Case study reports – Step 3-4

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Deliverable status: Final
1 Introduction

The Deliverable 4.3 contains all 12 case study reports of step 3 and 4. Further details are provided in D4.4 (Discussion paper), in particular information relating to selection of the 12 Steps 3-4 case studies, including a first compilation of the results.

- The full case study reports are also available on the project website at: http://pega-sus.ieep.eu/resources-list#case-study

- The case study reports are accompanied by fact sheets and PowerPoint presentations that are available upon request from the national research teams and at the above URL.
## Overview of case studies

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CASE STUDY

ORGANIC FARMING IN MOUNTAIN REGION MURAU (AUSTRIA)

D4.3 | Final Version | March 2017

Thilo Nigmann, Gerhard Hovorka, Thomas Dax
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Around 150 mountain farms in the region Murau produce organic haymilk under a private quality label contributing to the provision of ESBOs, in particular biodiversity and cultural landscapes (among others).
1 Introduction: What is the case study about?

Austria is a predominantly mountainous country, where in large parts high nature value farming, clean environment and rich cultural and natural heritage prevail. The mountain area comprises 70 % of the national territory and 50 % of the Utilized Agricultural Area (UAA). Mountain farming has a key role in safeguarding sensitive ecosystems through the preservation of multifunctional, small structured, mosaic like landscapes and the general living environment, and is therefore fundamental to the tourism sector and to fulfilling needs of society at large (Hovorka, 2011, 2016). Organic farming is the most environmentally friendly form of agriculture in this context (Groier et al., 2005; Groier, 2013) and around 17 % of all farms in Austria are certified as organic farms, respectively 20 % of the total UAA in Austria is managed organically, representing the highest share of organically managed land use in the EU-28 (BMLFUW, 2015a). Around 72 % of all organic farms are classified mountain farms (IACS, 2014)1 and vice versa 25 % of mountain farms are certified as organic farms (BMFUW, 2016a). In Austria, around 69 % of all dairy cattle is reared by mountain farms, with 14 % of dairy cattle being reared in organic mountain farms (IACS, 2014). The high shares of organic farms in disadvantaged alpine regions can be explained by i) the lack of agricultural alternatives under the prevailing climatic and topographical conditions (Greimel, 2003) and ii) existing extensive agricultural practices made transition to organic feasible in relation to public support for organic farming and the opportunity to achieve higher product prices (Krammer, 2007; Buchgraber et al., 2011).

Given the relevance of both organic and mountain farming in the Austrian context, this case study focuses on successful implementation of the joint organic quality certification and marketing initiative “Zurück zum Ursprung”2 (ZZU). While their product portfolio ranges from a wide array of organic dairy (i.e. haymilk, silage milk, cheese, yoghurt, etc.) to organic non-dairy products (i.e. vegetables, flour, bread, meat, etc.), this case study focuses exclusively on the organic mountain haymilk production scheme in the region Murau (Figure 1). This area represents one of three localized ZZU organic mountain haymilk branding strategies (i.e. Murau, Styria; Pinzgau, Salzburg; Kitzbühel, Tyrol) in Austria.

The district Murau (part of the NUTS-III-region AT 226) is defined as mountain region and covers an area of 1,384 km². It is home to 28,388 inhabitants (2016) who live in the 14 municipalities of the region. Like many other mountain regions, it is characterised by low population density (21 people / km²). There is an ongoing trend of rural depopulation which is aggravated by both a negative rate of natural demographic change as well as a negative migration balance (2011-2015) which is among other factors often triggered by a lack of employment opportunities. Only 20 % of the area is considered “permanent settlement area” (BMFUW, 2015b). In the district Murau, 1,297 farms are registered within the IACS system (2014) of which 1,185 are classified as mountain farms. Organic mountain farming is a widely-spread management system in the district, 34 % of all farms are organic farms, respectively 37 % of all mountain farms are organically managed (IACS, 2014). Mountain farming in the region is dominated by milk production and livestock breeding as well as forest activities which together constitute

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1 Integrated Administration and Control System (IACS). For further information please consult: http://ec.europa.eu/agriculture/direct-support/iacs/index_en.htm
2 “back to the origin”, translation by the author

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the three main sources of agricultural income. About 34% of all organic mountain farms in the district currently participate in the organic haymilk scheme of ZZU.

Figure 1: Location of the case study district Murau, Federal State of Styria, Austria

Generally, haymilk production is a traditional form of a relatively extensive type of farming in which cut grass is processed dried representing the prime fodder base for dairy cows (instead of silage). It is considered the highest premium milk product in Austria at present (ARGE Heumilch Österreich, 2016a), and consumer awareness, sales and turnover are steadily increasing (BMLFUW, 2016). The development of the general situation of the (national) milk market and price volatility is assumed to have direct impacts on the producer price for haymilk as well. The substantial agricultural support for farming in Austria reveals effects of absorbing shocks due to volatility of milk markets, at least at a short-time scale. Nevertheless a stabilization of the general milk market is desirable for the haymilk production as well, since it would further stabilize market developments.

The umbrella organization ARGE Heumilch was established in 2004 and unites around 8,000 haymilk producers and 60 dairies, cheesemakers and alpine dairies. Members of ARGE Heumilch deliver around 420,000 tons of haymilk per year (2016), representing 15% of the total volume in Austria (3 Mio. tons) while in the EU context, only 3% of the total production accounts to haymilk (ARGE Heumilch, 2017). Since March 2016, haymilk is recognized as Traditional Specialty Guaranteed (Council Regulation (EEC) No 1848/1993).

While haymilk itself is a success story in Austria, the organic mountain haymilk scheme of ZZU links haymilk production to both organic and mountain farming. The initiative ZZU started first in 2006 as a conventional venture and transformed production into all organic in 2008. Milk of the participating organic mountain farms in the district Murau is processed by a local dairy

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3 The results of a recent comprehensive study (Lindner and Kittl, 2016) on the structure of haymilk producers in Austria verified the potential of organic haymilk. The study also found that there is significant untapped potential for farms not using technical hay drying support which would increase fodder quality and reduce the amount of manual labour (Lindner and Kittl, 2016)

4 OJ L 58/28 04.03.2016
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

and is distributed by one of the largest Austrian retail chains (and the largest discounter) which also holds the intellectual property right of the ZZU brand. The organic mountain haymilk scheme ZZU comprises more stringent requirements than those of EU organic regulation (i.e. Council Regulation (EC) No 834/2007), including e.g. silage-free forage, the requirement to use 75% roughage from own production, 100% organic feed from Austrian origin, prohibition of soya bean feeding, a minimum of 180 days access to open runs of which a minimum of 120 days on pasture grazing (Schenkenfelder, 2015; Werner Lampert Beratungsges.m.b.H., 2016a). By connecting the production of quality products to alpine landscapes, the organic mountain haymilk scheme creates synergies between the improvement of the income of mountain farmers (e.g. higher organic haymilk premium, premium guarantee) and those of other parties along the value chain, and maintenance of typical landscapes and high levels of biodiversity (e.g. through continuation of farming, and prevention of overgrowing and succession to forests).

Table 1: Key features of the ZZU project

<table>
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<th>Region or locality</th>
<th>District Murau (part of the NUTS-III-region AT 226).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main farming/forestry system</td>
<td>Organic haymilk production, animal grazing, hay mowing. Most farmers also manage private forests, along with big forest estates.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; case study)</td>
<td>Organic haymilk farmers in district Murau: about 3,450 ha of UAA, 450 ha alpine pastures and about 5,250 ha of forest.</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Focus on “species and habitats” and “landscape character and cultural heritage”. Additional important ESBOs: rural vitality, animal welfare, and GHG mitigation.</td>
</tr>
<tr>
<td>Total no. of farmers/foresters involved</td>
<td>150 organic haymilk farmers, participating in regional initiative ZZU (“Back to origin”), with rising tendency. Each farm has on average 10 dairy cows and a total average annual milk delivery of 50,000 kg.</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Dairy processor, retail chain, private consulting agency.</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Basic milk price, organic haymilk premium, premium guarantee and CAP support (particularly AEM and ANC).</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>Established in 2006 (conventional) and transformation to organic scheme in 2008.</td>
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The analysis focuses on the conceptual framework of environmental social beneficial outcomes (ESBOs) and investigates how the production of organic mountain haymilk in this case results in positive externalities such as “species and habitats: Achieving (or maintaining) the presence of diverse and sufficiently plentiful species and habitats”, thus enhancing ecological diversity (ESBO no. 11) and “landscape character and cultural heritage: maintaining or restoring a high level of landscape character and cultural heritage” (ESBO no. 14; Maréchal et al., 2016).

The case study was conducted using a multi-method and multi-disciplinary approach relating to the analysis of the provision of ecosystem services, the conceptualization of the relevant Social-Ecological System (SES) and its use as analytical framework, policy analysis of most influential policy elements (e.g. CAP agri-environmental measures) and the reference to participatory involvement of local actors and actors involved at various stages of the value-chain. In an initial assessment, stakeholders were identified representing all actors of the value chain as well as the wider social and political environment. Subsequently, focus groups and in-depth interviews were conducted in which participants (i) mapped in a participatory scoping process the key ESBOs related to organic-haymilk production, (ii) specified how they perceive, access, use and value the selected main ESBOs and (iii) provided their perception of the current ESBO status and trends.

The general aim of the case study is to better understand the provision of ecological and social beneficial outcomes through agriculture and forestry, in our case the organic mountain haymilk production under the private actor scheme ZZU in the district Murau.

5 There are also other highly relevant ESBOs such as rural vitality, animal welfare and air quality (absence of odour nuisances through silage production, etc.) that are connected to the production of organic haymilk under the ZZU scheme. The intention of this case study however is to focus analysis on key ESBOs.
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

Key ESBOs considered:
1. Species and habitats
2. Landscape character and cultural heritage

**RESOURCE SYSTEM**
Diverse cultural landscapes in the district Murau (14 municipalities, 30,000 inhabitants). Around 150 certified organic mountain farms participate (with tendency to rise) in the organic mountain haymilk project ZZU (2016); contrary to the general trend of farm abandonment with adverse effects on selected ESBOs.

**ACTION SITUATIONS**
The production of organic mountain haymilk by means of extensive agricultural practices contributes to a diverse and intact alpine cultural landscape. Economic viability is dependent on public support and price premia payments, including mid-term price premia guarantee. Standard setting, extension services, quality assurance and traceability system and marketing activities by ZZU leads to an effective product differentiation which creates value added and in combination with exclusive distribution and sales through one of Austria’s largest retailers, is key to the successful value chain organisation.

**GOVERNANCE SYSTEM**
The legal framework of EU CAP and national RDP are the public support fundament for mountain agriculture in the region. In addition, collective action at ZZU level; producers required to be certified organic mountain farmers, renounce silage use and comply with additional private ZZU haymilk regulations. Establishment of a joint quality certification scheme and joint marketing and sales strategy.

**ACTORS**
Mountain farmers; local economy (e.g. Upper Styrian dairy, general businesses); retail chain Hofer; ZZU brand and standard development by the private consulting agency Werner Lampert Beratungs-ges.m.b.H; EU bodies; Austrian state apparatus; local population; consumers; tourists and excursionists.

**MACRO-ISSUES**
Negative: EU milk market; price volatility; intensification of production.
Positive: consumer preferences

Figure 2:
Summary of the SES framework for [AT-1] case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)
2.2 Description of the SES

Hay farming constitutes a labour-intensive type of farming that requires specific resources and well-developed skills. The labour intensity of hay harvesting increases with an increase of the mountain slope gradient from below 35% compared to above 50% on average three times (Blaschka, 2012). Until the middle of the 20th century, it was the predominant mode of land management in the alpine regions of Austria (and other mountain regions of the world with similar climate and production situations) and decisive in formation of its distinctive cultural landscapes. Since then this traditional mode of production has been by and by replaced by economically more efficient silage based management systems. This occurred in line with the general trend of an increase in farm size, scale in production, commodification, delocalization of production and consumption systems and concurrent reduction of agricultural labour, farm abandonment and rural depopulation. Yet, mountain farms have received substantial public support since several decades (in particular output neutral payments for disadvantaged areas depending on the degree of difficulty on a cadastral scale system of 1-4 as well as agri-environmental scheme payments) that acknowledged their specific social, ecological and economical function already prior to EU accession in 1995 (Krammer, 2007). In the aftermath of Austria’s integration into the single market, producer prices dropped sharply which was mitigated by transition direct payments on a temporary and degressive basis as well as by measures of the new Agri-environmental Programme (Hoppichler, 2007). This situation prior to the EU accession also influenced the relatively high CAP 2nd pillar share of Austria in comparison to the EU average (AT 60%; EU 33%)6 (Pohl, 2009, p.35) as well as the overall high share of organic farms. Although there is political consensus and substantial public support in place, the transitional processes of intensification and increase in scale on the one hand, and price volatility and reduction of the total number of farms especially in disadvantaged areas on the other hand, is still prevalent. Despite widespread policy support for mountain farming, the challenges threatening the provision of ESBOs (i.e. intact cultural landscapes and resulting high levels of biodiversity) as well as increasing disparities between high-productive lowlands and less-favoured mountain regions have remained core features of land use in these regions.

At the same time, agri-food systems in Austria reacted to changing consumer attitudes by incorporating new post-productivist concepts (e.g. provision of ESBOs among others) into their value chain organisation and branding strategies (Schermer, 2015). These happened often through regional, organic or traditional labelled products which are to a large extent distributed via mainstream retail channels, often marketed as specific “store brands”. The three largest food retailers in Austria (Rewe, Spar, Hofer) hold together 82.9% of the food sector’s market share (BMLFUW, 2014) which is the highest market concentration of the EU countries (Mayr, 2011). They act as gatekeepers and exert market power to both consumers and input suppliers (Salhofer et al., 2011). Considering that almost 70% of the organic sector’s turnover is generated via these large retail channels they are of strategic importance (Größ, 2017).

The private sector initiative ZZU and their organic mountain haymilk scheme is a practice illustration of this development. ZZU was launched through the efforts of a private consultancy company (Werner Lampert Beratungsges.m.b.H.) first as a conventional mountain haymilk

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6 The percentage rates are based on the mean value of the budget for the programming period 2007-2013 and include both EU and national budget
venture in the district Murau in 2006 and was then transformed into an organic scheme in 2008. This private actor is responsible for the standard setting, extension service and the establishment of the quality assurance and traceability system of the private label. Farmers participating in the scheme sign a declaration of participation and guarantee to adhere with the ZZU standard for which they receive a guaranteed minimum price premium for the delivered fresh organic mountain haymilk (currently until 2020) (personal communication, 1-5, 20.01.2017). The actual price premium payout is currently above the minimum price premium agreed for that period. The fresh milk of the participating mountain farms is processed by a nearby regional dairy (Obersteirische Molkerei). The retail chain (Hofer; 19% market share of Austrian food retail sector; Mayr, 2011) is proprietor of the brand ZZU and exclusively distributes the products under their private label through their network of around 460 stores in Austria (Nielsen, 2015). Besides the production site Murau, ZZU extended their branding strategy to two other organic haymilk production regions in mountain areas of Austria (i.e. Pinzgau in Salzburg and Kitzbühel in Tyrol) and diversified their product portfolio to a wide range of organic dairy and non-dairy products of regional provenance. The significance of ZZU is the attempt to link organic farming with additional haymilk regulations and features of (traditional) mountain farming as well as the horizontal and vertical integration of the entire value chain. Its represents an effort to relocalse agri-food systems in mountain areas, to link the production to environmental and social outcomes and jointly market it under a territorial proposition under better terms of trade. Thereby, ZZU acts as an antipode to the mainstream trend of agricultural intensification, farm size enlargement and concurrent farm abandonment.

Mountain farms are fundamental to the provision of ESBOs and paramount to the analysed SES in the district Murau. The resource system is characterised by its diverse and intact cultural landscape which is a result of extensive agricultural and forestry activities. Predominantly these include dairy farming and cattle breeding. Around 81% of the district area is utilized agricultural and forestry area of which 30% is used for farming and 70% by the forestry sector (BMFLUW, 2015b). Most of the forestry owners (about 66%) are small forestry owners, with less than 200 ha forest area (BMFLUW, 2015b). Also for ZZU producing mountain farmers, forestry plays a significant role as complementary source of income (personal communication, 1-4, 21.12.2015; 1-12, 28.11.2016). Besides agriculture and forestry activities (both full and part-time), many ZZU farms offer vacation facilities through “on-farm holidays” to an increasing number of tourists who seek authentic farm holiday experience (personal communication, 1-12, 28.11.2016).

There is a total of 1,297 farms in the district of Murau registered in the IACS system (2014). Thereof, 1,185 are registered as mountain farms (representing 91% of all IACS farms) of which 442 are certified organic (Table 2). Thus, 37% of all mountain farms in the district are managed organically which is far above the Austrian average of 24% of all mountain farms (IACS, 2014). Organic operations are contrary to the common held belief slightly larger in size than the average. Furthermore, 192 of them renounce the usage of silage as part of the Agri-environmental scheme. Of these 192 farms that fulfil the requirements, currently around 150 farms participate in the mountain haymilk project ZZU. On average, each ZZU farm in the district has 10 dairy cows with an annual yield of around 5,000 kg milk per dairy cow (personal communication, 1-5, 20.01.2017). The national average herd size is 17 dairy cows and the annual milk delivery is 5,734 per cow (BMFLUW, 2016a). Therefore, ZZU organic haymilk farms are smaller than the national average.
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Table 2: Mountain farm characteristics in the district Murau (IACS, 2014)

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<tr>
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<th>Mountain farms</th>
<th>Organic mountain haymilk ZZU farms*</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Ø UAA (ha)/operation</td>
<td>Silage renunciation (AEM)</td>
</tr>
<tr>
<td>Conv.</td>
<td>743</td>
<td>15</td>
</tr>
<tr>
<td>Organic</td>
<td>442</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>1185</td>
<td></td>
</tr>
</tbody>
</table>

*Number of ZZU participants, Murau, 2016 (personal communication, 1-5, 20.01.2017)

The resource units of the SES (grassland, pastures, meadows, High Nature Value Farmland, forest areas, etc.) represent the resource system. In the district Murau, 39.8% of the UAA (excluding alpine pasture forage areas) represents High Nature Value Farmland which is compared to the Austrian average in mountain areas of 30.8% and the general Austrian average of 25.5% significantly higher. In terms of alpine pasture forage areas, in the case study region 72% is HNV Farmland and the Austrian average is 76.5% (BMLFUW, 2015d, personal communication, 1-13, 31.08.2016). These values show the high significance of close to nature agricultural areas with high species diversity in the district Murau. Figure 3 illustrates the typical cultural landscape prevalent in the district Murau. There are two main factors of the ZZU organic mountain haymilk project impacting the resource units. First, quality is significantly shaped by the type of management system applied. Organic mountain farming practices have generally a higher farm-level biodiversity potential in comparison to conventional farming (Schader et al., 2014). Secondly, price premia for organic mountain haymilk in addition to public support (i.e. Agri-environmental payments for organic farming and silage renunciation, Areas of Natural Constraint payments - ANC) render this more cost intensive type of extensive agriculture economically more viable. As a farmer noted “without public support, there simply wouldn’t be mountain agriculture and the cultural landscapes, iconic for mountain areas, would disappear” (1-12, 28.11.2016). While a positive economic return is necessary, economic viability of land management decisions however also depends on a range of other variables such as timing, stability and certainty of earnings as well as the input requirements, associated risks and opportunity costs but also non-pecuniary factors such as personal “belief systems” (Emerton, 2014). In interviews, all farmers agreed that besides the organic haymilk premium payments it was also the premium guarantee especially under volatile EU milk market conditions, allowing for greater planning stability, that motivated participation (personal communication, 1-5, 31.05.2016; 1-12, 28.11.2016). They also agreed that substantial public support (through the commonly available RDP measures) made a transition more feasible and some also highlighted the positive contribution to the environment and tourism sector as an important factor for participation (personal communication, 1-12, 28.11.2016). Therefore, it is important to take the heterogeneity of farmer’s decision making sufficiently into account (Darnhofer et al., 2005).
An adequate agricultural income for extensive land management systems reduces the trend of land abandonment and thereby preserves and maintains cultural landscapes and their intrinsic value (i.e. regional identity, leisure appeal). Haymilk price premium payments support agricultural income and thereby render mountain farming economically more viable. It also economically benefits other value chain actors as well as the local public (and society at large) who all profit from the provision of ESBOs (e.g. leisure, local economy, protective function against land and mudslides, etc.). On one hand, the CAP positively impacts resource units and mountain farming through the Areas of Natural Constraint scheme as well as through Agrienvironmental payments (e.g. support for organic agricultural practices and silage renunciation), on the other hand, the first pillar of the CAP contains contradictory signals towards intensification, commodification and growth.

Economic pressure on the European milk market as well as the trend towards intensification of production adversely affects resource units as well as extensive mountain farming and thereby the resource system as a whole. Positive implications on the other hand are triggered by an increasing consumer awareness and demand for organic haymilk as well as by the general trend towards healthier lifestyles and conscious consumption (personal communication, 1-1, 17.12.2015; 1-6, 02.06.2016; 1-7, 08.06.2016). While the current policies under the first pillar of CAP puts pressure on the provision of ESBOs, the second pillar supports extensive agricultural practices and therewith positive externalities such as the provision of selected key ESBOs. On a regional level, the ZZU standard is defined by a private consultancy which also offers extension services to its members. The ZZU standard requirements enable alternative positioning and differentiation in relation to other projects as well as to silage-milk, thereby creating a competitive advantage and positively impacting farm income and resource units.
and thus, conservation of cultural landscapes and levels of biodiversity. Different variables such as public support schemes, price premia, price guarantee, associated positive public perceptions and consumer awareness all play into the cost and benefits equations and render this type of extensive mountain agriculture economically more viable.

