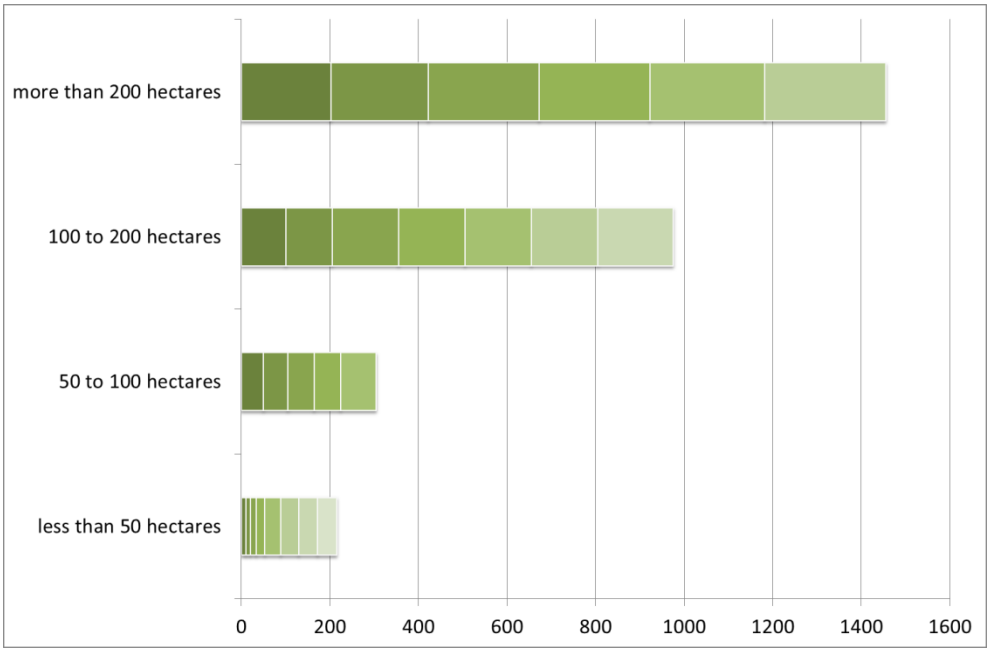


Fig 2: Have you participated in an agri-environmental scheme

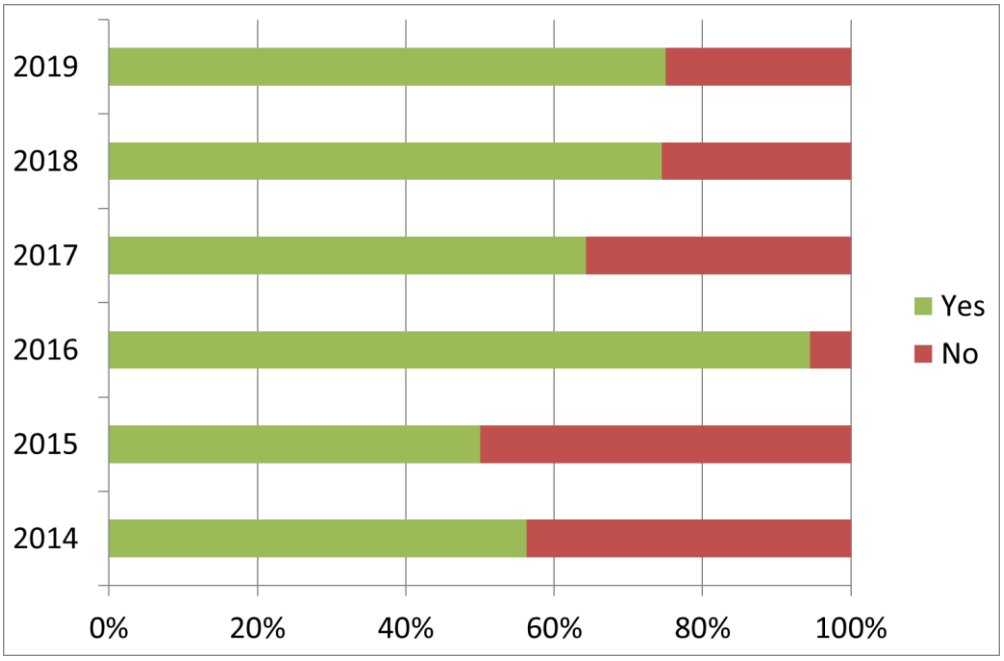
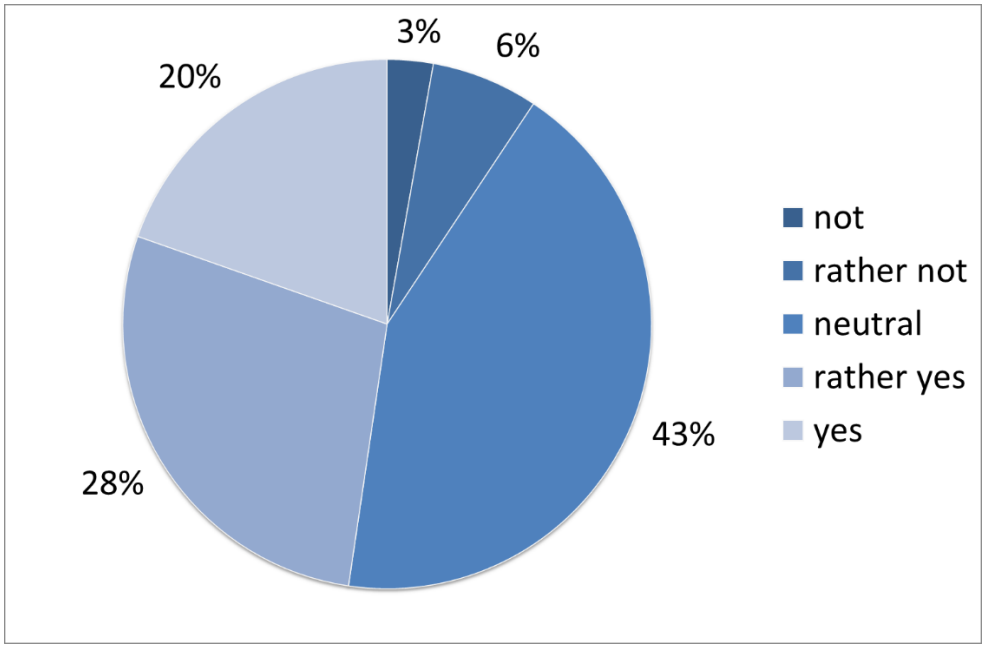
