



UNISECO

UNDERSTANDING & IMPROVING THE SUSTAINABILITY OF AGRO-ECOLOGICAL FARMING SYSTEMS IN THE EU

Deliverable Report D3.6

Updated Story Maps on Lessons Learnt from each Case Study

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ACRONYMS

AUA	Agricultural University Athens
BEF-LT	Baltijos Aplinkos Forumas VSI, LT
BEF-LV	Baltijas Vides Forums, LV
BOKU	University of Natural Resources and Life Sciences, Vienna
COMPAS	Comparative Agriculture System Model
CREA	Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria
FiBL	Research Institute of Organic Agriculture
GAN	Gestion Ambiental de Navarra, S.A.
GEO	Geonardo Environmental Technologies LTD
HUT	The James Hutton Institute
ISARA	Institut Supérieur D'Agriculture Rhone Alpes
LUKE	Luonnonvarakeskus
MAP	Multi-Actor Platform
SES	Social-Ecological System
SLU	Sveriges Lantbruksuniversitet
SMART	Sustainability Monitoring and Assessment RouTine
TI	Johann Heinrich von Thünen Institut
UNIABN	The University Court of the University of Aberdeen
UZEI	Ustav Zemedelske Ekonomiky a Informaci
WWF	Asociatia WWF Programul Dunare Carpati Romania

EXECUTIVE SUMMARY

In 15 case studies representing different European farming systems and stages along the agro-ecological transition, related barriers have been analysed and strategies co-constructed with the Multi-Actor Platforms over the course of the project. The strategies are the result of different assessments (such as sustainability assessment or social network analysis), interviews and workshops with local stakeholders. Narratives that derive the main lessons learnt on governance changes and sustainability implications of agro-ecological transitions have been developed in a set of web pages (story maps) to make the research outcomes accessible in an easy to understand language to practitioners, policy stakeholders and the wider public. While there are unique lessons learnt in each case study, there are three common domains of lessons learnt, namely (1) knowledge and social capital, (2) market access, processing and value added and (3) innovative policy support. Based on existing policies such as support for organic farming, the latter needs specially to focus on fostering cooperation, supporting of the knowledge system, result-based payments and green public procurement.

INTRODUCTION

15 case studies formed the core of the research work in the project UNISECO (see descriptions under section 1.3). Each of them represented a certain farming system with farms at different stages of the agro-ecological transition pathway (Prazan and Aalders 2019). In these case studies, the status quo was analysed by means of comparing conventional farms to agro-ecological farms with regard to their sustainability performance and by analysing the governance networks of the farming systems in the case study region as well as the institutional framework through a participatory engagement of the Multi-Actor Platforms (MAPs). The information generated was analysed with the help of the Social-Ecological System (SES) framework to better understand drivers and barriers of agro-ecological transition. The outcome of the SES assessment was the basis to co-construct strategies for agro-ecological transitions which propose actions and governance changes suitable in the particular case study context to address the key barriers and drivers of transition.

The main lessons learnt on governance changes and sustainability implications of agro-ecological transitions were then transformed into narratives presented in the form of story maps (see section 1.1 for a definition). These story maps profile actions that engage a wide range of different rural actors and deliver agro-ecological farming practices. They also comprise easily understood messages from farmers, rural communities, civil society, businesses and authorities referencing environmental, social, economic and governance issues across rural areas in 15 countries of Europe.

The story maps published with this Deliverable update the first set of story maps that were published in Deliverable D3.3 (Prazan et al. 2019) which was based on a limited set of results from the status quo assessment. This report outlines the approach of updating the story maps and contains links to and descriptions of the story maps. At the end, common themes of lessons learnt across all case studies are further explored in detail.

1. METHODS

1.1. STORY MAPS

Story maps are a technical solution developed by the mapping software company ESRI¹ to “combine authoritative maps with narrative text, images, and multimedia content.” (ESRI 2021). In the context of UNISECO, story maps are used to enable the dissemination of research results from each case study to a wider public. Consequently, story maps in UNISECO were developed by recognizing the following principles:

- Narrative character
 - Short and concise text
 - Language that is easy to understand
-

¹ WWW.ESRI.COM/EN-US/HOME

- Use of pictures and if possible videos to increase visual attractiveness

As a consequence, story maps balance between presenting the key lessons learnt from case studies and keeping the narrative character.