Current developments of the European milk market (e.g. abolition of milk quota, overproduction, declining prices) will also impact haymilk production in the long run. Declining price of conventional milk will also increase pressure on the organic sector.

The organic mountain haymilk production is a positive contribution to avoid overproduction of milk and may act as a role model for agricultural policy for site-specific development, production and distribution of regional products (personal communication, 1-7, 08.06.2016).

2.3 Levels of ESBO provision, trends and determinants

The negative impacts that intensive agricultural practices (e.g. input of fertilizers, pesticides, heavy machinery, silage production) exert on biodiversity levels is well documented (e.g. species reduction in intensively used meadows) (Benton et al., 2003; Zechmeister et al., 2003a; Zechmeister et al., 2003b). Also the potentially positive impact of both hay farming and organic agriculture on levels of biodiversity has been widely recognized (Hole et al., 2005; Schader et al., 2014; Schmitzberger et al., 2005). The general state of key ESBO provision in the case study area is considered very positive among all experts and organic mountain haymilk production is seen as a site-adapted management system favourable to biodiversity levels and the maintenance of cultural landscapes (personal communication, 1-9, 03.11.2016; 1-10, 08.11.2016; 1-11, 15.11.2016).

The essential requirements for participation in the ZZU organic mountain haymilk scheme include the following aspects (Schenkenfelder, 2015; Werner Lampert Beratungsge.m.b.H., 2016a, 2016b, 2010). Some (*) of which are more restrictive than EU organic (EU Council Regulation (EC) No 834/2007) and the regulatory framework for haymilk production in Austria (ARGE Heumilch Österreich, 2013; European Commission, 2016).

- Participation in the “abandonment of silage” measure of the Agri-environmental Programme
- Registration as mountain farm (*)
- Use of 100% certified organic and soy-free fodder, exclusively of Austrian origin (*)
- 75% of roughage from on-farm production (*)
- Minimum of 180 days / annum access to open runs (of which a minimum of 120 days / annum pasture grazing; and a minimum of 0.2 ha pasture area / livestock unit depending on the vegetation cycle; minimum of 6h / day) (*)
- Additional animal welfare standard - certified "Tierschutz geprüft" (certified animal welfare in cooperation with the Society for species-appropriate animal husbandry - Gesellschaft für artgemäße Nutztierhaltung) (*)
- Quality assurance and traceability system (monitoring of the entire value chain) (*)

The Research Institute of Organic Agriculture (FiBL), Austria is commissioned to conduct CO₂ assessments (since 2008) as well as water footprint, farm-level biodiversity potential (when
aggregated also at product-level) and so called “regional benefit” analysis at product-level (since 2010) for ZZU products, based on a range of different methods (e.g. ISO 14040 and 14044; Markut et al., 2015; Schader et al., 2014). For the production of ZZU organic mountain haymilk in the case study region, the results state 14,3% lower CO2 emissions, 14,8% lower water footprint, 26% higher biodiversity potential and an 80% increased regional benefit compared to conventional dairy production. Figure 4 shows the consumer information label of ZZU organic mountain haymilk of the region Murau printed on the milk packages.

Figure 4: ZZU organic mountain haymilk sustainability label of Murau

Among the most relevant factors impacting biodiversity potential in relation to organic haymilk production is the i) renunciation of mineral fertilizer ii) the choice of the appropriate mowing regime and iii) silage renunciation. Mowing is critical as there is a negative correlation between the number of cuttings as well as the time of cutting and plant species richness due to the reduced periods in which plants are able to flower and propagate (Zechmeister et al., 2003a). Hay farming is also responsible for the development and maintenance of the small-scale, mosaic like structures which are favourable in terms of biodiversity (personal communication, 1-11, 15.11.2016). The average number of cuttings in the case study area was around 2-3 cuttings per annum which is below the Austrian average of 5-6 cuttings (personal communication, 1-12, 28.11.2016). However, both values showcase an upward trend (personal communication, 1-12, 28.11.2016). In addition, intensive silage production often commits farmers to cut at an earlier stage and also more frequently which often leads to an advanced application of fertilizers with both in combination negatively impacts levels of biodiversity (Zechmeister et al., 2003a). Experts argued that organic hay farming tends to be more extensive than conventional silage based milk production (personal communication, 1-10, 08.11.2016; 1-11, 15.11.2016). It was argued that haymilk reduces the acquisition of nitrogen through concentrated feed which in turn fertilizes the soil negatively, impacting levels of biodiversity (personal communication, 1-10, 08.11.2016). According to experts, the positive effects on key ESBOs are to a large degree the result of the underlying organic and extensive hay farming practices which are combined in the standard ZZU regulation (personal communication, 1-10, 08.11.2016; 1-11, 15.11.2016).

The conservation of biodiversity and cultural landscapes in alpine settings is generally appreciated by society at large. This is reflected by the Austrian Agricultural Law of 1992 (BMLFUW,
2015a) and by various measures in Austrian agricultural policies (BMLFUW, 2013) and the Rural Development Programme (BMLFUW, 2015c). Evaluation reports of the RDPs in the programming periods 2007 – 2013 and 2014-2020 confirm the positive impacts (BMLFUW, 2010; 2016d). The participation in Austria’s Agri-environmental Programme compensates farmers for income loss resulting from changed management practices that favour the environment (i.e. organic farming, silage renunciation). All ZZU participating farmers receive financial support from this scheme. In addition, mountain farmers receive payments from the Areas of Natural Constraint Scheme. In combination with the former, ZZU price premia (guaranteed until 2020) generate a significant income effect and thereby contribute to the continuation of farming.

A quantitative based approach for assessing the value of key ESBOs in monetary terms is not available and, what is more, methodically and conceptually not meaningful. A valorisation can be accessed via the level of support per hectare organically managed area as well as on payments per hectare from the Areas of Natural Constraints Scheme. The organic haymilk premium payment of ZZU can in the wider sense be considered as appreciation for the provision of key ESBOs. In addition, consumer associate higher environmental sustainability with organic haymilk production and acknowledge its impact on mountain cultural landscape (Matscher et al., 2009). Therefore, consumer willingness to pay higher prices for ZZU products may act as a proxy indicator for the high appreciation of key ESBOs.

Main improvements in relation to the provision of ESBOs might be achieved by further developing the ZZU product standard, through project expansion (e.g. number of participants) as well as through activities raising consumer awareness. Key limiting factors are the complex requirements (e.g. level of red tape, related costs) for transition from conventional to organic farms, hay drying facilities, milk market developments (e.g. declining prices, limits of demand for organic haymilk, restrictions in the value chain and diverse bottlenecks in high quality products provision, etc.), future expectations concerning mountain farming as well as individual mountain farmers’ considerations (e.g. farm succession, off-farm employment).

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

The production of organic mountain haymilk creates cross sector synergies. This is for example paramount to the regional tourism sector in terms of maintaining alpine cultural landscapes, regional identity and public awareness. The avoidance of odour nuisances from silage production was also frequently mentioned as a positive side effect contributing to the alpine image (personal communication, 1-11, 15.11.2016; 1-12, 28.11.2016). As a farmer noted, “on-farm holidays are for many of us the only way to make ends meet. For that, tourists want to enjoy the classical image of a mountain scenery, see cows grazing and not experience odour nuisance caused by silage” (1-12, 28.11.2016). A striving tourism sector contributes to the creation of quality job opportunities and thereby mitigates rural depopulation to some degree. The maintenance of agriculture in mountain areas restrains the succession of grassland to forests and secures the protection function against mud and landslides. In essence, organic haymilk production in the mountain region Murau is a valuable example of integrating environmental sustainability with economic and social welfare in line with the EU objectives of inclusive, smart and sustainable growth.
3 **Shifting societal norms, collective learning and voluntary actions**

The district Murau was study subject in the development of a conceptual framework for an “organic region as a model for sustainable regional development” some years ago (Groier et al., 2008). The general idea was to develop an authentic localized organic umbrella brand that would enable local actors to market their products. Even though the “organic region” remained a conceptual framework, the region was hereby already well prepared for the application of a joint organic quality certification and marketing initiative.

The transformative capacity that initiated the ZZU brand (in 2006) however came from a private actor outside of the region (with substantial existing experience) who perceived the prevailing conditions as ideal for the development of a differentiated marketing strategy based on a site-adapted haymilk standard which would also benefit the maintenance of extensive mountain farms (personal communication, I-2, 17.12.2015; 1-6, 02.06.2016). Due to the changing consumer awareness towards conscious consumption, healthier and more sustainable lifestyle choices, the timing was considered ideal (personal communication, I-2, 17.12.2015; 1-6, 02.06.2016). In 2008, it was decided to move forward and transform the ZZU standard into organic farming. “The change of production system was a challenge for many of us at first, but proved to be a step in the right direction” as a farmer stated (personal communication, 1-12, 28.11.2016). The brand ZZU “conveyed” the image of an “idyllic alpine region with high nature value” which triggered a feedback loop with positive implications on rural identity, environmental awareness and tourism (personal communication, 1-4, 21.12.2015; 1-12, 28.11.2016). The participating farmers are incorporated in the further development of the project ZZU via their engagement in a working committee (personal communication, 1-6, 02.06.2016).

4 **Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision**

4.1 **Organisational capacities, leadership, networking and communication**

The agri-food chain is governed by vertical and horizontal cooperation of value chain actors. The brand ZZU brings together private actors (i.e. farmers, dairy, the retail chain and consultancy firm) in the endeavour to valorise place-specific assets (i.e. biodiversity, alpine cultural landscapes, tradition). These assets function as a competitive advantage and enable the positioning of a quality product, applying a targeted marketing strategy based on unique territorial identities which promote the visibility of rural areas that are embedded in a global economy (Horlings et al., 2014).

The alliance between all value chain actors in a new organisational form is governed by a formalized commonly shared set of rules. In this alliance, farmers agree to comply with rules and regulations defined by the private standard of ZZU through a declaration of participation. The cooperation first started in 2006 and is well developed and consolidated. The conditions for the production and preservation of both private and public goods are a reflection of consumer demand, public support measures and the private initiative ZZU. It seems important to highlight that it needed the organization of the whole value chain, from land use, primary production, processing, retail organization to marketing, and activities to raise consumer awareness.
and appreciation of the particular product features of haymilk in order to establish an effective marketing and lasting economic performance.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

The brand ZZU can be understood as the development of a “new governance structure for existing markets” employing a value added strategy in order to overcome challenges that come along with volatile milk markets driven by market liberalization agendas (Van der Ploeg et al., 2012). The normative framework of ZZU signals “fair prices” for primary producers in mountain areas, increased and unaltered organoleptic properties, transparency of the value chain, and positive externalities on the environment and animal welfare through organic and extensive agricultural practices. The governance arrangement builds on the horizontal and vertical cooperation of value chain actors. While this governance structure engenders value added for involved farmers, it is nonetheless highly depended on public support.

There is a significant concentration of market power at the retailers end of the dairy value chain in Austria which exercise strong market power that impacts both input and consumer prices (Salhofer et al., 2011). These influential retailers function as gatekeepers leaving little bargaining power to primary producers, and also limit influence exerted by processors, in our case the regional dairy.

The value-added strategy in combination with the inter-branch cooperation between farmers and the retail sector within the ZZU value chain generates higher farm income and is therefore a feasible alternative to the prevailing paradigm as it antagonizes the trend of intensification, abandonment of farming and thus supports the provision of ESBOs.

4.3 The role and impact of policy in ESBO provision

Rural development policies address the trade-offs in policy objectives on economic goals on the one hand, and on societal goals to provide ESBOs on the other hand. In Austria, support levels are particularly high for Pillar 2:

- Organic mountain farms (both haymilk and silage production) in the district Murau (total of 442 farms) received 2.7 Mio € support from measures of the 1st pillar of CAP and 6.6 Mio. € from 2nd pillar CAP measures (IACS, 2014) (Annex Table 6).
- Organic mountain farms with haymilk production (total of 192) received about 0.9 Mio. € from 1st pillar and 2.9 Mio. from 2nd pillar (IACS, 2014) (Table 3).
- On average, each haymilk producing organic mountain farm received 4,635 € from 1st pillar CAP, 15,157 € from 2nd pillar CAP of which 8,835 € from the Agri-environmental Programme and 5,614 € from the Area of Natural Constraint Scheme.
- ZZU mountain farmers (about 150 of the 192 haymilk producing organic mountain farms) receive a total of CAP support payments of about 3 Mio. € per annum (Nigmann et al., 2016).

Experts agreed that without public support measures (in particular the Agri-environmental Programme, Area of Natural Constraint Scheme) mountain agriculture would not be feasible, putting alpine cultural landscapes and levels of biodiversity at stake (personal communication,
Therefore, the European Rural Development Policy plays a central role in the quantity and quality of ESBOs provision.

Table 3 shows the distribution of public support for organic mountain haymilk farms in the region Murau based on IACS (2014) data. Only measures which can be combined with organic farming have been considered.

Table 3: ESBOs relevant distribution of public support for organic mountain haymilk farms, Murau, 2014 (IACS, 2014)

<table>
<thead>
<tr>
<th>Policies and measures</th>
<th># of farm enterprises</th>
<th>UAA (ha)</th>
<th>Total public support (€)</th>
<th>Ø public support per ha (€)</th>
<th>Ø public support per farms (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st pillar CAP</td>
<td>192</td>
<td>3,970</td>
<td>889,966</td>
<td>224</td>
<td>4,635</td>
</tr>
<tr>
<td>2nd pillar CAP</td>
<td>192</td>
<td>3,970</td>
<td>2,910,129</td>
<td>733</td>
<td>15,157</td>
</tr>
<tr>
<td>Agri-environmental Programme (ÖPUL)</td>
<td>192</td>
<td>3,970</td>
<td>1,696,273</td>
<td>427</td>
<td>8,835</td>
</tr>
<tr>
<td>1 Organic farming</td>
<td>176</td>
<td>3,466</td>
<td>756,169</td>
<td>218</td>
<td>4,296</td>
</tr>
<tr>
<td>13 Abandonment of silage</td>
<td>192</td>
<td>2,934</td>
<td>458,575</td>
<td>156</td>
<td>2,388</td>
</tr>
<tr>
<td>14 Preservation of scattered fruit tree stands</td>
<td>15</td>
<td>6</td>
<td>688</td>
<td>114</td>
<td>46</td>
</tr>
<tr>
<td>15 Mowing of steep surfaces</td>
<td>171</td>
<td>908</td>
<td>152,221</td>
<td>168</td>
<td>890</td>
</tr>
<tr>
<td>17 Alpine pasture and shepherding</td>
<td>30</td>
<td>307</td>
<td>14,634</td>
<td>48</td>
<td>488</td>
</tr>
<tr>
<td>19 Greening of arable surfaces</td>
<td>36</td>
<td>121</td>
<td>15,721</td>
<td>130</td>
<td>437</td>
</tr>
<tr>
<td>26 Rare livestock breed*</td>
<td>6</td>
<td>77</td>
<td>21,710</td>
<td>282</td>
<td>3,618</td>
</tr>
<tr>
<td>28 Preservation and development of surfaces valuable in terms of nature water protection (nature conservation measure)</td>
<td>22</td>
<td>92</td>
<td>39,453</td>
<td>427</td>
<td>1,793</td>
</tr>
<tr>
<td>29 Animal protection measure*</td>
<td>189</td>
<td>3,430</td>
<td>205,197</td>
<td>60</td>
<td>1,086</td>
</tr>
<tr>
<td>Area of Natural Constraint Scheme</td>
<td>192</td>
<td>3,970</td>
<td>1,077,863</td>
<td>271</td>
<td>5,614</td>
</tr>
<tr>
<td>Other measures</td>
<td></td>
<td>135,993</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*number of livestock units  The key premium rates of the Agri-environmental Programme in the period 2007-2013 were as follows:

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7 Farmers in the region (NUTS 3 level), an average of around 60 % of farm income is derived from public support in 2014 according to the Austrian Farm Accountancy Data Network (FADN) - (LBG Österreich GmbH, 2015)
- Organic farming premium: 110 € for < 0.5 roughage consuming livestock units / ha and 240 € for >= 0.5 roughage consuming livestock units / ha (BMFLUW, 2015c, p.263).
- Abandonment of silage premium: 130 € / ha, respectively 170 € / ha depending on the milk quota / ha forage acreage (BMFLUW, 2015c, p. 322).
- Mowing of steep surfaces premium: 105 €, 230 € or 370 € depending on the slope gradient (BMFLUW, 2015c, p. 329).
- Animal protection premium: 60 € / livestock unit (BMFLUW, 2015c, p.386)

The Agri-environmental Programme is mainly oriented in maintaining and improving environmental conditions with the objective of preserving cultural landscape and biodiversity. Farmers who chose to participate have to remain in the program for a minimum of five years. In the district, each haymilk producing organic mountain farm received on average 427 € / ha from the Agri-environmental Programme. On average, each organic mountain farm in the district received 271 € / ha from the ANC scheme. The total payment per ha from 1st and 2nd pillar CAP amounts to 957€ per ha. These payments contribute substantially to the agricultural income of mountain farmers (BMFLUW, 2010; Hovorka, 2011). The bulk of these payments is provided by pillar 2 measures (ca. 70%). The largest amount is provided by Agri-environmental payments (ca. 45%) and the Area of Natural Constraint Scheme (ca. 28%) of all CAP support (IACS, 2014).

Besides the significant income effect these policies generate with its positive impact on the continuation on farming, the Agri-environmental Programme also contributes to the provision of ESBOs (esp. cultural landscape, levels of biodiversity). Table 3 exemplifies the most relevant measures in the district Murau. The results of the evaluation report show that the measures “organic farming”, “abandonment of silage”, “mowing of steep surface”, “alpine pasture and shepherding” and “nature conservation measures” exert clear positive impacts on the level of biodiversity (BMFLUW, 2010). In addition, “animal protection measures” is not only relevant in terms of species-appropriate animal husbandry but also an indication for rural vitality and important alpine cultural assets (personal communication, 1-9, 03.11.2016; 1-11, 15.11.2016). However, the various measures differ in terms of their effectiveness and it is acknowledged that more targeted measures have a higher impact leaving room for future improvements (BMFLUW, 2010). Yet, there is a frequent critique that public funds should be applied as focused as possible. While the responsible handling of public funds is beyond doubt, it bears the internal risk that only regions with a low environmental standard receive funding, leaving areas with existing high nature value behind (personal communication, 1-11, 15.11.2016). Therefore, it is important to acknowledge the role of the AEP not just for the establishment but also the maintenance of a high environmental standard. For this reason, both broad and targeted measures are of equal importance.

4.4 The role of the private sector in ESBO provision and enabling factors

ZZU is a prime example of horizontal and vertical cooperation in the Austrian context. The private quality marketing generates added value by the market and distributed under improved terms of trade along the value chain (Table 4). It should be acknowledged that public

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8 “Agri-environment measures provide payments to farmers who subscribe, on a voluntary basis, to environmental commitments related to the preservation of the environment and maintaining the countryside.” For more information, please see: [http://ec.europa.eu/agriculture/envir/measures/index_en.htm](http://ec.europa.eu/agriculture/envir/measures/index_en.htm)
support is independent from project participation but constitutes a basic requirement to engage therein (i.e. certified organic production, mountain farming situation, renunciation of silage). The retail partner markets the ZZU brand under a territorial proposition including values such as: traditional local production (exclusively produced by organic mountain farms and processed by a local dairy unit), animal welfare, GMO-free production, transparency, food quality, and processed through a fair partnership. ZZU claims to create a viable alternative for small-structured alpine agriculture in Austria which conserves and maintains cultural landscapes and high levels of biodiversity (Schenkenfelder, 2015; personal communication, 1-1, 17.12.2015; 1-5, 31.05.2016; 1-6, 02.06.2016). This general target is further supported by activities in other mountain regions enhancing other quality product patterns and applying similar value chain organizations. In all these activities, the transparent presentation of the product origin and the regional impact and ESBOs provision is of core relevance in the marketing strategies and consumer communication. Our case study product, the ZZU brand, has achieved a particularly high consumer recognition value and enables the retail chain to improve its image and competition at industry level. Figure 5 shows the value chain organisation of ZZU.

**Figure 5: The value chain: organic mountain haymilk production in Murau**

In terms of value distribution, the dairy, respectively the retail chain offers an organic haymilk premium payment of 0.12 € / kg milk (4.2 % fat, 3.6 % protein) (in 2014) which has recently been increased up to 0.21 € / kg (personal communication, 1-6, 02.06.2016; 1-12, 28.11.2016). The additional variable cost of ZZU organic mountain haymilk is estimated to be 0.15 € / kg higher than conventional milk (personal communication, 1-12, 28.11.2016). The higher variable costs are mainly attributed to higher cost of certified organic concentrated feed (personal communication, 1-12, 28.11.2016). The final consumer sales price of conventional milk is 0.81 € per litre (excl. VAT) and 1.17 € per litre (excl. VAT) for ZZU organic mountain haymilk. While the farmers’ share of the value chain is around 35 % for conventional milk, it is 40 % for ZZU farmers. The generated additional turnover for 150 participating farmers in the region is roughly around 1.57 Mio. € (calculated with an average annual milk production of 50,000 kg).
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814.

or about 10,500 € per farm. Considering the higher variable cost, net value added is on average roughly 3,000 € per farm higher than for conventional production.