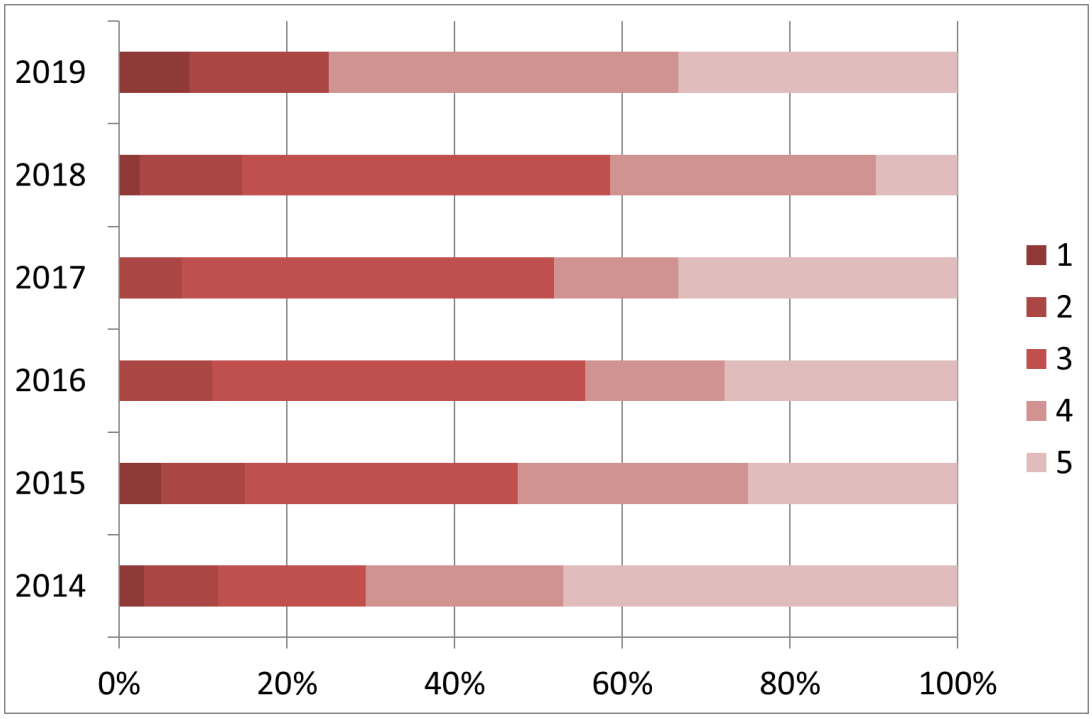


Fig 3: Farmers' perception whether the financial support was sufficient in the agri-enviromental scheme?