1.2. UPDATE OF STORY MAPS

A first set of story maps were developed for the deliverable report D3.3 in the project (Prazan et al. 2019) and have now been updated to include the lessons learnt from the case studies after the completion of the case study work. To ease the dilemma of presenting as most relevant information as possible while keeping the story maps in a format which is easy to read, project partner could also choose to create a second story map complementing the first story map. Consequently, there are some case studies with two story maps (see Table 2).

Regarding the inclusion of key lessons learnt, the partners received two guiding questions for the update:

- **Status Quo:** How does the case study fail or succeed to deal with the key dilemma (e.g. successful and hindering policies and market instruments as well as other drivers / barriers)?
- **Outlook:** What are promising ways to overcome (remaining) barriers?

1.3. CASE STUDIES

The case studies in UNISECO were conducted in 15 European countries at different levels of scale (from NUTS 3 level to the level of the whole country) and focused on different productions systems as well as sustainability issues and dilemmas. Table 1 provides an overview of the case studies.

Table 1: Overview of the case studies, adapted from Prazan et al. (2019).

Partner Country	Sustainability Issue (selection)	Dilemma
Austria (Ökoregion Kaindorf - mixed farm)	Water scarcity because of climate change, soil quality decline	How to tackle impacts from climate change (e.g., increasing water stress), increase carbon sequestration in soils, prevent soil degradation and reduce soil fertility loss from arable land while maintaining or improving the farm's social and economic sustainability and contributing to climate change mitigation.
Czech Republic (Vysočina region – dairy farms)	Soil degradation	How to maintain the good performance of arable land management in organic dairy farms in Vysočina region to reduce arable soil degradation and water pollution by pesticides while ensuring economic viability.
Finland (Nivala region – dairy farms)	Carbon emissions, nutrient recycling.	How to reduce harmful climate, soil and water impacts of dairy farming in Nivala region without sacrificing economic viability of the dairy sector, by means of envisioning and implementing a multipurpose bio-product plant along the lines of circular bioeconomy, with the aim of producing bioenergy and organic fertilizers from manure.
France (Auvergne-Rhône-Alpes – winegrowers)	Pesticide pollution,	How to reduce dependency on external fertilisers and to reduce pesticides use (especially glyphosate) through agro-ecological

	economic viability	practices increasing soil ecological services (soil biology) while maintaining the economic profitability of farms?
Germany (Nienburg in Lower Saxony – arable farms)	High pressure on biodiversity and water quality	How to integrate agro-ecological practices on arable land (conventional and organic) in highly market-oriented farming systems to reduce biodiversity loss and water pollution threats without significant negative impacts on the economic viability of farms?
Greece (Imathia region of Central Macedonia – fruit farms)	Pressures due to using agro-chemicals (on soils, water, biodiversity)	How to sustain the long-term economic viability of farms whilst protecting the natural resources? How to protect biodiversity and water quality in orchards whilst also improving competitiveness and market access?
Hungary (Belső Somogy region – arable farms)	Soil degradation, water pollution, biodiversity on arable land	How to integrate agro-ecological practices on arable land in highly market-oriented arable farming systems to maintain and improve soil quality without significant negative impacts on the economic viability of farms?
Italy (Chianti region – winegrowers)	Nutrients and pesticide pollution, biodiversity	How to promote cropping system diversification in a highly specialised and market-oriented winegrowing area via the adoption of agro-ecological practices, to increase biodiversity and improve landscape management while maintaining the profitability of farming through local value chains.
Latvia (countrywide – dairy farming)	Economic viability and adding value	How to increase the economic viability of conventional and organic, largely grass-based, dairy farms while preserving biodiversity in grasslands and water resource quality? How to ensure that all organic milk is processed into organic dairy products?
Lithuania (countrywide – dairy farming and cheese making)	Economic viability and adding value	How to maintain and encourage extensive management (grazing) of grassland habitats? How to become (or remain) competitive in the market without intensifying the farming practice?
Romania (Transylvania and Maramures region – mixed farms)	Economic viability, slowly increasing intensification	How to increase the economic viability of small- scale farming while preserving the cultural landscape and biodiversity?
Spain (Basque Country and Navarra – mixed farms)	Environmental, social and economic viability	How to reduce the fragility of agro-ecological farms while maintaining the social, economic and environmental sustainability?
Sweden (countrywide – ruminant farms)	Livestock contribution to climate change	What are the challenges and possibilities to diversify specialised ruminant farms (conventional and organic) to include more crops for direct human consumption while simultaneously integrating more agro-ecological principles to enhance sustainability performance in an economically strained production sector?
Switzerland (Lucerne Central Lakes region – livestock farms)	Lake eutrophication, P increase in water, ammonia emissions	How to reduce the high animal densities and at the same time remaining profitable against the backdrop of important path dependencies (barn constructions, depths, up- and downstream market, knowledge system).
United Kingdom (Grampian and Tayside in north-east Scotland – mixed farms)	Soil degradation, water pollution	Producing public goods whilst maintaining viable production of private goods, and securing economic and social sustainability at a farm level