Table 4: Comparison average milk prices by kind in Austria and value chain composition

<table>
<thead>
<tr>
<th>Farm raw milk prices in € cent / kg (4.2% fat, 3.4% protein) (excl. 13% VAT)</th>
<th>Price premium in € cent / kg (excl. 13% VAT) compared to conventional farm raw milk prices</th>
<th>% change compared to conventional farm raw milk prices</th>
<th>Estimated higher variable cost of ZZU organic haymilk in € cent / kg (4.2% fat, 3.4% protein) (excl. 10% VAT) compared to conventional</th>
<th>Estimated average final product sale price in € cent / kg (excl. 10% VAT)</th>
<th>Value chain composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>28.4</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>80.9</td>
</tr>
<tr>
<td>Haymilk (conventional)</td>
<td>34.0</td>
<td>5.6</td>
<td>19.8</td>
<td>8</td>
<td>99.1</td>
</tr>
<tr>
<td>Organic</td>
<td>41.2</td>
<td>12.8</td>
<td>44.9</td>
<td>12</td>
<td>113.6</td>
</tr>
<tr>
<td>ZZU organic haymilk</td>
<td>47</td>
<td>18.6</td>
<td>65.5</td>
<td>-</td>
<td>117.3</td>
</tr>
</tbody>
</table>

1 personal communication, 1-12, 28.11.2016
2 Average Austrian milk prices on October, 2016 (AMA, 2016, p. 9)
3 Based on calculated average product prices at retail level as of 12.11.2016

Public support is highly relevant in the production of organic mountain milk. Table 5 shows a very simplified calculation estimating the average CAP support per kg of farm raw milk of different production systems. The calculation is based on the average milk delivery and the average CAP support per management system shown in the Table. In this context, it is important to consider that 1st pillar payments are site-related, not connected to production and not related to any specific production type or level or management, thus being granted also in the absence of milk production. In addition, the calculation considers an estimated average contribution of dairy production to farm income of 39.2 % at NUTS 3 level (AT 226).

Table 5: Estimated average CAP support per kg of farm raw milk

<table>
<thead>
<tr>
<th></th>
<th>1st pillar CAP</th>
<th>2nd pillar CAP</th>
<th>Σ CAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>All milk producer</td>
<td>2.1</td>
<td>5.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Organic milk producer</td>
<td>3.0</td>
<td>7.4</td>
<td>10.3</td>
</tr>
<tr>
<td>Organic haymilk producer</td>
<td>3.6</td>
<td>11.9</td>
<td>15.5</td>
</tr>
</tbody>
</table>

1 Average milk delivery (organic and non-organic) per farm per annum is about 100,000 kg (personal communication, 1-5, 20.01.2017). In comparison, the average milk delivery (organic and non-organic) in the Federal State of Styria is 99,695 kg (BMLFUW, 2016a).
2 The calculation assumes an average milk delivery of 80,000 kg per farm per annum. In comparison, the average organic milk delivery in the Federal State of Styria is 81,613 kg per annum for farm (BMLFUW, 2016a).
3 Average organic haymilk delivery in Murau is 50,000 kg per farm per annum (personal communication, 1-5, 20.01.2017). In comparison, the average milk delivery in the Federal State of Styria is 62,386 kg (BMLFUW, 2016a).
According to participants (personal communication, 1-12, 28.11.2016) the current farm raw milk price is 0.47 € / kg (excl. VAT) (4.2 % fat, 3.4 % protein) for ZZU organic mountain haymilk, including ZZU premium payment of 0.19 € / kg (excl. VAT). The estimated production costs are in the range of about 0.45 € - 0.50 € / kg (personal communication, 1-12, 28.11.2016). Considering even the current low basic milk price, project participation for milk farmers is considered as economically viable.

The vertical integration of the value chain helps to reduce transaction costs and mitigates the production risk of producers (i.e. price premium, premium guarantee). Price premia but also the Agri-environmental Programme seek to provide an economic incentive to farmers to undertake farming practices that include i) prohibition of chemical pesticides and inorganic fertilizers, ii) management of field margins and iii) preservation of mixed farming. Organic management provides a more wide ranging advantage as the whole farm is subject to the organic standard and not just certain areas on conventional farms under the AEP. Besides financial incentives, a range of individual intrinsic motives such as prestige, tradition, independence, environmental attitudes, etc. endorse the decision making process and the type of farm management system applied (Darnhofer et al., 2005; Emerton, 2014; Schmitzberger et al., 2005; personal communication, 1-12, 28.11.2016). The increased economic viability and attractiveness of project participation contributes to the continuation of farming, the maintenance of small structured mosaic like cultural landscapes and high levels of biodiversity.

5 Potential pathways towards an enhanced provision of ESBOs

Future development scenarios of the initiative ZZU fostering an enhanced provision of key ESBOs enhance the supply and respond to the demand for this type of products, and include as well a public and a private driver component.

On the supply side, the development of the European milk market (e.g. overproduction, declining prices) undoubtedly impacts the directions taken by the initiative ZZU and its appeal to producers. Firstly, because extensive haymilk production is only a part of agricultural practices and the prevailing cultural landscape in mountain regions. Secondly, a declining price of conventional milk will also increase pressure on the organic sector. Therefore, experts argued that it would be advantageous to decouple the haymilk price from the general milk price and to market it as specialty product (personal communication, 1-8, 08.06.2016), a strategy which is, however, already pursued through the marketing of ZZU milk. If the organic haymilk premium provides sufficient incentives for milk farmers it might be attractive for additional farmers, also from other regions to engage in similar activities.

In terms of drivers, both public (i.e. support under AEP and ANC scheme) and private (i.e. price premium, price guarantee) support are decisive factors impacting on farmer’s land management decisions and contribute to increasing participation. Without the public support measures, agricultural production of marginal productivity areas might be given up and production in favored areas would tend to shift towards more intensified forms of management or other more favourable regions (personal communication, 1-9, 03.11.2016; 1-11, 15.11.2016). While AEP measures are not targeted directly towards achieving an income supplement, they however de facto function as such.
ZZU premium payments incentivize the adoption of environmentally sound land management systems. However, premium payments may also bear an internal risk towards increasing intensification (personal communication, I-11, 15.11.2016). Concerning the provisions of ESBOs, private standards should therefore clearly define, communicate and monitor production measures that limit tendencies for intensification (e.g. number of cuts, sucker cow husbandry). This way, the “conventionalization” of the organic sector may be hampered (Darnhofer et al., 2010). It is also important to note that aggregation of certification schemes and additional red tape is seen as critical and may bear especially heavy on small-scale farms in disadvantaged mountain areas. The term “farmer’s welfare” was also often mentioned and should be considered in further developments of public policies and private production standards (personal communication, I-12, 28.11.2016).

Currently there are around 150 of the 192 organic mountain farms of the district that renounce to silage use and are part of the initiative within the district Murau (2016). While there are an additional of around 250 organic mountain farms who could potentially convert production in order to fulfill ZZU participation requirements. In addition, conventional haymilk producing farms could convert to organic production methods. Hence, there is still some untapped potential for increase of the scheme and improvements of ESBO provision at regional scale.

This fact links to the demand side. While ZZU first initiated a joint organic mountain haymilk quality certification scheme, every supermarket stocks a similar product today. The total volume of haymilk in Austria is 420.000 tons (2016) which represents around 15 % of the total volume produced (3 Mio. tons) compared to an EU average of only 3 % (ARGE Heumilch, 2017). Yet for only around 343.000 tons a haymilk premium (2015) is paid as the differential is mixed production and marketed as conventional milk, potentially showing a bottle neck of the demand side (AMA, 2016). Therefore, there is still some need for further activities to raise consumer awareness.

The haymilk production is a positive contribution to address challenges in the milk market and may act as a role model for agricultural policy for site-specific development, production and distribution of regional products with concurrent provision of ESBOs (personal communication, 1-7, 08.06.2016; 1-8, 08.06.2016). Necessary socio-economic factors for a sustained and enhanced provision of ESBOs depend on the continued viability of mountain farming as well as extensive land management systems for which an adequate agricultural income is a prerequisite. In this case, it is composed of the basic milk price, a substantial support for mountain farmers through payments of the 1st and particularly the 2nd CAP pillar and the additional haymilk premium payment.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The project team discussed the SES framework with stakeholders, both in interviews and focus groups which brought along new useful insights. The main advantage of the SES framework is the graphical illustration of the systemic interrelations that enabled a structured discussion regarding social and ecological aspects in a holistic way. Yet, the actual work on it was quite demanding, particularly with regard to achieve high participation. The selected variables
needed some thorough explanations fitting the context of the case study as different stakeholders showed a different level of understanding and conceptual approach of the variables. The rationale for divergent views may be grounded in different corresponding previous knowledge of the subject as well as individual, corporate or political affiliations. For this reason, the application of the SES framework is especially useful in the qualitative domain showing the role specific ESBOs assume for different stakeholders. This also relates to the assessment if and how the relevant ESBOs impact on stakeholders’ decision making processes as well as stakeholders’ understanding of the variables. The action oriented approach was mainly driven by the project’s interest in this case study as the private actor’s interest in action research was not pronounced. This may be attributed to the protection of interests (e.g. business information, competition context, limited time resources etc.). However, the repeated visits and interviews with actors of the production and processing side of the value chain triggered and reinforced the awareness regarding ESBOs.

7 Main conclusions derived from the Steps 3-4 analysis

The analysis of steps 3 and 4 allowed an intensification of contacts with specific experts and stakeholders and an extension of the scope of interviewees. This enabled a deeper knowledge of the various aspects of the SES and its relevance in providing ESBOs, the analysis of the governance aspects and the institutional framework, with a focus on the horizontal and vertical aspects of the value chain, a discussion on the main driving forces and enabling factors for the specific kind of land management and product quality of the project, and the pertinence of the case for the general CAP discussion and provision of public goods through land management organisation.

7.1 Key findings on the particular SES and the provision of ESBOs

Agriculture and forestry in the mountain district Murau are inseparably linked to the provision of key ESBOs. The organic haymilk initiative ZZU has a strong positive impact on them. An important prerequisite for the continuation of mountain farming and the provision of ESBOs (e.g. on a medium-term) is a sufficient agricultural income. Under the current regime this is achieved via relevant support measures from the RDP in combination with haymilk premium payments. Without these top-ups, a marginalization of low yielding areas and an intensification of high yielding areas would occur. Consumer choices in favor of organic haymilk products directly impact the provision of relevant ESBOs. Also, revenues from other gainful activities (which means farm diversification income, like farm holidays) and off-farm employment opportunities contribute to the continuation of farming in the region. Therefore, adequate regional policies for mountain areas are relevant for the provision of ESBOs.

The conservation of cultural landscapes and high levels of biodiversity in mountain areas is relevant to the wider society and local population alike (quality of life) and an important resource for the tourism sector as well as for mountain farmers themselves. This is reflected by support measures within the framework of the RDP, the objectives of agricultural policies, increasing consumer demand for organic haymilk and directly by the interest of farmers to participate in the initiative, proven by the substantial share of farmers in the region participating in the project ZZU.
This analysis exemplifies that ZZU is a potential way to successfully increase agricultural income while simultaneously “producing” positive environmental and social outcomes. Based on the success story, other retail chains established similar schemes based on the production of haymilk. There is also an umbrella association of haymilk producers as well as an haymilk specific label with high consumer recognition value (ARGE Heumilch Österreich, 2016b). Considering the current demand situation, a further expansion and development of haymilk production can be expected and appropriate expansion strategies are recommended.

The awareness and provision of ESBOs can be increased by consumer awareness building activities as well as by incentivizing agricultural management practices that enhance ESBOs provision (e.g. price premia, measures within the AEP such as illustrated under 4.3). Since March 2013, Austrian haymilk is also recognized as Traditional Specialty Guaranteed which may promote consumer recognition.

7.2 Key findings on governance arrangements and institutional frameworks

The combination of public and private governance arrangements and institutional frameworks successfully contributed to the provision of ESBOs in the case study area. Paramount to the success was the establishment and implementation of the project ZZU by private actors and the cooperation with other private parties. Especially, the dairy on the processing side as well as the powerful distributional capacity (throughout Austria) and a long-term agreement with premium guarantees, provided by the retail chain enabled the development of the label and its marketing success. In addition, the willingness of farmers to convert to organic agriculture and to join ZZU was decisive.

Subsequently, similar ventures developed in other mountain areas in Austria. While this project could in principle be replicated in lowlands, necessary structures often do not exist anymore and the close relationship to some of the core ESBOs (landscape character) are absent in those regions. Therefore, it is primarily an approach for a specialty product from mountainous regions.

Uniform and transparent terms and conditions (e.g. participation, standards) of the agreement were the particular strength of the governance arrangement. Third party control and monitoring guarantee compliance as well contribute to the image of the project and establish consumer trust.

The last CAP reform had no direct, immediate impact on the project. However, EU wide trends (e.g. overproduction of milk) will inevitably lead to declining (overall) milk prices in the long run. Given the current price levels of organic milk (e.g. in relation to conventional milk) the interest of farmers for initiatives like ZZU will continue and it might increasingly attract prospective producers (personal communication, 1-6, 02.06.2016).

Agricultural policies, especially RDP instruments of the 2nd CAP pillar, have a distinct impact on the provision of ESBOs (e.g. support for organic agricultural practices, silage renunciation, Areas of Natural Constraint Scheme).

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9 OJ L 58/28 04.03.2016

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7.3 Other enabling or limiting factors

Prior to the creation of the organic brand ZZU there have been preparatory studies regarding the opportunities for an “organic region Murau” (Groier et al., 2008). While this concept has not been put into practice, it was valuable for the discussion and creation of ZZU. Due to the long-term priorities of agricultural policies for supporting mountain farming and agri-environmental focus in land use management (since several decades), the case study area of Murau is still home to a significant number of haymilk producing mountain farms. This fact certainly made the up-take of the organic haymilk project ZZU more feasible than in other contexts. For this reason, the ESBOs provision was already high prior to the project start and appreciation of the situation is an important aspect in Austria’s policy discourse. However, future land management in mountain areas, including the case study, is threatened by challenges arising from a global market.

7.4 Contributions to EU strategic objectives

The last CAP reform with its focus on “greening” and the discussion of “external effects” provided through agricultural and forestry management already addressed the increasing concern and role of public goods provision. A more critical assessment, however, reveals that the CAP reform approved primarily used this focus in order to “justif(y) the CAP with a transformation of key discourses (productivist, multi-functional and neo-liberal) by emphasising the hugely popular environmental element while, at the same time, employing a strong productivist discourse … and the budgetary distribution between EU member states and farmers’ groups” (Erjavec & Erjavec, 2015, p.53). Moreover, another study on the evaluation of the effects on the protection of positive functions of farmland and grassland ecosystems concludes that the “EU agricultural reform fails on biodiversity” (Pe’er et al., 2014, p.1090). There is hence an important task to provide methods and useful examples that provide public goods in various regional contexts. The case study is an example that links the provision of ESBOs with a specific regionally adapted land management system and highlights the need for private initiative and public support.

The starting discussion on the future of CAP post-2020 addresses the high importance of analysing the relevance of local public goods and global public goods and the role of policy support towards each of them (Matthews, 2016). It seems that the influence of Pillar 2 measures which are the most important base to this case primarily enforces local public goods and is driven by future Rural Development Policy (Dax & Copus, 2016) with its strong inter-dependence with other regions’ markets and social demands evolution. A comprehensive assessment of public goods linked to the local opportunities and asset base and a careful development of value chains integrating local, regional and trans-regional levels seems crucial for achieving successful initiatives.

The present case study underpins the opportunity of mountain regions for reasonable and effective solutions to link various concerns of different actors and to contribute towards EU strategic objectives like securing biodiversity levels, landscape development, high-quality production, and impacting on rural vitality aspects as well. It constitutes an interesting model of appropriate land management, organization of high-quality production, establishing the necessary labelling and value chain and enhancement of societal demand for the product and the public goods linked to the management.
7.5 How about the transferability of the approach/mechanism used?

The case study presents an activity that is usually referred to as a process led by private actors. This is true and particularly relevant for the labelling of the products, the management organisation and rules, linking up to the value chain and marketing of the products. However, it is based on a widely applied and intensive CAP support for mountain farming in Austria that has its origin in (national) support schemes elaborated since the 1970s. What is more, the total of farm support has achieved a level of about 80-90% of the agricultural income of mountain farms (Hovorka & Dax, 2009) which underscores the long-term valuation of these land management systems and its effects for the society at large. The case of a specific (private) premium as a top-up payment to this support level is specific to the increasing valuation of high-quality products, addressing all three aspects mountain origin, organic production and the use of a traditional (and environmentally beneficial) management method.

In general, the organization of the production of haymilk could be extended to other areas in Austria, or other countries. Limitations apply to such extensions as the market capacity has to be prepared and adjusted, so no immediate “transfers” seem possible. The applicability of the scheme in other countries depend also on the traditional management organisation in those countries and how the haymilk method matches to those management systems.

On the other hand, it seems more interesting to consider transfer of the logic of the quality production and the value chain and learn from the organization of the market. In particular, it seems useful to highlight that the private company took the initiative and, referring to the public good aspect of the “traditional” land management system, elaborated a regional cooperation and national distribution of the high-quality product. Their marketing concept always addressed the issue of maintenance of mountain landscape and biodiversity through developing this product.
8 References (including projects docs, evidence reports etc.)


ARGE Heumilch Österreich. (2016b). Österreichische Heumilch erhält EU-Gütesiegel g.t.S. 


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9 ANNEX: Reflections on the case study methodology used

As mentioned in chapter 6, the action oriented approach was restricted to the efforts taken by the project team to engage repeatedly with actors at different levels. It was not as pronounced as envisaged as the retail chain was not available to participate in a more intensive “action research” process. This fact might be attributed to the protection of business information, competition context of the market as well as time availability and perceived relevance. It was agreed to keep interviews and, specifically, sections of interviews anonymous which is the reason that sub-chapter 9.5 should be removed before publication.

9.1 Objectives and activities undertaken with initiative/stakeholders

The action mandate envisaged a strong involvement of mountain farmers as well as stakeholders at regional level. This was achieved by organizing an additional regional focus group in step 3 of the case study work were different ZZU mountain farmers, working committee members and dairy representatives participated. Moreover, a range of experts including both the coordinator of the Agri-environmental Programme and the coordinator for the Areas of Natural Constraint Scheme as well as researchers from the Austrian office of the Research Institute of Organic Agriculture were interviewed.

9.2 Outcomes and further steps

The gathered information (e.g. hand written manuscripts, flipcharts, audio recordings) have been carefully analysed and synthesized. Relevant information was included in this Case Study report. The synthesis will also be published in German on presented on the institute’s homepage. Lastly, it is envisaged to present the study results in a regional workshop for discussion with local and regional actors.

9.3 Judgement on the process

The expectations of farmers regarding the outcome of the interviews and the project as a whole was mainly based on the idea to address their issues at EU level. While the information will be published, and discussed at various fora, the expectations of using the case study as transmission towards higher levels has to be dampened. A more action oriented approach might have been feasible in a mainly bottom-up based initiative.