In general the majority of the farmers believe that the financial support in the AES is sufficient. Also, the overwhelming majority of them is neutral or positive related to the statement that long-term economic sustainability is possible with AES practices. However, those who participated earlier tend to be more neutral than positive about long term economic sustainability.

Fig 4: Farmers' perception whether participation in AES is economically sustainable



On the other hand farmers have listed many perceived benefits of AES answering to open question. There were a high number of nature and environment related benefits, and many has mentioned healthy food and ecotourism. It seems that local farmers are quite conscious about the increased ecosystem services. There were many respondents who could not mention any disadvantage. Those who mentioned highlighted increased pest occurrence, difficult requirements and very often the difficulty and extent of needed paperwork.

Table 6: Perceived benefits and disadvantages of AES

Perceived benefits	Perceived disadvantages
nature conservation	pests
more bird species	conflict with phytosanitary regulations
more game population	lower harvests
research	needs more management
ecotourism	too much bureaucracy
fodder production	conflicts with neighbouring farmers
income	difficult to meet requirements
environmental benefits	
landscape	
organic farming	
healthy food	
awareness raising	
more employment	
habitat for useful insects	
good for poor agricultural lands	

The benefits of AES for nature has been especially highly rated by farmers who did participate in the AES earlier, which indicates that the AES participation has an important sensitising and awareness raising factor as well.

The majority of respondents have also agreed that AES has a positive impact on employment.