2. RESULTS

2.1. LIST OF STORY MAPS AND ACCESS LINKS

Table 2: List of story maps

Country	Story map title	Access link
Austria (Ökoregion Kaindorf - mixed farm)	Mitigating of climate change by humus formation in arable farming	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=032cf66052e64ecd9cc752d7cdf6286c
Czech Republic (Vysočina region – dairy farms)	Improvements of soil properties on the arable land	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=ecf7eb6ab4cd4b98b4757b6f5ae6cf65
Finland (Nivala region – dairy farms)	Reducing environmental impact of milk (1 st story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=64fa4b18c31a4fedb4f66732c6657460
	Transition towards carbon-neutral milk (2 nd story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/MapJOURNAL/INDEX.HTML?APPID=a9ef8c5d49649c3bbb28ad28951ee6a
France (Auvergne-Rhône-Alpes – winegrowers)	Viticulture and agroecology	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=bfe0d6ab6ad942a2b3b289d7949d2254
Germany (Nienburg in Lower Saxony – arable farms)	Improving biodiversity and water quality without generating significant negative impacts on the economic viability of farms	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=90547de4dee34e9399ba56b752e8f526
Greece (Imathia region of Central Macedonia – fruit farms)	The transition of a fruit producing area to sustainability	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=fda66920ba444c208a82e277a7803cf2
Hungary (Belső Somogy region – arable farms)	Sustainable natural resource management to increase economic viability	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=09dac6682fc141b18bc2bdbfe61a74f2
Italy (Chianti region – winegrowers)	Diversifying specialised winegrowing areas - Improving the sustainability of land use for transitioning towards agroecology (1 st story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=66ca5d7b066f4f73bb27095d23d53112
	Promoting Biodistricts can help the agroecological transition in Chianti (2 nd story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=4497efd2f35b4a0cb002944d73d59515
Latvia (countrywide – dairy farming)	Improving the sustainability of grassland-based organic dairy farming in Latvia - Increasing the production and consumption of organic dairy products (1 st story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=278e2cfc9d3c4e95b8c4f90db9e87ba9
	Improving the sustainability of grassland-based organic dairy farming in Latvia - Policy Measures Supporting Transition to Organic Dairy Farming and Consumption (2 nd story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=ab9081041d4e4a09967ddeee3ee93855
Lithuania (countrywide –dairy farming and cheese making)	Keeping it small and extensive: the way to a sustainable future in Lithuanian dairy sector	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=0f6e7664f2b44b1a8ea411e859d22357
Romania (Transylvania and Maramures – mixed farms)	Small-scale farming in Transylvania	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=e6fb7494f71e40cda73839d33613c5df
Spain (Basque Country and Navarra – mixed farms)	Agro-ecological farming systems in northern Spain	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=5322d26972743468d7f65ed88c9d86e
Sweden (countrywide – ruminant farms)	More food from ruminant farms (1 st story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=719a0b3b83f8428db8d0f4288e27b389
	Potential for increased food production from ruminant farms (2 nd story map)	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CAscade/INDEX.HTML?APPID=925fb47c265040e8959b334fa441c3e3

Switzerland (Lucerne Central Lakes region – livestock farms)	Strategies for reducing stocking densities	HTTPS://PANDA.MAPS.ARCGIS.COM/APPS/CASCADE/INDEX.HTML?APPID=631653c9b5a64f398abe03ef7d665c58
United Kingdom (Grampian and Tayside in north-east Scotland – mixed farms)	Delivering Public Goods- Transitions to Agro-Ecological Farming Systems in North-East Scotland, UK (1 st story map)	HTTPS://BBSRC.MAPS.ARCGIS.COM/APPS/CASCADE/INDEX.HTML?APPID=9135e00f333b46d59db8963353127de4
	Transition to agro-ecological farming systems (2 nd story map)	HTTPS://STORYMAPS.ARCGIS.COM/STORIES/C7E4BE0940E148079D60572BEF49537D