It seems highly difficult to step into a “privately-owned” scheme and suggest exchange of experiences where local actors are convinced of their successful implementation of a high-quality project. The reference to the research concept on public goods and ESBOs provision at the regional scale confirms the private labelling strategy and indicate its more general relevance to national and EU policy objectives. Although our intensive case study allowed a visualization of diverse actors and perspectives in this project, elaboration of the scheme and product success are much more long-term targeted. In assessing the project’s contribution to local discussion, we should be aware of these diverse time horizons and commitment.
9.4 Supporting data and statistics

- Austrian IACS system (data for 2014)
- Agricultural Census Austria [Agrarstrukturerhebung Österreich] (data for 2013)
- AMA Marktbericht (Milch und Milchprodukte No. 9. Ausgabe 2016)

Table 6: Distribution of public support for organic mountain farms in the district Murau (IACS, 2014)

<table>
<thead>
<tr>
<th>Policies and measures</th>
<th># of agricultural operations</th>
<th>UAA (incl. alpine pastures) / ha</th>
<th>Total public support / €</th>
<th>Ø public support per ha / €</th>
<th>Ø public support per farms / €</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st pillar CAP</td>
<td>442</td>
<td>11,220</td>
<td>2,676,821</td>
<td>239</td>
<td>6,056</td>
</tr>
<tr>
<td>2nd pillar CAP</td>
<td>442</td>
<td>11,220</td>
<td>6,635,462</td>
<td>591</td>
<td>15,012</td>
</tr>
<tr>
<td>Agri-environmental Programme (ÖPUL) in total</td>
<td>442</td>
<td>11,220</td>
<td>3,713,179</td>
<td>331</td>
<td>8,401</td>
</tr>
<tr>
<td>1 Organic farming</td>
<td>415</td>
<td>9,381</td>
<td>2,047,985</td>
<td>218</td>
<td>4,935</td>
</tr>
<tr>
<td>2 Environmental sound management of arable and grassland surfaces (UBAG)</td>
<td>23</td>
<td>434</td>
<td>40,350</td>
<td>93</td>
<td>1,754</td>
</tr>
<tr>
<td>3 Renunciation of the use of yield-increasing inputs on arable land</td>
<td>1</td>
<td>0.07</td>
<td>8</td>
<td>15</td>
<td>8</td>
</tr>
<tr>
<td>4 Renunciation of the use of yield-increasing inputs on arable land dedicated to green forage and on grassland</td>
<td>21</td>
<td>367</td>
<td>17,239</td>
<td>47</td>
<td>821</td>
</tr>
<tr>
<td>5 Abstention from the use of fungicides on grain-growing land</td>
<td>4</td>
<td>15</td>
<td>384</td>
<td>25</td>
<td>96</td>
</tr>
<tr>
<td>13 Abandonment of silage</td>
<td>192</td>
<td>2,934</td>
<td>458,575</td>
<td>156</td>
<td>2,388</td>
</tr>
<tr>
<td>14 Preservation of scattered fruit tree stands</td>
<td>29</td>
<td>10</td>
<td>1,134</td>
<td>116</td>
<td>39</td>
</tr>
<tr>
<td>15 Mowing of steep surfaces</td>
<td>390</td>
<td>2,052</td>
<td>329,135</td>
<td>160</td>
<td>844</td>
</tr>
<tr>
<td>16 Management of mountain meadows</td>
<td>1</td>
<td>0.45</td>
<td>194</td>
<td>430</td>
<td>194</td>
</tr>
<tr>
<td>17 Alpine pasture and shepherding</td>
<td>78</td>
<td>1,551</td>
<td>68,937</td>
<td>44</td>
<td>884</td>
</tr>
<tr>
<td>18 Greening of arable surfaces</td>
<td>104</td>
<td>396</td>
<td>51,306</td>
<td>130</td>
<td>493</td>
</tr>
<tr>
<td>25 Low-loss application of liquid organic fertilizers and biogas manure (m3)</td>
<td>1</td>
<td>1,000</td>
<td>1,000</td>
<td>1</td>
<td>1,000</td>
</tr>
<tr>
<td>26 Rare livestock breed*</td>
<td>20</td>
<td>226</td>
<td>42,825</td>
<td>189</td>
<td>2,141</td>
</tr>
<tr>
<td>27 Rare agricultural crops</td>
<td>3</td>
<td>5</td>
<td>545</td>
<td>115</td>
<td>182</td>
</tr>
<tr>
<td>28 Preservation and development of surfaces valuable in terms of nature water protection (nature conservation measure)</td>
<td>53</td>
<td>228</td>
<td>91,863</td>
<td>404</td>
<td>1,733</td>
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<tr>
<td>29 Animal protection measure*</td>
<td>414</td>
<td>9,445</td>
<td>561,701</td>
<td>59</td>
<td>1,357</td>
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<tr>
<td>Area of Natural Constraint Scheme</td>
<td>442</td>
<td>11,220</td>
<td>2,670,799</td>
<td>238</td>
<td>6,043</td>
</tr>
<tr>
<td>Other measures</td>
<td>251,484</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*number of livestock

Note: Table 6 comprises organic mountain haymilk farms and organic mountain silage farms
Table 7: Distribution of public support for conventional mountain farms in the district Murau (IACS, 2014)

<table>
<thead>
<tr>
<th>Policies and measures</th>
<th># of agricultural operations</th>
<th>UAA (incl. alpine pastures) / ha</th>
<th>Total public support / €</th>
<th>Ø public support per ha / €</th>
<th>Ø public support per farms / €</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st pillar CAP</td>
<td>743</td>
<td>12,605</td>
<td>2,859,910</td>
<td>227</td>
<td>3,849</td>
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<tr>
<td>2nd pillar CAP</td>
<td>743</td>
<td>12,605</td>
<td>6,802,735</td>
<td>540</td>
<td>9,156</td>
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<tr>
<td>Environmental sound management of arable and grassland surfaces (UBAG)</td>
<td>716</td>
<td>12,605</td>
<td>962,118</td>
<td>76</td>
<td>1,344</td>
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<tr>
<td>Renunciation of the use of yield-increasing inputs on arable land</td>
<td>41</td>
<td>55</td>
<td>6,276</td>
<td>114</td>
<td>153</td>
</tr>
<tr>
<td>Renunciation of the use of yield-increasing inputs on arable land dedicated to green forage and on grassland</td>
<td>634</td>
<td>9,521</td>
<td>439,591</td>
<td>46</td>
<td>693</td>
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<tr>
<td>Abstention from the use of fungicides on grain-growing land</td>
<td>20</td>
<td>62</td>
<td>1,538</td>
<td>25</td>
<td>77</td>
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<tr>
<td>Abandonment of silage</td>
<td>246</td>
<td>2,278</td>
<td>348,847</td>
<td>153</td>
<td>1,418</td>
</tr>
<tr>
<td>Preservation of scattered fruit tree stands</td>
<td>21</td>
<td>10</td>
<td>1,176</td>
<td>118</td>
<td>56</td>
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<tr>
<td>Mowing of steep surfaces</td>
<td>612</td>
<td>2,576</td>
<td>430,773</td>
<td>167</td>
<td>704</td>
</tr>
<tr>
<td>Alpine pasture and shepherding</td>
<td>112</td>
<td>1,553</td>
<td>72,353</td>
<td>47</td>
<td>646</td>
</tr>
<tr>
<td>Greening of arable surfaces</td>
<td>93</td>
<td>285</td>
<td>37,879</td>
<td>133</td>
<td>407</td>
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<tr>
<td>Preventive soil and water protection</td>
<td>1</td>
<td>35</td>
<td>1,892</td>
<td>54</td>
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<tr>
<td>Low-loss application of liquid organic fertilizers and biogas manure (m3)</td>
<td>1</td>
<td>70</td>
<td>70</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>Rare livestock breed</td>
<td>16</td>
<td>130</td>
<td>30,043</td>
<td>231</td>
<td>1,878</td>
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<td>Preservation and development of surfaces valuable in terms of nature water protection (nature conservation measure)</td>
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<td>Animal protection measure</td>
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<td>3,440,177</td>
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<td>4,630</td>
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<td>Other measures</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>391,227</td>
</tr>
</tbody>
</table>

*number of livestock

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

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9.5 Supporting data and statistics

- National workshop, 1 (28.09.2015)
- Interview 1-1: Project manager 1 of ZZU, Werner Lampert Consulting Company (17.12.2015)
- Interview 1-2: Project consultant of ZZU at Upper-Styrian dairy (17.12.2015)
- Interview 1-3: General Secretary of Agricultural Chamber, Murau (17.12.2015)
- Interview 1-4: Leader-manager of local action group “Holzwelt Murau” (21.12.2015)
- Interview 1-5: Project consultant of ZZU at Upper-Styrian dairy via email (31.05.2016/02.06.2016/20.01.2017)
- Interview 1-6: Project manager 2 and 3 of ZZU, Werner Lampert Beratungsges.m.b.H. (02.06.2016)
- Interview 1-7: General Secretary of Agricultural Chamber, Murau (08.06.2016)
- Interview 1-8: Leader-manager of local action group “Holzwelt Murau” (08.06.2016)
- Focus group 1-9: Areas of Natural Constraint Scheme coordinators, BMLFUW (03.11.2016)
- Focus group 1-10: Sustainability analysis experts, FIBL Austria (08.11.2016)
- Focus group 1-11: Agri-environmental Programme coordinators, BMLFUW (15.11.2016)
- Focus group 1-12: Project participants, Zeutschach, Styria (28.11.2016)
- Interview 1-13: Expert on HNV farmland in Austria, Umweltbundesamt (31.08.2016)
CASE STUDY

BIRDS AND AMPHIBIANS SUPPORT ON WET MEADOWS (CZECH REPUBLIC)

D4.3 | Final Version | February 2017

Jaroslav Prazan, Hana Sejnohova, Klara Camska, Marta Mrnustik-Konecna
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Source: https://www.google.cz/search?q=josefovsk%C3%A9+louky&biw=1920&bih=920&tbm=isch&imgil=7-kfrrlva0i3M%253A%253Bnp1n-silJpYWVM%253Bhttp%25252F%25252Fwww.cso.cz%25252Fin dex.php
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1 Introduction: What is the case study about?

Two NGOs together with other stakeholders (including few farmers) restored irrigation system and recreated habitats on wet meadows for biodiversity improvement.

The project “Bird Park Josefovské louky” (Josefov Meadows) is located in the north-eastern part of the Czech Republic in Hradec Kralove region in arable land area and was founded in 2008. The aim was to create appropriate conditions for return of wetland birds and amphibians to the meadows in the floodplain of the river Metuje and to enable people to appreciate the beauty of nature - the motto is "Park for birds and for the people".

The idea was promoted by a local amateur ornithologist, who proposed restoration of one part of the original hundred years old unique irrigation system in some 70 ha grasslands located between Old and New Metuje river. The aim was to create a bird private reserve.

In the past, the floodplain of the whole river Metuje was often flooded and there was created a system of irrigation channels to support grassland production in dry seasons. The abandonment of irrigation system led to decline of waders in the locality. In terms of ornithology and botany, the site was not valuable at the beginning of the project (source: Czech Society for Ornithology). Decline of livestock production in 90s led to low demand for grass in the region, therefore farmers produce hay for unstable market, and without CAP support this activity would not be economically viable.

The project focuses on ESBOs: 1. restoration and increasing of biodiversity, joint with alluvial meadows and wetlands, especially wader birds and amphibians, and 2. educational benefits for public. As secondary effect, there is 3. benefit of cultural experience with restoration and using of former irrigation system, unique in the region.

But there is a dilemma: increase of biodiversity relying on increase of ground-water level and visits of tourists negatively influence conditions for farming. The restored irrigation system is in hands of NGO and not in hands of farmers, which cause uncertainty on the influence of irrigation to farming (e.g. farm operations).

Therefore, there is a problem of sustainability of water management and long term cooperation of project leaders with farmers, who manage the meadows. The farmers are motivated to manage grassland mainly by CAP payments (limited demand for hay). The project leaders (NGOs CSO and CSOP) indicated, that without CAP support, and farmers in area, they can imagine to manage the area themselves, but the improvements of the site would be much slower, and the sufficient fund rising much more difficult.

Actors and activities central for the case study
Czech Society for Ornithology (CSO) – NGO, leading and coordinating all the project activities, the owner of a part of the land.
The organization of the *Czech Union for Nature Conservation Jaro Jaroměř* (CSOP) – cooperates with the ornithologists closely from the beginning, now it focuses especially on the technical side (e.g. mowing grassland and constructing pools), does monitoring of biodiversity (plants, amphibians) and publishes popular articles about progress in the project for the local press.

*Municipal office Jaroměř* (Environment Department) - addresses administrative procedures around the handling of water and any complaints.

*Donors and volunteers* - are essential especially for land purchase and some work activities. *Farmers* – they are tenants of the most of grassland, partly also land owners, they do grassland management, sometimes also on the land owned by the ornithologists, and some of them help the ornithologists to communicate with the land owners (source: the farmers). *Hunters* – they exercising the right of hunting on leased hunting area, feeding birds during the winter, one of them is an owner of the land.

*Owners of small hydro power plants* in the Old Metuje river- the same interest as ornithologists- water in the river, they partly compete for water with the project in a dry season.

CSO is the *leader of the project* and cooperates closely with the NGO Jaro-Jaroměř. They created board which took the key decisions, but the board does not have a legal status.

In cooperation with the town administration CSO got permits of water use/management and the document with rules of water management was drafted and approved (e.g. amount of water to be used for irrigation, timing of irrigation) (source: Municipality Jaroměř). CSO started to discuss with farmers the grassland management, and soon they decided to buy the land from owners, who rent the land to farmers. For this purpose, the CSO carries out public collection from donors, at the beginning mostly members of Czech Birdlife. Other activities (e.g. creation of small ponds for amphibians and waders) were financed from public funds (source: CSO). The land purchase has been necessary to get property rights to influence effectively the water and grassland management and to build pools and lightweight structures such as bird observatory. CSO owns 24 ha (32 % of the site) (source: CSO).
Table 1: Key features of Bird park project

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Lowland area, mostly arable, the Bird park is wet meadows area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Grassland for hay production, only partly commercial, managed with support of CAP.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; Case Study)</td>
<td>Bird park project area is 70 ha</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Biodiversity, cultural values, water management.</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>Six farmers, all have some connection with the initiative, most of them have much more land outside the Bird park.</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Two national NGOs as main project leaders; one community fully involved; support from key government agencies; involvement of small water power plant owner; hunters; donors and volunteers involved.</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Using of public investment through Ministry of Environment, important input through ‘in-kind’ contributions (volunteers) and financial donors.</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>Bird park has started in 2008.</td>
</tr>
<tr>
<td>End date of initiative</td>
<td>Ongoing.</td>
</tr>
</tbody>
</table>
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

Key ESBOs considered:
1. Biodiversity-birds, amphibians
2. Water retention
3. Public education
4. Traditional values (irrigation system renewal)

RESOURCES

RESOURCE SYSTEM
Approximately 70 ha of alluvial grassland placed between the Old and New river Metuje. Managed for hay and benefiting CAP support.

ACTORS

Direct: The Czech society of ornithology, the environmental local NGO Jaro Jaroměř, farmers, Local officers, donors, and volunteers
Indirect: Local population, hunters, fishers

GOVERNANCE SYSTEM
The project carried out by a board (two NGOs) in collaboration with other stakeholders. The site management under CAP support-agreed on national level, operational rules on national and local level, partly also Ministry of Environment policy (e.g. ponds construction);

Unprofitable livestock production, extreme weather events (droughts and floods), slight increasing interest of public on the environment

Unprofitable livestock production, Extreme weather events (droughts and floods), slight increasing interest of public on the environment

RESOURCE UNITS

Grass (tons), Biodiversity, educational and traditional values

ACTION SITUATIONS
An NGO board orchestrates ground-water and grassland management in cooperation with key stakeholders, with public support, to create private reserve

2.2 Description of the SES

In order to reach the goal – to create a private bird reserve with increasing numbers of waders and amphibians - it was necessary to agree on change in management of the area with several stakeholders. The key points of change were restoration of the irrigation system for manipulation with ground water level, creation of small pools/ponds, and adjustment of grassland management in favor of birds/waders. The project required renewal of facilities for water management (for bringing water to ditches in meadows from the river Metuje), getting the permit for use and manipulation with water from the town administration and an agreement on the water management rules. It was agreed to bring water to the meadows three times during a year and the timing should not prevent farmers from making hay and usual operations on meadows. It was necessary to agree with all key stakeholders on future cooperation
and with farmers on timing of hay cut, which is more favorable for birds. The project leaders (CSO/CSOP) focused on recreation of the habitat favorable for birds and attract local/regional community to the site with purpose of education on biodiversity and the importance of water management in the landscape.

**Production system and production units:**
The key production system is grassland, where hay is produced as a unit of production. The total area is about 70 hectares of which 55.8 ha are in LPIS (eligible for CAP payments). The area outside LPIS is partly non-regularly cut by NGOs and partly is left to the natural succession; it is planned for future creation of ponds and other facilities. The meadows were originally wet (natural course and floods of Old Metuje river), but after the creation of second course/branch of the river, the water was lost. In response to that, the Water cooperative in past created irrigation system for these meadows, and the system was abandoned during communist time. Meadows/plant communities adapted to decades without irrigation. When irrigated, there is higher potential for production (three cuts a year). But the current demand for hay is low, because of decline in beef numbers in the region during 90s, joint with the end of the state-governed agriculture, and transformation of the grassland managers (from state/cooperative farms into private farms). In addition high soil fertility in the region and high and rather stable prices of the plant commodities have made animal production less attractive in this region. Therefore, the hay is sold to horse keepers, zoological gardens, and other small clients. Because there is no motivation for production of large amount of hay, the meadows management is quite extensive and using low inputs. There are six active farmers but only two of them have more than 10 hectares of land there. Some stakeholders assume the quality of hay will change (probably decline) after some years of using irrigation as a result of changes in plant communities.

**Governance system**
Management of the great part of the grasslands (nearly 80 %) is supported by CAP (Direct Payments, Agri-environmental-climatic Measure – next AECM) and it is major motivation for continuation of grassland management (also responsibility to owners to some extent). Policies are decided on national level. Investments (e.g. pools creation) were supported under policies of Ministry of Environment.

There is rather informal governance on the project level. Two NGOs created informal board or as the NGOs call that “working group”, which coordinates the action situation and makes key decisions concerning development of the whole project and major activities (such us creation of pools on the meadows). Representatives of CSO and CSOP meet personally twice a year and communicate mainly by emails in the meantime.
**Actors (partly described under section 1)**

The NGOs *CSO and CSOP* (Jaro-Jaroměř) are interested in the growth of biodiversity, restoration of the area with increasing water capacity (retaining water in the landscape) including renewal of irrigation system (representing traditional value), and educating public (including children) on the biodiversity and landscape management. Therefore, they initiated the project and coordinate all key activities and the cooperation with other stakeholders (source: CSO, CSOP). They are enthusiasts and their reward is mainly in satisfaction from improvement of biodiversity and other benefits of the project.

Interest of *the farmers* was to manage the site while receiving CAP support (especially Direct Payments and partly AECM), and to some extent to sell some hay (some farmers use the hay for hobby horses), but the motivation is to produce it as cheaply/as easily as possible, because of low demand for this commodity and nearly no animals to feed in the region (intensification was not an option). But the restoration of the irrigation system and bringing water to meadows three times a year created uncertainties and some management difficulties to farmers (e.g. rise of ground water level could threat hay production). In addition, farmers were asked to change some of their management practices by the board (e.g. to cut parts of meadows in two different dates).

Interest of *the public and donors* in the project is growing because of intensive work of board of CSO a CSOP. There are several visits and public days organized every year and the Bird Park got quite good publicity between local/regional inhabitants. The donors are regularly informed by e-mail on the improvements reached with the support they provided. *The town officials* were involved from the very beginning of the project especially in the preparation of the water management plan and the approval of the water use for CSO. *The small power plant owner* shares interest in enough water in the river with the CSO and share part of facilities on river for water management. Their interest is mirrored in the rules defined for the water management.

**Action situation**

The NGO board orchestrates ground-water and grassland management in cooperation with the key stakeholders and with the public support to create and to maintain (and improve the state of) the private bird reserve. The board (both the NGOs) agreed water regime with the municipality officials and the farmers, and this is mirrored in the formal document, regulating water management. The project manager (employed by the CSO) communicates with the farmers and the small water power plant owner over the actual dates of the water use (releasing it to the irrigation channels) and agrees with the farmers adjustments to the grassland management (e.g. later cut). To have funds for the land ownership, the CSO runs a fund, which collects financial support from general public (public collection). For creation of small facilities in project area (e.g. a bird observatory, small pools) the CSO applies for the public support (the financial tools of the Ministry of Environment). With the aim of increasing public awareness the CSO organizes public days with guided tours in the site for the local school children and other interested groups, which have become quite popular in the region. All activities aiming at increase of biodiversity and at rising awareness of public on biodiversity are carried out mainly by the CSO or board of the CSO and CSOP while attracting public, farmers, power plants owners, municipality and other stakeholders to cooperation. The board is involved in
conflicts resolution. The weak point is the present cooperation of farmers, because some of them do not accept the activities of the CSO/CSOP fully and do not support the project sufficiently.

**Changes in SES over time**

There have been few major changes over time in socio-ecological system. The most significant change has been in property rights, because the CSO now owns about 32% of agricultural land in the locality. This is strategic step done by the CSO to increase the control over the land use and they plan to carry out additional purchase. The changes are seen also in the bird and amphibian biodiversity provision (increase) and there are expected changes in plant community structure.

Details of the SES description are in Camska et al., 2016.

### 2.3 Levels of ESBO provision, trends, and determinants

The meadows were at the beginning of the project rather poor in sense of biodiversity because of lack of water and partly lack of management (source: CSO). Memory of inhabitants says that there were several species of waders during time of regular irrigation. After the irrigation restoration and the grassland and water management changes the numbers of target species increased significantly (see figure 1 and table 1 below). The appreciation of these public goods is quite high in the local/regional community. The CSO supports that on several events in which up to 100 visitors participate on each (the source: CSO). These are guided tours, and public days, or school visits (pupils are invited especially during the spring time).

The biodiversity increased significantly after the introduction of the project and investment in irrigation system and pools with shallow water.

![Figure 2: Numbers of bird/waders species observed on the site](source: data CSO 2017 (not published))
Table 2: Numbers of amphibians observed on the site

<table>
<thead>
<tr>
<th>Amphibians - numbers</th>
<th>2009</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsh frog (estimates)</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td>Crested Newt</td>
<td>5</td>
<td>150</td>
</tr>
<tr>
<td>Number of species</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>

Source: data CSO 2017 (not published)

The development of biodiversity proved that the level of provision of ESBO is high and increasing. The increase of species of waders is apparent from Figure 1 and rising of amphibian’s numbers is shown in Table 1.

One of the ESBOs is the educational value of the site for inhabitants and young people. The public interest could be shown on the development of organised visits for group of interested people from region. The development of events numbers is shown in Figure 2 and number of visitors in Table 2 below.