Fig 5 Farmers' perception on the benefits of AES for nature

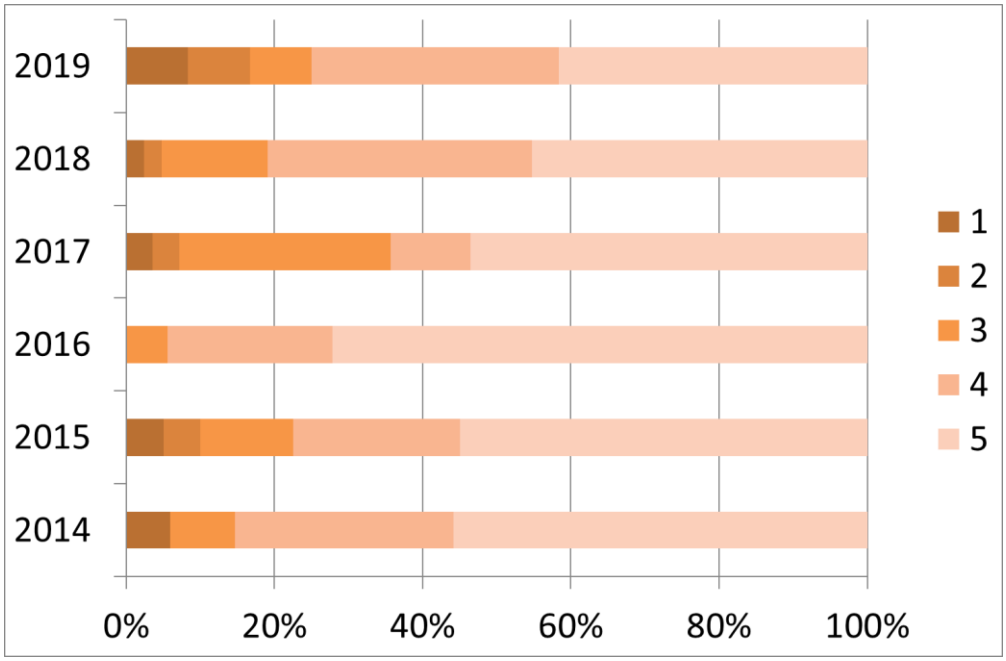


Fig 6 Farmers' perception on the benefits of AES for employment

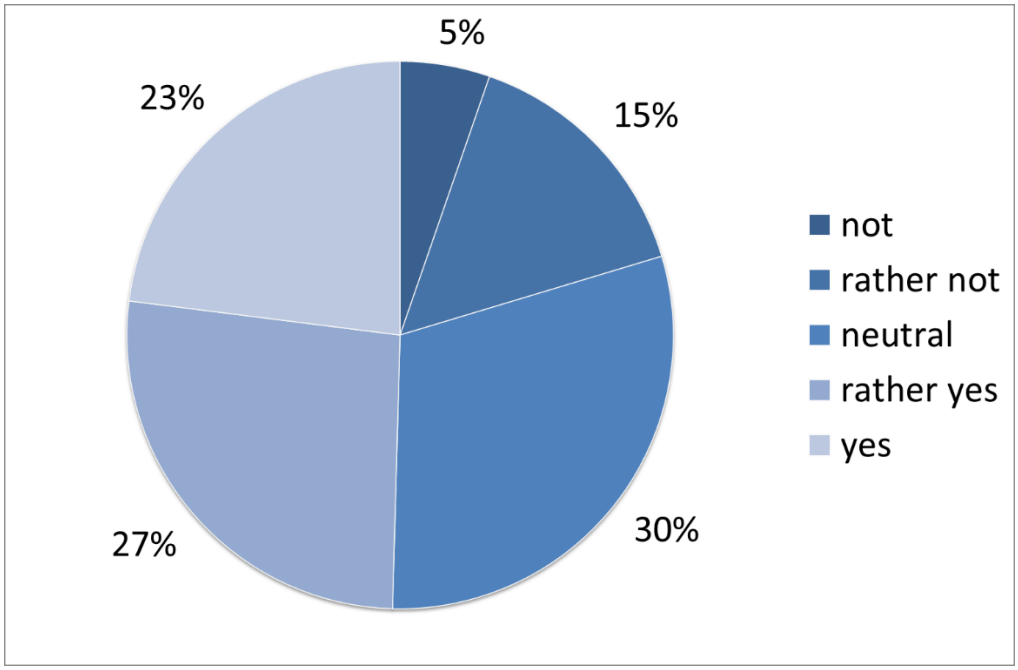
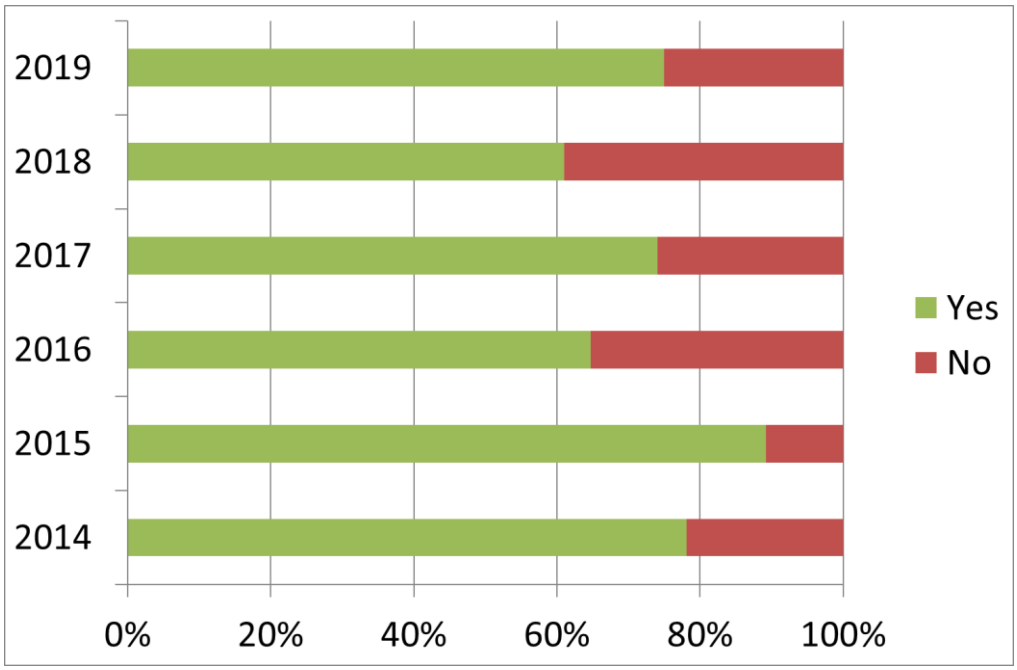


Fig 7: Farmers's intent to continue AES practices if financial support is no longer available



Overall, the majority of farmers have indicated that they would continue AES practices even without financial support. Among those who have already participated, it is still a majority, but at a significantly lower rate. This might be due to experience on actual economic outcomes as well as management issues related to AES practices. In 2020 due to the covid pandemic, we have carried out qualitative phone interviews, and received similar results indicating that AES payments are a significant factor in maintaining AES practices. In fact in 2015 there was a suspension of AES payments for administrative reasons and many farmers have stopped or loosened AES practices.

5 References

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