2.2. DESCRIPTION OF STORY MAPS

2.2.1. AUSTRIA (ÖKOREGION KAINDORF - MIXED FARM)

The background of the “humus formation” initiative in the Ökoregion Kaindorf is to increase humus contents of soils on arable land. The Ökoregion Kaindorf is located in federal state of Styria in Eastern Austria. No or reduced tillage, site-specific and year-round green cover and the use of compost reduces greenhouse gas emissions and sequester carbon in the soil and improves resilience of farmers against climate change impacts. Carbon certificates help to increase economic resilience of farms. The program includes knowledge transfer to farmers and experience on increasing soil fertility is exchanged in a group of regulars. The region is characterized by a high diversity of farm activities. Especially those humus-farmers, who achieve a high degree of ecology with a high diversity of products and use of alternative marketing channels, also achieve a high sustainability performance. Yet, the agro-ecological practices of the Ökoregion are not entirely implemented in the region nor in Eastern Austria. More transfer of knowledge and experiences is needed. Other agro-ecological practices would be innovative and new to the relatively dry climate of Eastern Austria, such as agroforestry. Ways to amplify alternatives market channels are direct sales at farms and via farmers’ markets and to caterers, establish cooperation between farmers to amplify the product range so to attract more consumers, and establish and improve the supply of public canteens with agro-ecologically produced goods. Humus formation, as Fritz Loidl, an organic farmer in the region tells us, is an ecological path for both conventional and organic agriculture.

2.2.2. CZECH REPUBLIC (VYSOČINA REGION – DAIRY FARMS)

The central theme of the Czech case study is an improvement of soil properties on arable land by conversion to organic dairy farming in the Vysočina region.

Organic dairy farms have more favourable effects on soil, water and air quality and contribute significantly more to enhancing biodiversity compared to conventional farms, but they are more economically vulnerable.

Uncertainty in sales and price premium has proved to be, together with limited experience, need for new investment, lack of work-force, a major obstacle to keep producing organic goods. Although organic farms have formed a sales cooperative, they still face market uncertainty and low price premium.

Improving knowledge, connecting with other actors in the food system and keeping added value are proposed strategies to overcome barriers. Support for advice and green public procurement, together with organic farming support measure, are instruments selected by

stakeholders as most promising to support the proposed strategies implementation. One of the key conditions for the successful implementation of strategies and the effective use of incentives is increased cooperation between farmers.

2.2.3. FINLAND (NIVALA REGION – DAIRY FARMS)

By using the example of a biogas plant that was planned by dairy cooperative Valio to be built in municipality of Nivala, the Finnish case study demonstrates that the complexity of agro-ecological production systems can act as barrier in their implementation. The uncertainty inherits in a multiproduct system (biogas and bio-based fertilizer), in which the future demand and prices are subject to great uncertainty, results in large risk in the investment decision. Furthermore, the complexity of causal effects in the environmental benefits associated with the production poses a problem for communicating those benefits to consumers. The policies designed to remove the economic barriers for investments were considered important by the stakeholders, but could also lead to favouring a certain scale of biogas plant in which the manure nutrient valorisation to bio-based fertilisers will not be feasible.

2.2.4. FRANCE (AUVERGNE-RHÔNE-ALPES)

In viticulture, the general dependency on external inputs such as fertilisers and especially pesticides is high. The reduction of synthetic inputs could impact yields and many farmers fear economic consequences. Despite this, some farmers are already implementing agro-ecological practices but the majority of them intend to start implementing practices such as: green manure to reduce external fertilisers use, using combined cropping and mechanical weeding to reduce pesticides use (wine shrubs and other crops), testing specific materials for slopes (i.e. rotary spade) to prevent erosion and reduce water evaporation. These emerging practices need to be intensified and encouraged through different policies and instruments.

Farmers mainly adapt their practices to quality schemes production rules, purchasers' requirements and markets' expectations. Including environmental expectations in these requirements is necessary to enable changes in farmers' practices at a broad scale. It can be done by relevant private and public product specifications (such as broadening rules for geographic indication).