Table 3: Number of scholar visitors of the Bird park

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of scholar visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>462</td>
</tr>
<tr>
<td>2014</td>
<td>360</td>
</tr>
<tr>
<td>2015</td>
<td>477</td>
</tr>
</tbody>
</table>

Source: CSO (2017) (not published)

The demand for the ESBO in the region could be assessed by interest to visit the site. It is growing and the limiting factors for the numbers of visitors is the carrying capacity of the site, the size of the site, and the capacity of the NGOs to provide guides to the groups of visitors.
The numbers of visitors presented in Table 2 represent visits in groups which are guided on the site. Number of individual visitors has not been recorded. CSO still considers adding some events for visitors, but the capacity of the site and CSO to organise such events is close to its limits (some events attended over 100 visitors). The educational, traditional, and biodiversity value is partly expressed in a small fee collected from school’s visitors to cover the costs of the guide.

The key determinant of improvement in ESBO provision is the enthusiasm of the local ornithologists and relevant NGOs (CSO and CSOP), who put a lot of effort to the Bird Park creation, and their ability to convince donors to support the project. At the same time building of pools and the increase of ground water level and thus renewal of the irrigation supported the increase of species/numbers of waders and amphibians. The capacities of NGOs to communicate with local stakeholders and staff of municipality administration were preconditions of irrigation renewal, purchase of land for capital works, and some degree of agreement with farmers on grassland management. But some farmers did not accept the project idea and do not cooperate with project leaders. The NGO representatives even believe that one of the farmers tries to buy land in the area to prevent some activities in the Bird Park, but there is not clear evidence of that (source: CSO representative). Therefore, one of the limiting factors is the lack of cooperation with farmers, who do not share the enthusiasm for the project benefits (source: results of interviews and workshops).

The key institutional change was getting permits of using water for irrigation and agreement on the rules of water use with official of municipality and with other stakeholders including farmers. Another important institutional change was creation of reputation and trust as project leaders who have capacity to provide new and more ESBOs in the area (that attracted donors and volunteers supporting park creation).

The project of the Bird park did not cause great changes in the farming practice. The farmers can use the same machinery as before, but they have to adapt the cutting time. They feel that the grassland management is more time and work consuming. They expressed also some uncertainty about expected changes in the land lease from the CSO (both availability and costs) and grass/hay quality (source: interviews). They do benefit from the CAP, and partly AECM (not all of them, the barrier is mostly short-time land leasing agreements). Moreover, the CSO is still considered to be a strange element in the region and the farmers are sometime not presented by the CSO/CSOP as partners (e.g. in the public days). There are also some disagreements about what and how to protect between the CSO and the local hunters (often farmers in the same person). But the farmers are important for ESBO production. But the low trust partly reflects general low trust in the Czech Republic and low trust between farmers and people in nature protection (Uslander 2003, Frane 2003, Prazan 2014).

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

It is important to mention that the project covers relatively small area (about 70 hectares), therefore its capacity to attract a lot of interested people to visit the site is limited. In addition, the project leaders plan to divide the project area into two zones, of which one should be closed for visitors to protect birds. There is no evidence of economic benefit (no exact figures)
of the project in the region, but the stakeholders believe (e.g. the representative of municipality), that there are more visits of tourists in the area, because of the project which could have positive economic effect on the economic activities in the region (e.g. restaurants). The project created a job opportunity, because CSO employs the project manager (half personal capacity), but a rest of potential job creation was not identified. Due to the size of the park and numbers of visitors, it can be assumed the overall creation of jobs is limited (source: workshop).

The educational value of the project is very high, the NGOs, CSO and CSOP, support that by promoting biodiversity values in region on number of occasions there (see previous section). Therefore, it could be assumed that the positive social benefits are created too. When pupils from schools in region learn about the traditional value of the ancient irrigation system supporting biodiversity together with the social/production benefits it represents clearly also social benefit (e.g. the young people could be proud of the cultural values in the region). The stakeholders agreed that the project has also traditional/cultural value, because of restoring the ancient irrigation system.

One of the stakeholders explained, that the project has a value as a show case of sensitive landscape management based on renewal of habitats in the intensively farmed area (source: CSO).

3 Shifting societal norms, collective learning, and voluntary actions

The representatives of the CSO believe there is seen a shift in societal norms in the expected environmental or social behaviour from the farmers. The general reason is seen in the change of generations, but more because of a pressure from the public, and even more the influence of environmental experts, environmental NGOs, and representatives of state institutions in nature protection (source: interviews with the CSO, CSOP, municipality representatives). Collective learning facilitated innovations in communication, because they came from the need to communicate with the stakeholders, to explain several biodiversity issues, and searching for compromises (source: representative CSO). It can be concluded, that these ways of communications and common issues facilitated searching for solutions.

The communication, exchange of views/values, and attitudes were carried out by seminars, personal meetings between stakeholders, public events (e.g. organised visits of the site with a guide), telephone calls (and SMSs). Different ways of the communication were used for different purposes, but at the same time they served to collective knowledge (source: interviews, workshops).

In addition, the board contributes to the publications of local periodical magazine. One of the CSO representatives believes the exchange of values could be supported in addition by a production of films/videos and possibly a creation of a specific broadcasted program for public (source: interviews).

The leading stakeholders in the exchange of views and collective learning are the CSO and CSOP. The representative of municipality reported, that she learned a lot about the environ-
ment and the ways how it could be protected/enhanced (source: PEGASUS workshop, interview). Some farmers block the exchange of views and collective learning, because do not agree with some features of the project (source: interviews). These farmers were not at the initial meetings, where the project was introduced (organised with the municipality Jaroměř in its building). Despite they were invited they did not come and even during PEGASUS surveys and workshops most of them refused to participate. Project manager contacted them regularly (e.g. announcing the date of the grassland irrigation), but despite relative general high trust to him, the participation of most of the farmers did not improve (source: interviews and workshops). There is only one farmer, who attends all the project board meetings. This person also participated on the PEGASUS workshops. Another one was open to one PEGASUS interview, but later refused even to answer to additional questions. Therefore, the level of participation of most of the farmers is low and it is assumed that also collective learning was limited to only those participating stakeholders. One of the barriers of the participation of farmers is uncertainty about the land ownership in future, which could influence their future income (CSO buys land from owners), and also not balanced sharing costs and benefits (source: interviews, workshop).

Initiation of the project

Threat of abandonment of previously wet and biodiversity rich meadows and irrigation system initiated the project idea. The threat motivated local ornithologist to consider creation of a private bird park by renewing the local former irrigation system to recreate wet meadows. This step was based on pure enthusiasm without business ideas behind. The initiators of the project started to communicate with the key stakeholders who could be influenced or could be important for success of the project idea (including the farmers) (source: interviews).

The project would happen even without policy support, but still the progress would be much slower (source: interviews). The initiative could be seen as a self-help project, while motivating general public to contribute by financial means and/or by actual work. The policies (financial policy tools) played significant role in speeding up the process because it was possible to rely on CAP support in the suitable grassland management and use investment supports for creation of pools and bird-watching facility.
Table 4: Changes in the project and their relation to policies

<table>
<thead>
<tr>
<th>Changes or maintaining activities, which could be ceased</th>
<th>Due to drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation of the project as whole</td>
<td>Danger of abandonment potentially (and in past) biodiversity rich habitat – no market incentives</td>
</tr>
<tr>
<td>Property rights change (purchase of the land by CSO)</td>
<td>Public support (public collection, donors’ management) and low trust to farmers on agreement on the management in future</td>
</tr>
<tr>
<td>Maintenance of the grassland management</td>
<td>CAP support (without CAP difficult to maintain, additional effort needed to raise financial means)</td>
</tr>
<tr>
<td>Creation of the pools for amphibians</td>
<td>Investment support from policies of Ministry of Environment</td>
</tr>
<tr>
<td>Creation of the bird-watching facility</td>
<td>Investment support from policies of Ministry of Environment</td>
</tr>
<tr>
<td>Irrigation system renewal</td>
<td>Investment support from policies of Ministry of Environment</td>
</tr>
<tr>
<td>New institutions: rules of water management, agreements on grassland management with the farmers</td>
<td>Self-help</td>
</tr>
<tr>
<td>Higher level contracts under Agri-environmental-climatic Measure</td>
<td>Initiated by CSO, supported by CAP (small part of area)</td>
</tr>
</tbody>
</table>

Source: based on data from interviews

An important change in the leadership was employment of the project manager, who is an enthusiast, but also a local inhabitant, and most of the stakeholders trust him, including the farmers.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

The Bird Park is a collective action, because several actors agreed on some rules for the same benefits (increase of biodiversity, education, and rescuing traditional values). The collective action and role of the actors are described in the chapters 2.2 and 2.3. The board takes the key decisions and coordinates activities and provides information on them to the relevant stakeholders. The CSO employs the project manager with the responsibility to take operational decisions and coordinate the collective action. The activities of CSO rely a lot on voluntary work and time spent. In the group the project manager is half time employed, but works more than half time job and in addition involves his family to the project activities (source: workshop). There is one retired voluntary working experienced person/a local member of the CSO (e.g. doing paper work, negotiating with the land owners). And the rest about two people take this project as additional effort to their regular work at the CSO (e.g. director and one employee).
CSOP, beside the role of being part of the board, carries out management of the site (e.g. cutting grass outside farmer’s land) and helping with local knowledge to carry out small projects (e.g. pool creation).

The formal leader of the network is the director of CSO, but there is the project manager who oversees coordination of all key activities in the project under supervision of the board. He is the local enthusiast, who is employed by the project (half time). He is well known and accepted by all the key local stakeholders, because he is the local inhabitant. Concerning the action situation this person is actual leader of the collective action. The director of CSO seats in the capital of the country quite far from the project locality and therefore all the local stakeholders do not accept him so well (source: interviews).

When considering the key factors supporting collective action, it should be mentioned, that trust differs. It is quite high between CSO and donors, CSO and most of the stakeholders. But it is rather low between CSO and some farmers. The difference is also when assessing trust to CSO as an organisation (headquarters in Prague) and the local project manager. The trust is lower to CSO as an organisation, but quite high to the local project manager (for details see Camska, Sejnohova, Prazan 2016).

**Characteristics and principles of collective action and action situation**

The list of characteristics and principles of collective action is based on literature on the institutional analysis and collective action (Ostrom 1990, Ostrom 2005, Ostrom 2010)

The **number of the stakeholders** is rather low for a stable collective action. There are only six farmers, who manage the land, and only two of them have in the area more than 10 hectares of grass. None of them has these grasslands as the only source of income and most of them have the area in Bird Park only as a fraction of their total land area (two farmers have more than 50% of their total farm area in the Bird Park). The income generated on grassland in the case study area is not for all farmers the only and main income, therefore the dependency on this income is rather low.

For the **appropriation** of the resource unit it should be stressed, that the creation of wetland made the yield of hay more reliable. But in extremely dry season no water is available and the irrigation system does not help. On the other hand, there is an uncertainty concerning wet weather coming after an irrigation which could make the meadows too wet for usual farming operations.

The **monitoring activities** are rather easy. The project manager can easily check the area concerning irrigation and grassland management (source: interviews).

It is rather **easy to manage** the irrigation system and the project manager can rather easily measure availability of water in the river for the irrigation. Farmers use usual technologies for hay making (e.g. tractor driven technologies). Grassland is occasionally grazed by low number of animals (e.g. horses), (source: interviews, workshops).
**Property rights:** Farmers do their farming on a rented land to a large extent (both from CSO and from individual land owners). When farming land of the individual owners they have property rights associated with relevant rent contract and there are no severe limits for grassland management. The main limits are stated by the CAP (Cross-compliance and Greening, which means the ploughing of the grassland is not allowed on designated protected grasslands). The limits, caused by the project, could emerge when too wet weather comes in combination with previous irrigation. This could prevent farmers from collecting the hay. When farmers rent the land from CSO, then the property rights are limited and they usually have to agree with the management requirements of CSO (even the requirements are not too demanding). For some farmers, the land ownership in hands of CSO is a sensitive issue (source: interviews, workshops).

**Sharing costs and benefits in the action situation (reciprocity)**

The actors do not share costs and benefits evenly in the action situation. All the stakeholders appreciate positive change in the biodiversity and improved landscape management. For project leaders (CSO and CSOP) the benefits are the same or higher than costs (including salary of one part-time employee coordinating operational issues under CSO). They invest their time, private financial resources (to a limited amount) and some of the involving partly also their families’ time and work in the park management, but the project is their life-long mission and they give it the highest priority (source: outcome of the workshop with key stakeholders in 2017). On the other hand, the farmers as the key partners in the meadows management consider their costs exceeding the benefit (source: outcome of workshop, only one farmer present, other not willing to communicate, not in favor of the project). The costs and uncertainties are seen especially in a risk of losing hay, because of the irrigation in combination with a heavy rain, the need for more careful planning, some risks during the meadow/grasslands management activities (e.g. some pools are not visible in grass and tractors could fall to them, and it happened already), decreasing quality of hay (e.g. later cuts). Some of the risks are not high, but farmers should count with them, but perception of risk is based on actual events which already happened and farmers take them as their costs associated with the project (source: outcomes of the workshop).

The workshop showed that the leaders of the project were not so clearly aware of the actual sharing of costs and benefits between stakeholders (source: comments of the CSO representative after the workshop).

**The level of the trust differs** between the stakeholders: It is quite high between CSO and donors (many of them are biodiversity enthusiasts), CSO and most of the stakeholders. But it is rather low between CSO and some farmers. The difference is also when assessing trust to CSO as an organisation (headquarters in Prague) and the local project manager. The trust is lower to CSO as an organisation, but quite high to the local project manager (source: interviews). Because the area is small and the number of actors is low the level of information on the trustworthiness and cooperation is rather well known to stakeholders. The workshop showed that the level of reciprocity was not so well understood by the stakeholders. Also rules are rather well known to the relevant stakeholders (e.g. on water use, timing, grassland manage-
The project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814.

This is ensured by the presence of the project manager, who makes sure all the relevant stakeholders are informed in due time. It is less systematic to spread the information on the cases of non-observation of the rules or agreements in the group. But it should be said, there are not many rules in concern and in case of breaking some promises this does not happen intentionally (source: interviews).

The actors can easily be linked; this is supported by the small project area, and low number of participants, and by current technologies of the communication (SMS, emails, personal visits of project manager).

The level of the coordination is described in the following section. But this is done in a simple way by the project manager and because the number of stakeholders is low, the coordination is not too demanding.

Regarding the similarity of the interest, there are two groups of the stakeholders. The board (CSO and CSOP), the fishers and hunters, a part of general public, bird enthusiasts, the small power plant owner, and the project donors, and volunteers have strong interest in the environment and landscape, biodiversity, and especially in the birds’ population/species enhancement (despite different views on how it should be supported). On the other hand, there are the farmers, who seek an economic sustainability of their farming, and even they enjoy the biodiversity too, this interest is much lower, than their economic interest associated to the grasslands in the Bird Park. This point of view is valid even the grassland is not the main source of income for them (source: interviews, workshops).

Most of the actors have a long-term interest in the resource system, only few stakeholders regard some farmers as having only a short-term interest in the resource system (source: interviews).

The stakeholders did not identify a presence of a participant with substantial leadership, but the project manager (CSO) is appreciated for his enthusiasm, commitment, trustworthiness, and local knowledge (source: interviews).

Rules: Constitutional rules were expressed in the process of forming the board with the strategic decision making power. Only two NGOs formed the board (CSO and CSOP, both environmental NGOs) and other stakeholders were not involved. It shows that the pure environmental interest was preferred when forming the core of the collective action (source: interviews).

The project operational rules are partly formalised (e.g. a part of the water management regime approved by the municipality) and partly not (e.g. the agreement, that the farmers are announced on the actual time of irrigation, informal agreements on the grassland management). The key stakeholders considered the rules concerning water management and irrigation as working quite well (source: interviews, workshop) (source: interviews).

The operational rules are actually used and monitored. An enforcement of the operational rules other than of the water management is rather weak and is based on personal power of members of the board to express dissatisfaction to the stakeholder, who failed to observe the rule. The enforcement is carried out by the project manager and one very skilled volunteer.
(an old member of CSO, who was a co-author of the idea of the project), both in behalf of CSO. The most frequent type of breaking the rules is not respecting the previous agreement on the grassland management or in a case of a competition for the land in the Bird Park (“a purchase race” between CSO and some farmers). The board does not use reporting wrong practices of the farmers to Paying Agency as a way of punishment, but there is such threat as an option. One of the reasons is the written agreements between the CSO and the farmers are not transparent enough, as indicated by the CSO representative (source: interviews). The operational rules do not contain way of punishment especially those, which are not formalised.

A specific set of the rules stem from the Agri-environmental-climatic Measure contracts, which are formal, monitored on a sample, and enforced. All prescriptions are well defined, from what should/should not be done, outcomes, and also a way and degree of a punishment in the case of non-compliance. Enforcement is carried out by Paying Agency and has rather good discouraging power (Prazan 2014). All in all, there is a combination of enforcement, by internal and external agents to the project.

The rules are rather well known between the stakeholders, but it is not clear to the stakeholders, how much the other stakeholders know the rules (source: interviews).

The key legislation is rather close to the working rules and makes a baseline to them (source: own assessment).

The costs of the action are personal (the employed project manager and partly the volunteers), capital (e.g. building of pools, bird observatory, facilities of the irrigation system), and opportunity costs – mostly for the farmers (e.g. more difficult planning, difficulties to manage the site, potential and partial loss of production). At the same time the production of hay is supported by the irrigation in dry seasons. The investment of these resources leads to production of not only hay, but first of all ESBOs (mainly biodiversity and cultural/educational values, see chapters above) (source: interviews).

The information on the management of the site and the outcomes is provided by the board of the Bird Park through different means. The farmers obtain the information by SMSs, personal communication with the project manager, seminars (on management of the site). For the donors, a site visits are organized, the donors also receive the regular leaflet with the information about the achievement on the site, and they are promoted on different meetings, seminars, and public days of the Bird Park. Moreover, the project website is used to show the achievements of the collective action (source: interviews).

A free rider problem was not recognised as the core group (board) is small and based on enthusiasm. In wider circle of the collective action the issue of free riders turns to issue of the control of compliance with the agreed rules.

The whole project and the collective action were started without the farmers. CSO and CSOP argue, that the farmers had been invited to the initial meeting, and they did not come. But also later the composition of the board did not give much space to the deeper involvement of the farmers (source: interviews, workshop).
Important is also motivation and especially the balance between internal and external motivation in the long-term contracts (Slangen et al. 2008), which is relevant for this case study. CSO/CSOP, donors, municipality, small water power plant owner, and hunters, are in case of ESBO provision motivated for actions mainly internally, but farmers are motivated mainly externally (CAP support and to a small extent also by market). This difference in motivation negatively influences also the capacity of the group of stakeholders for collective action, long term agreement, and partnership.

**Collective action in wider context and potential development**

Collective action was an innovation enabling institutional change by creating long term agreements and cooperation between stakeholders on production of ESBOs. The presence of the collective action is therefore a precondition of progress of the project, because it provided funds for the land purchase for the capital works, and gave the CSO ownership of the meadows, and thus higher control over the management of the grasslands (e.g. fund rising from the donors), (source: interviews). It can be concluded, that without the ownership of the land, it would not be possible to create pools for amphibians, and to improve substantially the habitats for waders.

There is a wide support of the collective action on the municipality level and also on the NUTS3 level. Some farmers managing the meadows do not support the project and this is a weak point of the collective action. They were not convinced from the very beginning of the project and no sufficient attention was paid to the costs they bear in context of the project. The strength is in the clear message of the project, it meets the demand of the number of local/regional biodiversity enthusiasts and the local population, the CSO created quite reputation and image concerning use of the collected funds, and also because well communicating the results of the project to the local population, and to donors (source: interviews, workshop). Clearly the lack of the trust (the general population level is rather low) did make it difficult to involve all the farmers to the project and low emphasise of the balance of costs/benefit sharing between stakeholders supported low trust even more (source: workshop).

The buying the land was carried out by the CSO as an alternative strategy to avoid lack of cooperation with the farmers in future and it already started process which creates for some farmers an uncertainty (great part of the land is rented by the farmers).

There were discussed some suggestions on the workshop, how the lack of trust could be overcome. First of all the CSO and CSOP could make an effort to attract additional compensations for the costs which are not covered by the current CAP. The reason is to improve the balance of sharing costs/benefit between the stakeholders. These two NGOs could organise small events with an attractive program (e.g. socialising with barbecue) in order to improve the relationships with some stakeholders. Also improved communication of the environmental effects of the project focused on the farmers and hunters could help. Another option is to decrease the uncertainty of farmers by a transparent communication of future plans of the CSO on the Bird Park (e.g. in land purchase, plans to decrease the damage of grass by visitors). Also the reputation of farmers who contribute to the Bird Park creation/management could be increased by the CSO/CSOP and the municipality (idea was supported by NGOs and the municipality), (source: workshop). But even the supportive farmer does not appreciate that offer,
because he does not see the benefit from having higher reputation in the region. One of the reason could be, that large farms usually sell their commodities through wholesalers and do not care too much about their local reputation (source: workshop). Most of the possible improvements are in hands of the CSO and CSOP. We can conclude, that there is apparently lack of knowledge of the key principles of the collective action, and the social knowledge in society was lost during time 1948 - 1990 in the Czech Republic (the country was governed by the Communist party).

The strength of the collective action is that most of the stakeholders are enthusiasts capable to communicate the value they provide by the project, and therefore it is possible to raise financial means for some of the types of costs.

The weakness of the collective action is that it is difficult for stakeholders to collect financial resources for running the NGO itself (e.g. personal costs). There is a lack of policies in this respect and donors are more willing to support capital works than the personal costs. It means that in a long run it could happen the enthusiasm could be exhausted and the collective action could face substantial difficulty. Additional weakness is the lack of trust and cooperation with some of the farmers (source: interviews, workshops).

The last weakness is partly compensated by the on-going purchase of the land in order to get more control over the management of the area, and to avoid potential risk from a lack of cooperation. But there are ways how to improve share of the farmers on the benefits of the project by for example adding high level schemes (under Agri-environmental-climatic Measure), suitable for the site, and providing adequate payments (this could be initiated by the board). The CSO and CSOP could organise some targeted events to improve the trust and communication between the stakeholders (e.g. barbecues), or discuss the future plans of the CSO openly with stakeholders to decrease uncertainty (source: workshop).

Collective actions with the aim of the production of public goods (even together with private goods) are quite rare in the Czech Republic, and therefore it is difficult to say, whether there is another good example of such collective action (source: the first PEGASUS workshop on the national level).

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

The provision of ESBO in this case has from of collective action with private initiative. Important part of the case study is a system of property rights and their change. These could be distinguished according to Ostrom (2010) to four types: (i) access—the right to enter a specified property, 4 (ii) withdrawal—the right to harvest specific products from a resource, (iii) management—the right to transform the resource and regulate internal use patterns, (iv) exclusion—the right to decide who will have access, withdrawal, or management rights, and (v) alienation—the right to lease or sell any of the other four rights.
Table 5: Overview of property rights according to actors

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Access</th>
<th>Withdrawal</th>
<th>Management</th>
<th>Exclusion</th>
<th>Alliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>On rented (most) and owned land</td>
<td>On rented and own land</td>
<td>Limited rights (some use patterns)</td>
<td>Grasslands (difficult to enforce)</td>
<td>Own land</td>
</tr>
<tr>
<td>CSO</td>
<td>Own land To irrigation system</td>
<td>Own land Irrigation system Benefits from ESBO</td>
<td>On own land Irrigation system</td>
<td>Irrigation facility – enforcing difficult</td>
<td>Own land</td>
</tr>
<tr>
<td>Owners of the land – non-farmers</td>
<td>On owned land</td>
<td>No (possible after lease contract ceased)</td>
<td>NO (on leased land)</td>
<td>On their land – difficult to enforce</td>
<td>On owned land</td>
</tr>
<tr>
<td>Hunters</td>
<td>On grasslands</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Fishers</td>
<td>To river facilities</td>
<td>Water body (river)</td>
<td>Water body (river)</td>
<td>Only authorised fishers</td>
<td>NO</td>
</tr>
<tr>
<td>Municipality</td>
<td>Water body Irrigation system</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
</tbody>
</table>

Source: own assessment based on results of interviews

At the beginning of the project CSO did not have any property rights in area and the governance and institutional change was possible after the property rights change (result of the change is presented in Table 5). The ownership of part of grasslands in hands of CSO enabled to start contracts with farmers with higher power over the grassland management, but it created uncertainty on farmers’ site and thus weaken the collective action.

Important new institution is a formal water use regime which reflects and respects property rights of other stakeholders (especially small water power plant owner and farmers). This has a form of officially approved set of rules for water management.

The most of the farmers have contracts with government on the management of grasslands. Prescriptions on management are part of contract in a framework of AECM (and less targeted measures under direct payments), which provides a governance structure for the way the management of grassland is carried out.

Farmers have medium to short term rent contracts with owners on the land management (most of the land is rented). Now they rent part of the land from CSO and the contract is rather weak (very low rent and the conditions are not demanding). The only condition agreed on the grassland management is postponing grass cut to support biodiversity. So the contract does not represent a burden to farmers (source: interviews, workshop).

The collective action is not formalised by written agreement, the only exception is water regime document, of which approval is required by law. It has form of relational contract based
on trust and in case of board, and relationship of board with most of other stakeholders it is rather stable, but it is quite weak with stakeholders with low trust level to the project leaders (i.e. farmers). The effort of CSO to keep the relationship right with other stakeholders is significant, but sometime CSO/CSOP does not respect some of the principles of collective action. The CSO put a lot of effort in providing experience of the benefits of the project to donors (e.g. well showing the result in the ESBO provision, invitations to public days) in order to keep principles of reciprocity and support long term relationship with them.

There is rather flexible management of the Bird Park and coordination of collective action. The CSO and CSOP run the board which meets twice a year, communicates by emails and telephone calls with each other, and with other stakeholders. The board makes strategic decisions. The head of CSO has a decision-making power and delegate operational decisions to local project manager. The same arrangement was from the beginning of the project and it was not necessary to change that (this is regarded by key actors as successful). The only change was hiring of the local project manager after some time of the project in order to make easier the actual management of the project, and to enhance close contact with local stakeholders (source: interviews, workshop). The new project manager was the major change in the project management.

There are only two levels of management (director and project manager), and the mechanism of communication (meetings, emails and telephone communication). The flexible work of board is possible because there is a sufficient level of trust between both NGOs and all of the NGOs members are enthusiasts, sharing common interest and benefits of the project (CSO and CSOP) (source: interviews).

The difficult part of the management is that the project work is quite demanding and there is not sufficient personnel capacity to face that challenge (source: interviews).

The leaders of the project believe the governance model and management is transferable, because it is a simple and flexible model, and it is suitable to the purpose (source: interviews). But the property rights structure is rather specific and even in principle transferable, the potential for spreading this model is limited. The reason is the long-term limits in sustainability and high costs associated with land purchase. The situation when the land is owned by of NGO has an implication of high external dependence on financial support (of grassland management), which could make the initiative fragile in times of significant change (e.g. decline in support under CAP, decline in national economy). The option would be if the CSO/CSOP find alternative sources of financial support for the initiative.

The enhancement of biodiversity (the key ESBO) is the first priority for the board and it substantially influences the governance. The project manager was selected from local inhabitants, so he has an advantage of the local knowledge and participation in the local social networks. But he is also professionally (i.e. science and specially ornithology) skilled. The leaders have to make sure to find a right balance between biodiversity and educational purpose of the project, because the activities for visitors in the site should not limit the biodiversity improvement (source: interviews, workshop).
The project is supported on the regional level, especially the municipality (environmental department) put a lot of effort in support, and also regional government is supportive. Some farmers are supportive, but some of them not (source: interviews).

The nearest steps in enhancement of ESBO provision are: measures for wildlife support (creation of a new wetland for birds and bird-watching, creation of pools, and areas without a plant cover for waders, insects, and amphibians). The new activities for visitors will be an advertisement, creation of visitors’ infrastructure (e.g. educational leaflets and brochures, a path with educational boards, a bird-observatory), (source: interviews). The board plan to start management of their land in the site themselves (most probably by CSOP) to make sure the proper management will be in place.

4.3 The role and impact of policy in ESBO provision

The case study area represents 70 ha of grasslands in the lowland fertile arable land area and the Bird Park is not recognised as protected area (private park). These conditions determine also type of policies which are relevant for the case study. The area is not less favoured and not lagging behind in development.

The provision of ESBO is linked to grasslands in this case study. The most of the grass is used mostly for beef/sheep production nowadays in Czech Republic. But given poor economic performance of beef/sheep production, the provision of ESBO on grassland is driven more by supporting policy measures than by market.

The most influential are the CAP (Direct Payments under the Pillar 1 and AECM under the Pillar 2) and policies of the Ministry of Environment (Operational programs/national schemes). The regulatory framework is based on the Birds and Habitat Directives especially in Natura 2000 sites and the Czech Law on Nature Protection No. 114/1992 Col. Without influence of the mentioned policies, the part of the land could be abandoned.
Table 6: Policies linked to ESBO provision (biodiversity, cultural values, and public education)

<table>
<thead>
<tr>
<th>Policy type</th>
<th>EU</th>
<th>CZ</th>
<th>Payments (€/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional framework</td>
<td>-</td>
<td>Support in institutional change from municipality/ regional government</td>
<td>-</td>
</tr>
<tr>
<td>Regulatory framework</td>
<td>Cross-compliance (SMR), especially Habitat and Birds Directives</td>
<td>Law on Nature and landscape protection 114/1992 Coll.</td>
<td>-</td>
</tr>
<tr>
<td>Voluntary conditionality of CAP</td>
<td>EU rules on cross-compliance and greening</td>
<td>Detailed guidelines to comply with cross-compliance and greening</td>
<td>-</td>
</tr>
<tr>
<td>Supporting measures (area payments)</td>
<td>Rules for Rural Development Plan design</td>
<td>Agri-environmental-climatic measure (extensive grassland management support)</td>
<td>100-111</td>
</tr>
<tr>
<td>Investment support</td>
<td>Rules for Operational Programmes</td>
<td>Operational Program for Environment</td>
<td>Project based (e.g. pools and visitors facilities creation)</td>
</tr>
<tr>
<td>Supporting measures – indirect influence</td>
<td>Direct payments rules</td>
<td>Detailed rules and level of payment</td>
<td>201*</td>
</tr>
</tbody>
</table>

*) Including greening. Voluntary coupled payments are linked to LU of dairy cows, ruminants, and beef and not directly linked to area. If linked to area the payment could range from 2-55 €/ha.

Operational Programme for Environment was key source of investment support directly aimed at biodiversity provision, water retention, and education of visitors (e.g. facilities for visitors). New habitats were created (e.g. small pools), investments helped to restore irrigation system, and together contributed highly to the increase of ESBO.

Very important were policies of regional government (Region Hradec Králové) – meso-level - and the city of Jaroměř. Both were active in provision of administrative support and creating necessary new rules – like adjustments of Development Plan of City Jaroměř or design and approval of water management regime. Their assistance has made the collective action easier by its promotion (e.g. provided their facilities for meeting) and by help in institutional change. The farmers are motivated to manage the grasslands by market in limited way, but more by support of grassland management under CAP, and some of them also feel obligation to owners...
to take care of their land (source: LPIS, interviews). Partly direct payments with cross-compliance/greening, but mainly agri-environmental-climatic measure, contribute to the extensive grassland management (e.g. limiting application of fertilisers). Thus, CAP tools contribute to ESBO provision.

The main source of information provision to farmers on grassland management is ensured by the local NGOs and the project manager (source: interviews). The ESBO provision is not linked to any private scheme and market influence is very weak, because the beef production is in a loss.

The main change in the policy was an introduction of the Greening which replaced GAEC standards in prevention of grassland ploughing (the protection is actually weaker now). But the policy change actually did not influence the ESBO provision in the project. When the policies were introduced, the meadows were already degraded, and of a low biodiversity value. Therefore, the grasslands were originally addressed by not targeted scheme (i.e. support of extensive grassland management). But after the restoration of the irrigation system and wet meadows, waders came back, and the locality started to be valuable from the biodiversity point of view. Therefore, in the later stages of the project it was possible to designate a part of the area for high level schemes of AECM, but there is still some potential to increase the targeting (e.g. designation for corncrake protection). A significant policy failure was not identified there (source: interviews).

Because there has been no radical change in the relevant policies during the last 10 years, it is not anticipated any significant difference in ESBO provision caused by such change in this period. But without policies which originated before 13 years (i.e. the EU accession and the start of Agri-environmental Measure) the provision of ESBO would be much more difficult (as indicated above) (source: interviews).

The policies influencing the Bird Park management did not contribute to the collective action which was necessary for the ESBO provision, but supported basic grassland management. The CSO and CSOP helped the farmers in finding the right scheme under AECM and they also initiated designation of a high-level scheme in the area (i.e. suggested that to Ministry of Agriculture).

The current policies are rather coherent and complement the other activities. Some synergy could be seen between the support of education and the investment support of creation of pools. There was found a gap in the institutional framework for such an initiative, because the Czech regulatory framework does not recognise currently private parks for the nature protection, and therefore the private Bird Park does not benefit full support as the national protected areas do.

The aims of the Bird Park are partly in line with the aims of CAP policies (measures under RDP) and therefore the policies worked rather well here.
All in all, both the national (the support of investments in the Bird Park) and EU (AECM and Operational program) policy measures worked rather well and have been effective in facilitating ESBO provision in the Bird Park. Both types of policy were complementary in targeting the relevant activities. Some innovation in the policy was in tailoring of AECM for example relevant to the Bird Park and in the time period discussed. Policies were less targeted to support the collective action and more to individuals, who operate in the area.

Stakeholders in collective action integrated the policies to the project development and regard them as an important factor in the ESBO provision.

4.4 The role of the private sector in ESBO provision and enabling factors

The provision of ESBOs is partly independent of the private sector. It means the ESBOs are provided on the land owned by CSO and enhanced by irrigation again in the hands of CSO. On the farm-land not owned by CSO the local farmers provide ESBOs based on agreement with CSO on management and motivated by the CAP payments (the market is not important driver here, because the hay market in the region is small, and with high uncertainty). The ESBO is not provided in a framework of any private scheme in this Bird Park and it is not a private sector initiative. Because the market is a weak driver here, the other actors in market chain are not relevant here (beside the farmers). The key actors reported, that there is no prospect for private sector initiative or private scheme (source: interviews).

5 Potential pathways towards an enhanced provision of ESBOs

There has been already a discussion carried out between the members of the board how to enhance ESBO provision. Some proposals for the grassland management improvements and introduction of new pools, and small ponds were introduced. The target is to increase the number of the wader species nesting in the area up to three or four. In the case of amphibians, the number could increase only by one, maximum two species, because there are not more species in the area.

Due to the fact, that the size of the area is a major limit (70 hectares in total), the idea to enlarge the Bird Park has been already discussed, but it unlikely happens in near future (in surrounding only arable land is available). The other reason is that even current size is difficult to manage, because there is a lack of human capacity in CSO and lack of funds to pay additional human work (source: interviews).

In the case of provision of educational, amenity, and recreational values for public, there is still some space for increase of the provision. CSO and CSOP plan to divide the area to zones: for visitors, buffer, and zone only for birds. The plan could secure low disturbance of the birds and easier management for the birds’ protection by the CSO staff. On the other hand there is still a need to build some facilities (e.g. for bird-watching). In general the CSO seeks the right balance between number of visitors and the caring capacity of the site. There is still space for increase especially a number of individual visitors. Group visits are usually organised in around six actions per year and this number could not be increased substantially (the reasons: e.g. difficult to manage it, limited capacities of volunteers as a guide, caring capacity for a large
number of the people). The target number of visitors in ten years’ time is about 1000 visitors per year. This will be also influenced by funds available to schools for organising the visits (e.g. travel costs) and for paying the fee for one pupil in the group (source: interviews).

The provision of ESBOs will be secured in future by a successful continuation of the land purchase (financial contributions of donors are increasing currently) which gives to CSO full property rights, and power to pursue the proper management, and to decrease a risk of disagreement with the farmers on the grassland management (source: interview, workshop). The project target is ¾ of all the Bird Park land in hands of CSO in future. The limits are also in willingness of the owners to sell the land. Therefore, there is an intensive discussion with the owners over the future ownership lead by the CSO (source: interviews).

Also the availability of a sufficient amount of water is limiting, it means in some seasons there is not enough water for all users (especially in dry years like 2014-2015) and it is time consuming to change the rules of the water use, which should be approved by officials at the municipality (source: interviews).

All in all in order to enhance provision of ESBOs, the board of the Bird Park deals intensively with the land owners on the further land purchase, considering an increase of the total area of the Bird Park, but in long run. The CSO will put further effort in creating new habitats for birds and amphibians to support them and to increase the numbers of wildlife.

There is no additional collective action, only which is described in the sections above.

The Bird Park board makes strong effort to diminish the role of the farmers operating on the land which is not owned by CSO. Therefore it is assumed that in future the property rights change substantially, because the farmers will rent the land from CSO and their management activities will be more under control of the CSO (the NGOs are considering to manage the site at least partly themselves in future). It means the private sector will be probably weaker in the Bird Park.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework was very effective in taking into account both ecological and social aspects, because in order to assess its performance it was not possible to avoid all the key variables, explaining the performance (the SES methodology and the history of development of this concept provided the set of variables needed).

For this case study the SES framework was not adapted much. It was necessary to consider that actors, who use the resource units, are not fully dependent on the production and that the production is not economically viable. It means that this context influenced the motivations and interest of the actors, and the strength of some rules in place.

Without SES approach it would be easy to overlook especially the role of social dimension (e.g. characteristics of the actors, a level of the trust, a sense of the history) in the assessment of
success/failure of the collective action, and thus also the provision of ESBO. It is because the actors are likely to be perceived as rational people, who are driven mainly by economic incentives to their decisions, and do not take into account benefits of common actions, additional benefit stemming from them or on the other hand seemingly irrational reasons for their decisions (e.g. based on low trust).

SES helps to understand additional factors, when analysing farming systems or policy influence to farming systems. Especially in the case when more actors are involved. These are especially characteristics of the subject of the transaction (here the hay and relevant ESBOs), the actors, and the whole dynamic of their interactions, which should be consistent with the characteristics of the good under the transaction. Also a deep insight to the group dynamics concerning their exchange of the information on the trustworthiness, on the level of the compliance control of the agreed rules, the way how the actors are penalised in case of noncompliance to the agreed rules, and a lot more help to see, what factors should be changed in order to make collective action improved or even possible.

Because the SES helps to include all key factors to the assessment, it could be called a holistic approach.

When the SES approach take past path dependency or history of the system into account, it is possible to assess influence of dynamic change under the complex initiatives as collective action.

The SES can provide quite deep insight into role of principles of collective action which help in decision making aimed at increase and sustainability of the ESBO provision (e.g. how to increase trust, how to make balance in costs/benefit sharing between stakeholders, how to improve coordination). Decision making could be done both on the collective action level and on a national policy level (creation of institutional framework).

SES approach can discover deficiencies in the cooperation of stakeholders and thus also be a basis for suggestions for their improvements (e.g. early involvement of all key stakeholders, ensuring fair distribution of information). SES shows the value and impact of information sharing, common decision making, and other factors of good cooperation.

The SES approach should include also stakeholders, who are or could be beneficiaries of the collective action and ESBO provision, and for example the enquiry about the sharing of costs and benefits lead researcher/project managers to assessment of the valorisation of the ESBO at least in a qualitative way. Assessment in a quantitative way is not necessary outcome of SES application.

Using the SES approach showed that precise definition of a system and its boundary, and using participatory approach during the initiation of collective action in order to meet its basic principles and principles of institutional change gives good basis for the stakeholders’ engagement. For example systems and institutional analysis is a good start, followed by ensuring of reciprocity during the coordination of the collective action.
For the most stakeholders the notions of public goods or ecosystem services are too abstract terms/concepts. In order to operationalise the approach these should be translated to the terms which are closer to their day to day life (e.g. support the birds and amphibians, and joy of people from nice environment – instead of public goods). The same effort should be made in case of lot of variables used in SES analysis and proposals for change.

A better management of the collective and common pool resource was the motivation for development of SES system approach, and therefore they are important for the understanding the approach.

The attempts to find solutions to identified barriers of ESBO provision with stakeholders are good tests of the SES approach in face of the capacity of system in question to overcome them. For example: SES approach identifies a low trust as a barrier to collective action and wit the stakeholders are proposed actions for overcoming of the barrier. Than the system (coordinators, actors) shows its capacity to introduce such a change. It gives a lesson about the capacity of the system for institutional change and also about the quality of SES assessment and this is quite new knowledge to both actors and also to facilitators of the case.

It is unavoidable to be involved in the process and to influence that. Therefore, action research needs independent approach to all stakeholders in order to gain trust, needs careful self-reflection on the influence of the process, and also a need to avoid manipulative behaviour. The SES approach studies cooperation of stakeholders in a complex environment and interactions, and both analysis of the system, and action research build on natural tendency of people to overcome “rational egoist” approach in the community if all key conditions are met. One of the conditions is at least minimum social capital (e.g. trust) allowing to bring stakeholders together and build the trust even more. But in CEE countries the trust between some groups of stakeholders could be so low, that it could be difficult even to bring them to the table to speak each other and to motivate them to come to the meetings more than one time. It is possible but it could be difficult and could need much more time and experienced coordination then in countries with more mature social capital (most of the EU 15). In this case sometime “start small” could be good concept, because people could be too quickly discouraged by seemingly no change for a long time.

In this case an innovation could be seen a focus on the learning of collective action coordinators about the social dimension of the SES in a participative way. This allowed them to accept different views while avoiding severe conflicts with other stakeholders. This was taken as a starting point to future potential change in approach in collective action. Finally the experience from the workshop was appreciated by project manager as useful for his further work with stakeholders. So the innovation was an adjustment of the approach and ambitions to the local social and institutional environment.
7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

The case study represents relatively small area and number of stakeholders based rather close to the wet meadows. The studied SES provided much more ESBO after the collective action was initiated and several actions were carried out because of that. The leaders of the collective action succeeded to meet the local/regional demand of especially biodiversity/landscape enthusiasts and it provided sufficient financial funds for the investment in the site. The collective action helped to renew the traditional values and supported the environmental education in the region.

The policy measures played an important role and the collective action leaders orchestrated their support to create especially new habitats, facilities for visitors, and to renew the old irrigation system of a high cultural value.