Collective action, such as the CUMAs (farm machinery cooperatives) networks of farmers, fosters the experimentation of new practices and the exchange of good practices. There are different policy instruments already in place that enable to empower groups of innovative farmers. Testing instruments to foster cooperation between farmers and non-farming stakeholders (local authorities etc.) for implementing crop diversification or agri-environmental measures is a promising approach.

2.2.5. GERMANY (NIENBURG IN LOWER SAXONY – ARABLE FARMS)

The Nienburg County in Lower Saxony comprises an intensive agricultural area with sustainability issues regarding biodiversity loss and water pollution. The case study area is adjacent to intensive livestock regions with high land prices. Particularly the latter exposes farmers to a high degree of economic market pressures. To initiate a practically feasible and accepted transitions towards a more sustainable agricultural system, key was identifying and integrating practices which address the sustainability issues but result in limited negative impacts on the economic viability of farms. Still, the implementation of agro-ecological

practices is hindered by cultural, knowledge, economic and policy related barriers. This includes the attitude and knowledge of farmers towards agro-ecological farming, their access to land and conditions of land rental agreements, the lack of added value of agro-ecological products, as well as the high bureaucracy of policy measures including strict control mechanisms and a lack of flexibility. These barriers were found to be best dealt with involving a local champion (acting as knowledge facilitator at the intersection of biodiversity and farming), adding value to products which were produced in a more agro-ecological manner (e.g. through consumer education and school programmes as well as food policy councils), and introducing innovative design changes to existing rural development measures (e.g. result-based approaches, integrating advice into existing agri-environmental programmes).

2.2.6. GREECE (IMATHIA REGION OF CENTRAL MACEDONIA – FRUIT FARMS)

The Greek case study is located in Imathia, Northern Greece, a highly intensive farming area where permanent fruit crops are dominant, mainly peach orchards for fresh consumption and canning. The case study focuses on the development of a competitive and market oriented fruit sector through the collective application of agro-ecological practices, such as Integrated Farming and a mating disruption method, aiming at mitigating the environmental impact of agricultural activities and producing safe products of high quality. The key dilemma for farms is to improve the farms' profitability by strengthening the competitiveness of their produce whilst protecting water quality and biodiversity. Case study findings revealed that collective investments in farm modernisation, advice and information provision, support for cooperation activities and joint actions among key actors of the value food chain that promote innovation and knowledge exchange may play a key role in supporting a viable agro-ecological transition strategy and ensuring sustainable agriculture.

2.2.7. HUNGARY (BELSŐ SOMOGY REGION – ARABLE FARMS)

Biophysical conditions for crop production in Hungary are generally considered to be good. However, extreme weather events, water shortage during the growing season, climate change and, in particular, the deterioration of soils poses increasing environmental challenges to farmers. Adoption of soil conservation farming practices are seen as a first step for conventional arable farmers in the transition to long term sustainable resource management and agro-ecology. Farmers need knowledge and advisory support to accompany them along the systemic change, as well as scientific evidence to underpin the economic viability of such practices. Many actors in the agri-food system are relevant to assist farmers to bring the widespread adoption of soil conservation farming practices to a success. Innovative design changes to existing rural development measures have the potential to successfully promote transitions to soil conservation farming if accompanied by measures of research and advisory development, raising public awareness and demand for crops produced this way.

2.2.8. ITALY (CHIANTI REGION – WINEGROWERS)

Chianti faces environmental challenges that can undermine the economic performance of farming. To face those challenges, pioneer farmers have promoted the agro-ecological redesign of the farming system via a grassroots initiative, i.e. the "Chianti Biodistrict".

UNISECO researchers and Biodistrict members jointly developed a strategy to foster the agro-ecological transition in Chianti, by identifying key farming practices and policy tools to ensure their diffusion among as many farmers as possible in the short/mid-term.

Crop diversification is the key intervention to ensure a successful agro-ecological transition.

Important barriers to crop diversification are the lack of food chain development for products other than wine, the difficult access to abandoned land by interested farmers, and the limited coordination among farmers and other local actors.

The measure for advisory services of the Rural Development Programme can help farmers identifying suitable crops to start the diversification process. The development of local food chains for small farmers can create market opportunities for the introduced crops. Recently, Tuscany Region has enforced a law that acknowledges Biodistricts as institutional actors, who can participate to the calls for grants funded under the Rural Development Programme.

Advisory services and peer-to-peer learning are likely the key to the diffusion of crop diversification and the change of farmers' mindset.