If there was no demand for biodiversity in the intensively farmed regions between inhabitants and biodiversity enthusiasts, it would be difficult (if possible) to carry out most of the capital work, which was possible to carry out only on own land (e.g. habitats for birds like pools or wetlands). But it was necessary to address this demand, to gain the trust in the project, and the relevant actors to turn the demand to actual support. The demand is growing and will be supported further by a targeted promotion of the activities and events in the site, and especially of the results – provision of ESBOs to the inhabitants, school children, and biodiversity enthusiasts (e.g. additional organised visits, new facilities for bird watching, better presentation of actual achievements related to support).

Evolution of the provision of ESBO in SES shows that there was an attempt to run collective action which was partly successful. The core group represent only two NGOs (CSO and CSOP) and does not include especially farmers, but other stakeholders too (e.g. fishers, hunters, small power plant owner). They are part of broader circle of the collective action. It means they are less involved, usually do not participate on decision making, but are informed and asked for opinion. There were attempts to include farmers more, but it was successful only partly (with only one or two farmers). One of the barriers of inclusion of the farmers is quite low general trust (Uslander 2003, Uslaner 2002, Frane 2006). The low involvement of farmers and uncertainty concerning future decisions of CSO (e.g. on land ownership) contributed also to a low trust to CSO and CSOP. Another reason is that distribution of costs and benefit of the action situation was not sufficiently discussed and managed. Farmers feel that they bear more costs than benefits.

The agreement on rules, their monitoring, and enforcement are rather well working, because the group of stakeholders and the site is small. Some rules are not formalised and their role is pursued by local quite respected project manager.

The small size of area and low number of stakeholders make it easier to board and project manager to spread information to all stakeholders (including personal communication), and
also coordination of the collective action is quite easy because that. Therefore, there is not felt lack of information.

The interesting finding is that in this case study the project leaders facing lack of trust to the key stakeholders decided to radically change property rights to land (NGO started to purchase the land) to ensure the ESBOs provision, rather than trying to build the trust and make a long-term agreement on the needed management of the site with stakeholders. The decision was made after the attempts to improve the trust level, which were not successful with some farmers. The project leaders started to consider a possibility to farm by themselves (not even renting the land to farmers), and now discuss all relevant advantages and disadvantages of that idea. Both the purchase of the land of interest and intention to start farming on their own can be seen also in other environmental NGOs (land trusts) and it is parallel to the long-term strategy of the state nature protection authorities in the Czech Republic. The reason were a combination of generally low trust in society and not sufficient experience in running collective action (i.e. some principles of collective action were not met).

When considering the other case studies under PEGASUS project it could be concluded following:

The successful collective action:

1. Involving key stakeholders in core group,
2. Keeping the key property rights the same (rules rely on agreement on collective action),
3. Providing ESBOs, should meet following conditions:
   a) There should be actual or potential demand for the ESBO in society.
   b) Sufficient social capital in the system allowing start collective action (i.e. agreed and used rules of collective work for the same benefit)
   c) There should be an agent (individual/organisation): 1. with capacity, knowledge, and leadership to initiate/run the collective action (e.g. meeting the principles of collective action) and 2. Capable to meet the actual/potential demand for ESBO in society.

If there is demand for ESBO, but either the capacity of the initiator of the collective action is not sufficient, or the barriers for collective action are substantial (e.g. too low social capital), then the second-best option could be radical change in property rights (e.g. buying the land). Such solution can secure provision of ESBO even with risk of collective action collapse.

7.2 Key findings on governance arrangements and institutional frameworks

There have been substantial changes in property rights in the project (e.g. change in land ownership, formal water management regime). Land purchase was the second-best solution in order to make sure the ESBO will be provided in future under conditions of lack of trust between project leaders and farmers. The contract between farmers and government is a governance structure of the grassland management on most of the area. The agreements under
the collective action enabled stakeholders to change environmental conditions on the site and increase biodiversity level.

This case is not strongly dependent on the policy measures, despite the leaders of the project used the public funds extensively. The capital supports (under the Operational Program of the Ministry of Environment) were quite suitable for the site and did not need specific enabling factors (not necessary to tailor them), but just the project oriented leaders of the collective action were needed.

The area payments under CAP were slightly adapted. High level scheme of AECM was introduced to reflect better the value of the site. The AECM support was positive factor which has made the provision of ESBO easier from financial point of view. The designation of the site for high level scheme under AECM (the only change in contract of farmers with government) improved to some extent farmers benefits from contributing to conservation and increased tailoring of the policy. The financial rules for NGOs are one of the obstacles of the economic sustainability of NGOs, which was recognised as a gap in the policy. If no financial support of the project was available, the project leaders believe, they can run the project, but the evolution of the project would be much slower and would rely mostly on donors.

All in all the policy was to a large degree in favour of the project and was utilised to a large extent. There is still some space for designation of additional fields for high level scheme and thus the policy could be better tailored and farmers more rewarded for their effort.

The weaknesses of the governance arrangements are following:

The Czech regulatory framework does not recognise private nature parks and therefore these do not benefit from usual regimes for similar localities (e.g. protection, support). The financial rules for NGOs are one of the obstacles of economic sustainability of NGOs, which was recognised as a gap in policy framework for the project.

The substantial change in the property rights during the last five years: caused higher stability of provision of ESBOs, but long term has made the project more fragile concerning dependence on external financial resources.

The management on the collective action level is rather flexible and the size of project allows quite simple distribution of responsibility which is based on the trust involving two NGOs. The leading NGO represents director with decision making power and project manager who has operational decision making power and implements the agreed actions by the board and at CSO.

7.3 Other enabling or limiting factors

Quite important factor in this case study is enthusiasm of members of the leading NGOs and volunteers. This is strong feature of the case, but could be seen long term as a weakness, because the work is quite demanding, not sufficiently paid, and in case of any radical change
in personnel (e.g. leaving, retirement), this could cause difficulties for the initiative. Contributions to EU strategic objectives.

The initiative contributes to local/regional tourism, but because small scale the real contribution is not measurable yet. The project contributes to employment to a small extent. The Bird Park represents a visible and inspiring contribution to sustainable management of resources (e.g. water, biodiversity). In Czech conditions the initiative is innovative as a community initiative involving to some extent stakeholders, because this is still rather rare when aimed at biodiversity (and in general too).

7.4 How about the transferability of the approach/mechanism used?

The leaders of the project believe the case is transferable, provided there is sufficient enthusiasm. It should be added that a lot of effort is needed in such cases to overcome for example lack of trust and not mature social capital in general. The approach is suitable to a small-scale project. In case larger areas and more stakeholders, the governance, rules enforcement and coordination of the collective action should be adjusted accordingly. It is advisable to try to avoid some weak points of collective actions, which could emerge in other cases in the Czech Republic (e.g. stemming from not mature social capital as a barrier for collective action).

The case is an example of securing ESBO provision with help of radical change of property rights (buying the land by project leaders) as the second-best solution when cooperation is not trusted from project leaders. This is a limit of transferability of the specific arrangements in the case, because this option is limited to specific cases, and usually prohibitively expensive for large areas.

On the other hand, the lessons from the project are highly transferable. Especially systematic implementation of principles of collective action are needed and this case study shows the weakness of collective action, in case this condition is not met. The case also demonstrates implications of not complete involvement of stakeholders to collective action. As a response, some property right changes could lead to lower sustainability of ESBO provision long run and high dependence on external funds.
8 References (including projects docs, evidence reports etc.)


9 ANNEX: Reflections on the case study methodology used

This section focusses on the action mandate and its implementation by the research teams. It provides an overview of the participatory process, and its outcomes. It has to be discussed with the actors whether and in which format this section can become published. It has to be available internally for the comparative analysis but could be removed before publication.

9.1 Objectives and activities undertaken with initiative/stakeholders

Agreed objectives and implemented actions
In early stage of the project following objectives were collected from stakeholders:

a) To help with finding a balance between the extensity of farming and its economics, and demonstrating it to the farmers, and the ornithologists (source: the farmers). Finally the leaders of the collective action tried to get data on economics on farms, but it failed because farmers did not provided. The purpose of that objective was covered to a great extent by quite deep discussion of distribution of costs and benefits between stakeholders, where costs of farming were discussed (even in qualitative way).

b) Demonstrate the complexity and research potential to the decision makers on the national level and representative of universities (source: the ornithologists). This objective was covered to some extent by national level workshop on findings and research in the case study area at the end of 2016.

c) Potential for improvement of water management agreement, but the condition is to start measuring of the water use (source: focus group). At the second workshop it was clarified that the water management works rather well, and the issue of measurement is no central to the case study, and is more of interest of hydro-power plant owner and the municipality.

d) Members of NGO are keen to work more on finding of good communication with other stakeholders in order to improve collective action (source: focus group).

It means the last objective was the most important for the case study further development and was the main focus of the next workshop and discussions.
### Actors involved

<table>
<thead>
<tr>
<th>Actors involved</th>
<th>Their role</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSO and CSOP (several members)</td>
<td>Provided information on the site, ESBO provision and variables of SES in interviews. Actively cooperated in workshop preparation and organisation, active participation on workshops. Gave feedback to the results. Active discussion of possible actions in future. Were keen in results for potential implementation. Appreciated the discussed actions and expressed need to take them into account in future coordination of collective action.</td>
</tr>
<tr>
<td>Farmers</td>
<td>Some open for interviews (some refused). One actively participated on workshops, gave feedback to results of SES analysis and discussed the proposals for actions for SES improvement.</td>
</tr>
<tr>
<td>Owner of hydropower plant</td>
<td>Provided information in interviews. Participated on the workshop and discussed potential future actions.</td>
</tr>
<tr>
<td>Representative of municipality</td>
<td>Provide information and actively participated on workshop and discussed potential actions</td>
</tr>
<tr>
<td>Fisher</td>
<td>Discussed potential actions at the workshop.</td>
</tr>
<tr>
<td>Volunteer</td>
<td>Provided information in interviews. Actively participated at the workshops and discussed potential actions for the collective action improvement.</td>
</tr>
<tr>
<td>Water authority</td>
<td>Provision of information and interview provision.</td>
</tr>
<tr>
<td>Nature conservation agency – regional office</td>
<td>Provision of information and interview provision.</td>
</tr>
</tbody>
</table>

### 9.2 Outcomes and further steps

#### Outcomes of the process:

- records of interviews and workshops;
- results of analysis of SES with feedback (approval) from group of stakeholders.
- Set of proposed actions/approaches discussed at the workshop with feedback and expression of usefulness for further collective action and cooperation of stakeholders.
- Deeper insight to the distribution of costs and benefits between stakeholders gained during the workshop – assessment of project team.

#### Further steps:

Board (CSO and CSOP) and on operational level mainly coordinator commented the results will be implemented to improve coordination of the collective action.

### 9.3 Judgement on the process

#### Expectations of actors:

The expectations of actors were mainly in decrease of uncertainties regarding the future development of the project.
Expectations met?
The expectation was possible to meet partly. The obstacle was partly low motivation of some stakeholders to participate on the process (especially farmers). Partly lack of capacity of project team to elaborate more some actions proposals with stakeholders (e.g. strategy for improvement of human resources and financial sustainability of the project).

The added value of participatory approach – opinion of project team:
In our view, the stakeholders could under the independent facilitation learn about issues which could be otherwise too sensitive and partly hidden. For example they could experience the distribution of costs and benefits of the collective action between stakeholders in a “safe environment” and get the feeling where are potential for improvement while avoiding serious conflicts. The team assume that the experience gained by the core group of stakeholders, who coordinate collective action, could help to improve the collective action to some extent.

Lessons and what did not work well:
The phase of discussion of potential actions for collective action improvement needs sufficient time (which was not available). In environment of low trust the willingness to participate on workshops and even interviews decreased after repeated invitations quickly (usually those with low trust and low benefit from the project/collective action). It was not possible to overcome the low trust and to increase participation in case of stakeholders, who refused to communicate with the research team (mostly farmers). Therefore, the main lesson was available for those stakeholders, who attended the workshops. i.e. those who benefit from the collective action most.

9.4 Supporting data and statistics
The supporting data is in text in sections above.
CASE STUDY

TRADITIONAL ORCHARDS (GERMANY)

D4.3 | Final Version | March 2017

Kerstin Huelemeyer, Christoph Mathias, Simone Sterly
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Summary

<table>
<thead>
<tr>
<th>Country</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>The initiative operates in the three regions Kraichgau, Bergstraße and Odenwald (border area of Hesse and Baden-Wuerttemberg)</td>
</tr>
<tr>
<td>Farming/forestry system</td>
<td>Traditional orchards (agroforestry)</td>
</tr>
<tr>
<td>Kind of action/main mechanism</td>
<td>Supplier Premium to producers, who produce apples certified organic which are processed and sold by a press house in the form of organic juice</td>
</tr>
</tbody>
</table>
| Key ESBOs      | Current key ESBOs comprise  
- biodiversity in terms of ecological diversity, genetic diversity and pollination  
- landscape character and related cultural heritage  
- Educational activities  
Other ESBOs might become key in the future as well, e.g. rural vitality. |
| Key drivers of ESBO provision or of initiative/action | Demographic change  
Bad ecological state of half of the trees  
Growing market opportunity for (organic) supplier premium |
| Total no. of land managers (farmers, foresters, etc.) involved | 45 producers |

*Short summary of the case:*
The Support Association for Regional Traditional Orchard Cultivation (FÖG) is one of the oldest supplier premium initiatives in Germany, founded in order to maintain the regionally typical landscape element and related environmental benefits (esp. biodiversity) through a better price for producers and additional collective activities.
1 Introduction: What is the case study about?

This case is about a collective action for traditional orchards (other names are meadow orchards or scattered orchards). This form of cultivation comprises the regular use of single stemmed orchards with high fruit trees (minimum required stem height is not defined but 1.8m is recommended, NABU 2015) as well as the area where they stand, which are in Germany mostly meadows. In Europe, large traditional orchard areas can be found in Northern Spain, France, Luxemburg, Germany, Swiss, Austria and Slovenia. These characteristic elements of cultural landscapes show a decline in quality and quantity since the 1950s. In response, in Germany awareness for the decline arouse among nature conservationists in the 1980s, leading to a number of initiatives which intended to maintain the traditional orchards.

Our case study is about one of the first of these initiatives, the Support Association for Regional Traditional Orchard Cultivation (Fördergemeinschaft regionaler Streuobstbau, FÖG). It operates in parts of the three natural areas Bergstraße, Odenwald and Kraichgau, approximately 2,973 km², covering the southern part of the state Hesse and the North-West of the state Baden-Wuerttemberg (Figure 1).

![Figure 1: Area of the FÖG (termed project area)](image)

In 2013, the initiative had 54 producing members who cultivated traditional orchards on 125 ha and additional 35 supporting members who are not producers themselves. These are interested individuals as well as three local groups of the Nature and Biodiversity Conservation Union Germany (Naturschutzbund, NABU), one BUND (Friends of the Earth Germany) group and the city of Mannheim. Currently, there are 45 producers and 36 supporting members left...
but no numbers on the area available as the FÖG lost track on this information. In addition, the FÖG is not able to state clearly how many of the producers are farmers.

ESBOs which are provided through this land use activity comprise sustainable and sufficient production of food, water quality, climate adaptation and mitigation, healthy functioning soils, biodiversity, maintaining and enhancing landscape character, public recreation and education, and rural vitality (see section 2.3 for detailed analysis).

The initiative was founded in 1989 in order to maintain the regionally typical traditional orchards through a supplier premium. FÖG activities comprise inter alia communication with the press house, record-keeping (members, area covered, number of trees), taking care of the certification as organic, funding applications, quality assurance, and training of members. These activities are carried out mainly by members of the executive board. The collaborating press house (Falter Fruchtsaft) is involved in organic certification activities and quality assurance. In addition, they are responsible for marketing and sales activities and organise and carry out premium payment to producers. Other actors involve the certification body, two laboratories, an organic tree nursery, and the Nature Park Neckartal-Odenwald, in which most of the traditional orchards are located and which in some years supported the planting of young trees.

In the beginning, the initiative carried out marketing and sales of the juice itself, which changed to the press house Falter Fruchtsaft in 2002. The FÖG has been certified organic according to the EU organic regulation in 1998. It now funds pruning of the trees, as half of the trees are currently in bad condition (not well maintained due to age structure of producers as well as economic reasons: ‘Price of fruit gives no real incentive for maintaining the trees and some producers are not depending on the income’, FÖG 2015) and they fund planting of young trees. In addition, they offer fruit tree pruning courses open to the public.

The FÖG operates in the border area of the two German states Hesse and Baden-Wuerttemberg. The two states differ substantially in terms of funding and support for orchard maintenance. While in Baden-Wuerttemberg high importance is attributed to this traditional form of land use which still covers a substantial area of land (around 9.2 Mio orchard fruit trees) and funding through different programmes has a history; Hesse with its estimated 0.5 to 1 Mio trees, started funding and support only in the current EAFRD funding period (2014-2020).

Future risks to provision and societal demand of ESBOs (Environmentally and Socially Beneficial Outcomes) provided through orchard meadows concern economic deficits and decreasing knowledge on meadow orchard maintenance. Other than expected (cp. Sterly & Huelemeyer 2016), the upcoming termination of the spirits monopoly in Germany seems not influential – but demographic change. Most of all, however, half of the existing orchards in the area are in bad condition and a considerable amount of the trees has grown old. If no new trees are planted and well maintained ESBO provision through orchards will decline rapidly. In addition, the most important challenge for the initiative itself is to keep up the current organisational structure as association or reorganise to ensure continuity, as there are not enough volunteers for the executive work.
This is where PEGASUS action research connected, as the FÖG had already thought about setting up a project group to explore the future options of the initiative. The IfLS-PEGASUS team led this process, invited to and facilitated four scenario and strategy workshops and prepared the results for future activities. The process and the results were then analysed by the IfLS team to give answers to the main research question: How does an initiative like the FÖG successfully contribute to the provision of ESBOs? For us, the question implies that we look at different ESBOs taking into account their interrelations, and find success factors and barriers for the provision. We trace back the development of the initiative and the related ESBO provision, and explore future possible developments in order to see, what would be strategies to maintain or improve ESBO provision in the area.
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES

**RESOURCE SYSTEM**
125 ha of traditional orchards (agroforestry) managed by the FÖG, located in Bergstraße, Odenwald and Kraichgau, which is close to metropolitan area Rhein-Neckar; RS characterised by low productivity; half of the trees in bad condition; single rejuvenation and maintenance efforts

**RESOURCE UNITS**
Depending on which ESBO we look at: biomass from meadows; water; fruit trees providing shadow, fresh air, stable slope soils due to surface roughness preventing wind erosion, stock of apples, stock of orchards shaping distinct traditional landscape scenery, visitable by school classes, meeting point for people of the village when harvesting, recreation etc.

**ACTION SITUATIONS**
Little marketing activities but organisation of organic certification and supplier premium → maintaining economic value and existence of RS; (Few remaining) information activities → attribution of societal value to RU, focus is on few environmental outcomes; (small number of) training activities on tree cutting → ESBO provision; Conflict between executive board and managing director → swallows last energy of remaining active members; No identification of producers with product → do not consume FÖG juice themselves; No interaction between producers, most don’t know each other → no sense of community and corporate identity, no appreciation or no awareness of social ESBOs; little use of new ICT (operate a basic website) → channels for reaching new and younger members are missing; reluctance to work with other organisations or to set up new actions (lack of workforce and resentments) → no new input or members

**GOVERNANCE SYSTEM**
Initiative for a supplier premium with networks along the regional production chain; funding through RDPs and state/regional funds + (supra-national) regulations (EU regulation on organic production, EAFRD, WFRD); regional and local control mechanisms

**ACTORS**
Direct: FÖG executive board, 45 FÖG producers, 37 supporting members (including three local NABU groups, one BUND group, one community), over aging of members and decrease in number; trustful and long relationship with: Falter Fruchtsaft (press house), ABCert (organic certification body), 2 labs; long but sometimes difficult relationship with organic tree nursery; Indirect: local communities, regional authorities (NUTS3), regional park, state authorities

**MACRO-ISSUES:**
Demographic change, global market and industrialisation of apple cultivation and processing, local initiatives on orchards increase, new markets emerge (e.g. cider in cans), new approaches to social engagement, e.g. campaign- and fun-oriented, web-based

Figure 2: Outline of the main structure of the SES for the basic situation 2016 (adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)
2.2 Description of the SES

The relation between traditional orchard cultivation and the provision of ESBOs through this land management activity is quite straightforward (e.g. Lucke et al. 1992, Herzog 1998, 2000, Weller 2006, Plieninger 2011, NABU 2015). The key issue is how to maintain the traditional orchards which is strongly related to the economic subsystem – but as we will show also to the social subsystem.

The FÖG has started working on this topic in 1989, responding to the decline of orchards. The initiative was founded by environmental activists and correspondingly, the main objective was to protect the cultural landscape element and its related environmental value, with a main focus on biodiversity (provision of habitats for endangered species and maintenance of old varieties). Further environmental objectives were added over time, after correlations of orchards and their additional value were published: protection of soil and water bodies, contribution to a better local climate.