2.2.9. LATVIA (COUNTRYWIDE – DAIRY FARMING)

The rural landscape of Latvia is still largely characterized by a mosaic of farmland and woodland. As such, it is well-positioned to preserve and enhance existing high biodiversity and good water quality through the maintenance of existing extensive conventional farming practices and by a transition to organic and agro-ecological farming practices. However, both conventional and organic dairy farms are under pressure to increase productivity to remain economically viable resulting in the intensification of farming practices, including the conversion of permanent pasture.

Multi-Actor Platform stakeholders identified key transition barriers to organic and agro-ecological farming practices and systems and developed a transition strategy to: 1) Increase the economic viability of conventional and organic dairy farms while improving environmental performance; 2) Stimulate processing and consumer demand for organic dairy products. The transition strategy consists of a framework of policy measures that supports organic dairy and agro-ecological farming practices and the production and consumption of organic dairy products.

2.2.10. LITHUANIA (COUNTRYWIDE – DAIRY FARMING AND CHEESE MAKING)

The case study is concerned with sustainable development of the dairy sector and the preservation and extensive management of valuable grassland and wetland habitats. Currently dairy farming is shifting indoors and grazing is becoming less common thus the ecological quality of the grassland and wetland habitats is threatened. It is aimed to understand how dairy farmers can transition to agro-ecological farming and how barriers and drivers for such transition can be addressed.

At the centre of the story are the small scale extensive dairy farmers - cheesemakers, that process their produce on farm, but the case study encompasses any small dairy farm, organic dairy farms, and also larger more intensive dairy farms. The key sustainability issues are socio-economic in nature. Small farmers are unable to survive from dairy farming alone and

potential of small-scale family farms is not appreciated at the state level. As a consequence, the number of small farms has been sharply declining in Lithuania. The decline in farm and animal number results in a loss of valuable grassland habitats (or cessation of their management, due to decreasing grazing animal number). Other important barriers are lack of knowledge on agro-ecological farming practices, lack of promotion of sustainable farm goods, lack of innovative agri-environmental schemes and lack of encouragement for transition on the state level. Innovative agro-ecological dairy farming initiatives are present, but without clear government leadership and strategy they may remain as examples only.

2.2.11. ROMANIA (TRANSYLVANIA AND MARAMURES REGION – MIXED FARMS)

Small-scale farming in this region has historically produced a High Nature Value landscape, having had essential benefits for biodiversity, resilience in the face of climatic events, while offering opportunities for socio-economic wellbeing. Specific risks for biodiversity and the whole landscape are coming from both the intensification and the abandonment of traditional land uses, as well as from the erosion of the social and cultural fabric that has upheld these diverse ecosystems to date.

The UNISECO researches looked at 10 farms to better understand how they perform on various aspects, such as social wellbeing, environmental stewardship, and economic viability, including the barriers and drivers of their progress. Amongst these farms is Topa Organic Farm, a mixed family farm located near the UNESCO Heritage Site of Sighisoara for which the story map features the result of the SMART sustainability assessment applied to this farm.

Small and medium-scale farms such as Topa, which are numerically dominant in Romania, but occupy only an estimated 50% of the agricultural area, deliver wider societal goods apart from food (as revealed in our farm assessments for environmental integrity, for example), but they've been strongly eroded and are now endangered by market dynamics, the lack of rural infrastructures and resources (including through properly targeted agricultural subsidies), and reticence to cooperate for a better position in the food chain. If conventional farms were to switch to organic practices, they too would improve their environmental performance. And there is a certain segment amongst the larger farms which in spite of the hindrances have enlisted on a path to more sustainable practices.

Our assessment also revealed that all farms rely on subsidies quite heavily - they contribute up to around 80% to the gross farm income for organic farms and 50% of the gross farm income for conventional farms.

Part of the solution, as an NGO representative suggests, is that an integrated approach [is needed]. We need to develop new rural tourism activities, educational and experiential tourism and improving the farming systems, sustainably." Environmental and community organisations play a key role in alleviating some of the difficulties local farmers experience, not only in what regards economic viability, but also in terms of access to information, knowledge and skills in entrepreneurship, marketing, accessing and managing funds and grants. NGOs also help to raise public awareness about the benefits smallholder farming brings to society, and to advocate for better, more inclusive policies at local, regional, national and even European level.

2.2.12. SPAIN (BASQUE COUNTRY AND NAVARRA – MIXED FARMS)

The case study of Spain in UNISECO project focuses on local and organic farmers who are already at a high stage of agro-ecology. Farmers face social (psychological, cognitive and institutional), knowledge, economic, and policy related barriers, all of which prevent conventional farmers from implementing changes towards agro-ecological transition. The most effective strategies to address the current barriers should focus on supporting transformation and commercialization initiatives, strengthening of social networks and the associative fabric, and improving economic, bureaucratic and access to land conditions. The two key actors to implement transition strategies are farmers (as leaders of change, following a bottom-up approach to respond to the actual needs of the sector) and the public authorities (as facilitators). Agro-ecological transition needs a basis of cooperation or collaboration, with the additional involvement of other actors, in order to maintain and scale up advanced agro-ecological farming systems, and to offer to a growing consumer demand a more complete and varied option of local and organic food.

2.2.13. SWEDEN (COUNTRYWIDE – RUMINANT FARMS)

Ruminants are an important part of Swedish farming. In diversified agro-ecological farming systems, livestock can play a positive role by converting in-edible biomass to food for human consumption. At the same time, arable land can be used more efficiently by growing crops for direct human consumption. In this way, it is possible to increase the number of people fed per hectare.

The farmers participating in UNISECO have demonstrated that this change is possible through agro-ecology. They doubled the number of calories that they provide per hectare, as well as increasing the amount of protein and fat produced. An example of this is Sjöholms gård, which has increased its sustainability by decreasing the animals reared and converting to organic and pasture-reared heifers.

There are several barriers to farm diversification, such as long transition times, price fluctuations and lack of risk sharing. To overcome these, more cooperation between farmers and buyers is needed. UNISECO in Sweden has facilitated connections between the farmers and other actors, such as the small mill Berte Qvarn and the drink company Oatly. Another important step towards diversification is making crops for food more profitable. The Swedish UNISECO project, in collaboration with Oatly, has initiated a payment scheme for crops produced with sustainable practices. Finally, EU and national policies have an important role in promoting the production of crops for direct human consumption and pasture-fed livestock, for example by providing incentives and education throughout the chain.

2.2.14. SWITZERLAND (LUCERNE CENTRAL LAKES REGION – LIVESTOCK FARMS)

The Lucerne Central Lakes region with the Sempach, Baldegg and Hallwil lakes faces particular challenges due to high animal densities. They are, besides other factors, responsible for a number of environmental problems. A sustainability assessment as well as workshops and interviews with stakeholders confirms that agro-ecological transition to lower animal densities is not attractive to farmers because the current system generally performs economically quite well for them. However, there are other hindering factors too, such as

uncertain market demand for income alternatives (e.g. organic produce) and lack of know-how with regard to income alternatives (e.g. new crops). These barriers were found to be best dealt with strengthening the knowledge system in the region, in particular by promoting networks of innovative farms, decision support to young farmers as well as make advisory services more easily accessible.

2.2.15. UNITED KINGDOM (GRAMPIAN AND TAYSIDE IN NORTH-EAST SCOTLAND – MIXED FARMS)

The UK case study area of north-east Scotland has key assets which position it well for transitioning to a sustainable future. It is highly productive for many types of agricultural activity, particularly cereals and beef, and other primary production such as forestry and soft fruits, it has good access to markets which add significant value to the farm products and has a diverse skill base on which to build. It also has a strong cultural tradition in land-based industries and rural living, valuing the public goods associated with its natural and cultural heritage. The responses to the economic, environmental and social challenges of the sustainability issues and dilemma being faced in the case study provides evidence of the transition towards agro-ecological farming systems in each of the sub-systems of the socio-ecological system of the UK case study. Policy and measures are providing the frameworks or incentives to tackle most of the barriers to transition. The relevant actors all recognise the significance of such transitions, albeit with a focus in their own areas of remit or responsibility. Not all barriers can be overcome (e.g. changes in climate), but opportunities relating to mitigation or adaptation are being taken, and networks of knowledge flows are contributing to the credibility of such opportunities.

3. CONCLUSIONS

The 15 case studies of UNISECO have yielded numerous lessons learnt. While some of them are unique to the case study setting, there are three common themes of lessons learnt, namely (1) knowledge and social capital, (2) market access, processing and value added and (3) innovative policy support. Based on existing policies such as support for organic farming, the latter needs specially to focus on fostering cooperation, supporting of the knowledge system, result-based payments and green public procurement.

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