There was and still is only limited awareness of socially beneficial outcomes, it is only the educational function of orchard meadows, which is increasingly acknowledged. The FÖG conducts own pruning courses open to the public, which is mainly due to the fact that the director of the board makes part of his living from pruning of orchards but also because half of the orchards are in a bad state and need (better) pruning. In addition, public programmes have set-up a training for orchard pedagogues, who are supposed to specifically work with schools, which has also helped to spread the idea of the educational value of orchards. Other ESBOs like contribution to rural vitality via social inclusion activities (e.g. working on orchards together with migrants), increased communication through common activities, celebrations etc. are not taken into account and addressed by the FÖG.

The main governance mechanism of the FÖG is paying a supplier premium based on the idea of “protection through use” – connecting the objective of nature conservation with market principles. In the beginning, the number of producers joining the FÖG increased rapidly, not for idealistic but economic interest. This is still one of the drawbacks of the system, as the FÖG has failed filling the producers with awareness and pride for the side aspects of their production: the provision of ESBOs.

“Most of the producers make sure their apples get to the press house Falter so that they receive the supplier premium. But they don’t drink the juice themselves. Instead they buy those cheap china apple juice concentrates at discount stores!” (Interview statement FÖG member).

“The FÖG producers don’t appreciate and identify with the product” (Interview statement external).

The FÖG converted to organic production in the mid 90’s, as one of the two press houses they worked with set organic production as a standard requirement for taking FÖG apples. In turn, the other press house, Falter, set up an organic juice product line. While Falter survived and still cooperates with the FÖG, the other press house was subject to industry consolidation processes. Today, the organic juice production line is one of the unique selling points of Falter.
Beside organising the organic certification and holding pruning courses, support of planting of young trees is one of the FÖG activities (around 100 per year are funded, so that producers only have to pay one third of the original costs for organic apple seedlings). In addition, producers are assisted with funding applications within EAFRD and related state programmes (only in the federal state of Baden-Württemberg and with little response of producers, see sections 4.2 and 4.3). Furthermore funding for marketing activities is applied for, while other funding sources, e.g. from the regional Geo-Nature Park, are not taken advantage of, mainly due to administrative burdens and the low capacities in personnel (see sections 4.1-4.3).

The FÖG is rarely connected with other initiatives. Opportunities not taken so far comprise e.g. tourism related activities pushed at NUTS3 level, which are mostly related to high appreciation of the landscape and therewith a strong interest in maintaining this traditional landscape element. Other initiatives now try to use the cultural component of traditional orchards for integration of immigrants (bringing together people at harvesting time, providing a sense of tradition and culture in the states of Hesse and Baden-Württemberg). A LEADER LAG in the region funds orchard meadow related products but the FÖG has not taken up contact. The FÖG also declined the offer of a public authority at NUTS3 level to participate in the creation and production of a new apple mix beverage because of its current lack of volunteers. New initiatives like the orchard savers (Streuobstwiesenretter) focus both on socially and environmentally beneficial outcomes but also connect to market opportunities. Instead of collaborating with them, they are observed by most FÖG members with scepticism and are perceived as competitors (which has changed within the scenario development process initiated by the PEGASUS team, see section 9). The Streuobstwiesenretter perceive the FÖG as stolid, which might be related to the aging of the FÖG or their lack of certain enthusiastic members who are able to devote time for the association’s work. FÖG representatives draw a parallel between the new young initiative and their own success in early years:

“The Streuobstwiesenretter have members who are able to combine the initiative’s work with their daily work as it is related. When the FÖG started, we had these very active people, too. But now there is nobody like that left.” (Interview statement FÖG member).

In general, there is a lot of room for synergies in the region.

2.3 Levels of ESBO provision, trends and determinants

A number of studies has been carried out, reflecting on the topic of traditional orchards and the quantity and quality of ESBOs (e.g. Lucke et al. 1992, Herzog 1998, 2000, Weller 2006, Plieninger 2011, NABU 2015).

The most frequently named and communicated ESBOs provided (e.g. NABU 2015) are

- biodiversity in terms of ecological diversity (up to 5000 animal and plant species may exist on an orchard meadow), genetic diversity (German orchard meadows comprise 3000 varieties of fruit species) and pollination
- landscape character (as orchard meadows have been a characteristic landscape element contributing to the distinctness of the landscape in the last centuries) and related
cultural heritage (preservation of the cultural landscape through managing this traditional farming system)

- Educational activities (pruning courses, information on orchards)

Other ESBOs which can be associated comprise

- Sustainable and sufficient production of food (orchard meadows provide old fruit varieties which are suitable for allergy sufferers; in contrast to plantations the production is more sustainable, no use of pesticides etc.)
- Water quality and supply, soil protection, and climate mitigation (orchard meadows are a permanent culture with no groundwater input, no use of heavy machinery, grass prevents soil erosion, and grassland contributes to carbon sequestration)
- Climate adaptation (orchard meadows improve the local/micro climate)
- Outdoor recreation and experience of nature (either by enjoying the traditional landscape or by managing orchard meadows)
- Rural vitality (Numerous activities and events related to the maintenance of orchard meadows, harvesting as well as communication and information contribute to active and socially resilient rural communities)

All of these ESBOs are provided through traditional orchard cultivation. The FÖG focused in the beginning on biodiversity and landscape management. It started to carry educational activities (see 2.2) in order to improve maintenance of trees and opened these courses up to the broader public. In addition, the FÖG is now aware of the water and soil related positive benefits, promoting them as well on their homepage. The active targeting of ESBOs might change in the course of the future pathway the FÖG might take. The German PEGASUS team developed three scenarios together with the FÖG (see section 9). Especially the third scenario foresees a direct targeting of socially beneficial outcomes, which are not considered by the FÖG but could give the initiative a strong boost (acknowledging and realising its potential contribution to rural vitality would in turn lead to a more vital FÖG as well).

The German PEGASUS team has developed a concept and a list of indicators for assessing the levels of provision and the demand of ESBOs and started to acquire and quality check the relevant data (for more detail see section 9.4). It was not able to test and apply the concept, however, as the FÖG lost track of necessary information and was not able to provide the necessary resources to restore it. Thus, it made no sense to further acquire necessary data and then locate the orchards together with the FÖG in order to have a spatial reference which would have been the basis for applying a GIS based approach.

In general, we need to keep in mind that orchard meadows are a complex ecosystem with multiple interrelations influencing the actual provision of ESBOs of each orchard meadow, which makes a quantification difficult if not impossible. On the example of biodiversity, we would like to illustrate the problem: An orchard meadow may show, e.g. up to 5.000 animal and plant species, which depends on the maintenance of trees, the use of the meadow beneath the tree, etc. It would require field work to analyse the specific contribution of each meadow.
Main determinants of improvements in ESBO provision and key limiting factors

Looking at the related markets, globalisation and industrialisation of apple cultivation has lowered the profitability of conventional orchard growing considerably, while at the same time, a growing market share of organic products can be observed. In 2015, the business volume of organic products increased by 11% (BÖLW 2016). In addition, the demand for regionally produced products as well as for surcharge and fair trade products increases.

Stimulate by the increasing demand for regional and organic products new markets emerge, e.g. cider in cans, regional apple vinegar. The remaining, regional press houses are able to find niches and benefit from this development. On the other hand, a limiting factor might become apple imports, mainly from Poland and China, which have led to considerably low prices for conventional apples. If in China and Poland, e.g., organic apples and processed products are produced cheaper, they might lower the currently high prices for organic apples.

From a policy perspective changes in the organic regulation as well as changes in the seed regulation would have an influence on the SES. The first determines one of the main governance mechanism, organic certification, and the latter might lead to considerably high costs if old varieties would have to be licensed and in the end to further decline of the number of orchard meadows.

A limiting factor for initiatives clearly is demographic change, which means there are more older than young people who can engage potentially, while in addition, young people move to cities for educational and professional reasons. This potential limitation is, however, mitigated through the currently observed tendency of young people to come back to rural areas when starting a family with the intention to provide their children with a sense for nature. In addition, there is a trend towards a “hobby with purpose” and “mindfulness” etc., leading e.g. to a revitalisation of the honey-production sector (and often a related interest on orchards), interest in production of own food, juice, or cider etc. Currently, the FÖG is not able, however, to connect to and profit from this trend as it is not known to the broader public in the regions, neither does it have an active and/or creative image.

In this respect, the use of social media for networking and engaging and the tendency towards new approaches to social engagement, e.g. more campaign- and fun-oriented and web-based will shape future initiatives as well. Initiatives can adapt and use new media as a way of approaching and communicating with (potential) members. If initiatives fail to provide such activities, it will be challenging for them to maintain their membership base.

Knowledge on ecological and biodiversity issues is perceived to have declined, which might become another limiting factor for the work of the initiative and attracting future members:

“Most of the people simply don’t see the connections between orchards and biodiversity anymore. And if you don’t know anything about the rich flora and fauna which is there, you won’t do anything to maintain it.” (Interview statement external).
2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

The initiative does not aim directly at growing in the economic sense and is not creating jobs but helps to preserve jobs at the regional press house. If the FÖG were able to overcome its problems and successfully implemented the developed strategies (see further sections 4.2 and 4.3), it could bring pectin from orchard meadows to product maturity and contribute to smart growth.

3 Shifting societal norms, collective learning and voluntary actions

Shifting societal norms

The well-established structures and processes of the FÖG are challenged by shifting social norms about political activism and new forms of participation. The FÖG was founded in 1989, when the institutionalization of the environmental movement started (cf. Brand 1999: 252). As one of the first supplier premium initiatives, the FÖG established its innovative approach to preserve orchard meadows which was based on the idea “protection through use” (interview statement FÖG founder). It implied long-term collaboration of environmental activists, farmers, and press house(s). The main mechanism was to raise the interest of producers through a supplier premium, and raise consumer awareness through making them pay the surcharge.

For FÖG producers their orchard meadows are often a family heritage they want to preserve and enjoy preserving. The next generation however often lives at a distant place or hardly shows any interest in cultivating orchard meadows for themselves. The attitude towards the family heritage and the cultural or social value of orchard meadows has changed. However, this does not mean there is no interest in orchard meadows in the group of 25 to 35 years old people anymore. But today’s environmental movement is influenced by new forms of activism often connected to new media. Voluntary commitments for non-profit organizations like the FÖG have been changing. Micheletti & McFarlane (2015) refer to swarm-organized collective actions, web blogs and other applications of new media for the purpose of political activism as “creative participation”. While the FÖG still focuses on its supplier premium scheme with products directed at conscious consumers, new and more flexible forms of activism are not applied. The success of another regional initiative for the preservation of orchard meadows, the Streuobstwiesenretter shows that people are generally interested and willing to volunteer in that field. An analysis of activities and participants of the Streuobstwiesenretter shows that the motivation for participation is more than environmental protection of the habitat. Social aspects gain more relevance, like working together in a group and/or having a common family hobby; preserving the traditional landscape; doing something physically challenging outside as contrast to an office job; following “back to nature”, “do-it-yourself” and “mindfulness” concepts, etc. These activities in turn contribute to rural vitality, outdoor recreation and educational activities. Whereas the Streuobstwiesenretter is a quick growing network of mostly younger people, the FÖG is struggling to find members willing to take responsibility.

Even though the young initiative of the Streuobstwiesenretter is admired for their ability to mobilise young people, aging FÖG-producers can hardly imagine to open their orchard meadows for interested people outside their own family (e.g. through organising harvesting
events). Holding on to their ‘family orchards’ prevents the implementation of new approaches. One member of FÖG’s executive board described the FÖG’s attitude towards the new networking approach of the Streuobstwiesenretter very much reserved: “People in the FÖG think ‘well, those young guys sit around and talk but do they really work on the meadows?’”. It appears as if the FÖG did not realize that anything strengthening the Streuobstwiesenretter’s network is beneficial to their cause. Therefore, the networking approach of the Streuobstwiesenretter is not considered “serious enough”, in comparison to the FÖG’s producer oriented approach. Streuobstwiesenretter activities are not accepted as equally important or potentially successful. Nevertheless, their success in attracting young people for preserving orchard meadows is seen as something the FÖG has failed to accomplish.

The case study shows that societal norms have not been shifting within the FÖG initiative as they have in the larger society especially as an issue between generations. The FÖG is struggling with finding a strategy to adapt to the new circumstances. Without active members, the association will not be able to maintain the supplier premium model to preserve orchard meadows. Possible pathways, including the redefinition of norms are elaborated in chapter 5. The case study also shows that other actors like the Streuobstwiesenretter or the press house (see below) have found ways to connect social and ecological aspects to provide attractive leisure time activities and preserve orchard meadows or secure supply of apples from orchard meadows.

Collective Learning
Knowledge exchange activities are focused on formal transfer via courses: The FÖG initiative organizes pruning lessons with a focus on orchard meadows. The courses are targeted to members of the initiative and interested non-members, thus also promoted to the general public. Teaching activity increases the preservation service of the initiative beyond its actual membership base, as additional individuals are enabled to prune their trees properly and maintain orchard meadows in accordance with environmental aspects. At the same time, it improves the quality of orchard meadows of its members and contributes to a shared understanding of orchard meadow farming within the initiative. This is beneficial regarding the quality of the harvest, the organic audit and contributes to preservation of orchard meadows and ESBO provision. Key actors for pruning courses were both the director of the board and the executive officer. The first was also the instructor whereas the latter was responsible for organising the pruning courses. The FÖG observes an increased interest in the last years. In 2016, around 100 persons attended FÖG pruning courses.

There is no exchange focused on learning with other actors in the SES like the Press House or the Nature Park. Individual members participate in a LEADER working group with the aim to establish a local brand. The FÖG association is however not included in those talks as this project has not been communicated inside the FÖG.

Within the initiative, hardly any collective learning takes place. The individual supporting member as well as producers is not involved in any activities and the FÖG does not offer events or any other opportunities to interact or facilitate collective learning. Some members are responsible for specific tasks, like applying for grants or preparing the organic audit. But the fact,
that each volunteer is responsible for a different task and the fact, that the volunteers live scattered across three regions prevent collective learning from actually taking place. In addition, producers do not show interest in and recognize the amount of work that is done by the volunteers.

The federal state of Hesse does not offer classes on meadow orchard farming or tree pruning, which makes private activities in the field, like the one of the FÖG, especially valuable for ESBO provision of orchards. In Baden-Wuerttemberg, pruning courses are organised by the regional administration (NUTS3).

Beside pruning courses, other activities would be required to preserve and enhance existing knowledge on maintenance, harvesting, organic certification, apple products or application for funding. This may include setting up networks of exchange with other orchard meadow initiatives. In addition, collecting and systemising information and experiences would be helpful. This might lead to a comprehensive guideline for preserving orchard meadows. Furthermore, regular, periodic interaction of FÖG members would increase knowledge and at the same time facilitate a common understanding of the association and promote its development.

At this stage, however, none of the members, including the executive board and the executive office have taken responsibility for establishing knowledge transfer within the organization. Therefore, it missed to benefit from a systematic improvement of processes, e.g. applying for grants. The lack of awareness as well as structural barriers prevent collective learning. The association is based on voluntary work. For its continuation, it is important to find enough volunteers to carry out the specific tasks. Interviews show that the focus is on finding a successor, but there are no processes to preserve gathered knowledge on the tasks by the predecessor. The interviewees did not worry about the loss of knowledge and experience - despite the fact that in one case the person was assigned to a task for almost two decades. Geographical conditions contribute to the isolation of the individual members and constitute a spatial barrier for collective learning processes. The individual members are scattered around three regions; therefore, meetings require travelling great distances. Activities to facilitate collective learning are time consuming. The members already volunteering are trying to not spend even more time working for the initiative.

Changes and processes in the case study
Activists of the environmental movement established the FÖG initiative as a market based approach to preserve orchard meadows. This is a reaction to policy incentives between the 1950s and 1980s, which had been aimed at intensification of apple production, thus increasing productivity. The founders of the FÖG wanted to preserve orchard meadows, as they knew about the habitat function. In addition, the change of the traditional landscape was another motivation.

First, the initiative coordinated the processing of the apples with a regional press house, concentrated on selling and successfully marketed the produced juice themselves. It later decided to leave sales and marketing to the press house they cooperated with, in order to reduce the
amount of individual private time spent for FÖG related work and transfer the economic risk to the industry.

As there were problems with one press house, an additional one was found which required an organic certification of the meadow orchards. The FÖG therefore started to organise organic certification before any policy incentives were available. Until now it is a very attractive model for small scale farmers and private owners, who are thus able to benefit from the development of the global market (decrease of prices for conventional apples while prices for organic apples increase). Until that time, the first press house did not have an organic product line. Together with the organic certification of the FÖG the press house introduced its organic product line. Today, the press house, which is again the only collaborating press house, is fond of having this product line and will continue with other organic producers in the case the FÖG association will be liquidated.

Nowadays, the RDPs of Hesse and Baden-Wuerttemberg fund activities for the preservation of traditional landscapes and incentivise change to organic farming. Policy approaches reflect a high appreciation of orchard meadows and the ESBOs provided and offer a variety of support mechanisms (see section 4.3). Regarding the FÖG, policies did not have an effect on the above described activities as these were carried out before the programmes were implemented. Funding of marketing activities of press houses is relevant, however, as the market situation of small press houses is difficult.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

The network

By the 1980s orchard meadows were undervalued in society. Lower productivity compared to plantations and policies supporting the cutting of orchard meadows resulted in a rapid loss. In 1989 environmental activists established the FÖG association with the aim to implement a supplier premium scheme for orchard meadow farmers. The higher price should offer farmers an incentive for continuing to manage traditional orchard meadows. Until today the FÖG is organizing the premium scheme in cooperation with a press house. The stakeholders configuring the initiative is reflecting its origin until today:

- Supporting members are individuals interested in the protection of the environment, NGOs from the field of environmental protection (BUND and NABU), but also a few towns and cities. They all support the initiative financially. Individuals additionally contribute through their volunteer work. The decreasing interest of volunteers to work for the FÖG has put the initiative into a deep crisis of leadership.
- The executive board and the executive office: The executive board consists of seven persons. Since 2013 they are supported by an executive office with one woman working part-time. Tensions and conflicts increasingly shape their collaboration.
• Owners of orchard meadows and farmers of orchard meadows: Producers organized in the FÖG benefit from the premium scheme the initiative has established. Nevertheless, nearly none of the producers are willing to volunteer for the initiative. In addition, most of them have grown old and retire from the association as a whole as they lack a successor for their orchards.

• The press house has a contract with the FÖG to buy up the complete harvest of the FÖG producers (allowing producers to keep up to 10% of the harvest for themselves). It processes the apples and sells an apple juice and a juice drink under the company’s name with the add-on “FÖG juice”. The relationship between the initiative and the press house appears to be ambiguous. On the one hand, the members of the FÖG value very much the press house as reliable partner and that the owner herself has been the contact person. On the other hand, the scenario development process showed that there has been lots of miscommunication in the past.

The active players within the initiative are the board and the executive office. A small number of members who are neither on the board nor in the executive office also play an important role, e.g. if they took responsibility for a specific task because they possess specific experiences, like preparing grant applications.

Leadership
The FÖG association has established formal structures in accordance with the Law on Associations (Gesetz zur Regelung des öffentlichen Vereinsrechts – Vereinsgesetz), which makes the executive board the governing body. The chairman of the board has a strong influence on the development of the initiative. The executive office is the managing body and responsible for organizing the services of the initiative. It is subject to the authority of the board. To understand the situation the FÖG finds itself in, it is crucial to look at the issue of leadership. In 2009, a new chairman was appointed who tried to bring in new ideas, but found it hard to activate members to bring ideas into life. As he himself makes his living as a professional tree pruner (and sells additionally self-produced apple juice to small health stores), he succeeded in setting up the pruning courses, which bring him additional income as a side-effect. He considers moving to Switzerland for private reasons in the long term, and wants to give up his position as chairman. In order to reduce his work, an executive office was opened up in 2013, with a free-lance journalist working part-time. The person neither experienced working as executive manager, nor in organising organic certification etc. When the long-standing and old deputy chairman resigned, a friend of the chairman joined the FÖG and became his deputy. He was designated as successor and, by profession the owner of a Public Relations Agency, brought in many new ideas and a lot of enthusiasm. The initiative was about to redefine itself. After only one year, he resigned also for private reasons. The chairman became increasingly frustrated, conflicts between him and the executive manager arouse on how to carry out the work and how to continue with the FÖG. His interest is obviously to liquidate the association as no successor can be found - instead other board members indicated they wanted to give up their position as well. The executive manager felt increasingly as fighting alone – and declined good ideas on future projects coming from outside as she felt overburdened (e.g. a LAG who wanted to start an orchard project). She carried out a survey among the members on willingness to work actively in the FÖG - with a low rate of return and nearly no indication of interest to
engage. This led to her idea of setting up a working group on the future of the FÖG with the objectives to define the way to take, resulting in the scenario development process implemented by the PEGASUS case study team.

Both, the chairman of the board and the executive manager are the most influential people in the initiative, which is a contrast to early founding years of the initiative when a huge number of people engaged enthusiastically and actively. Now, the remaining active players are working against each other. They lack a common understanding of development goals and a trustful working relation. Currently, both a motivated and visionary leadership and a skilled, forward-oriented active management are lacking, which are additional challenges to the initiative on top to the decreasing number of active members.

**Work process and communication**

The initiative has established processes where individuals take responsibility to fulfil a task such as organizing the organic certification. If the executive office is not the implementing entity, volunteers are supported with information or contacts. For most of the members, this means no direct interaction with other members. Volunteers with a specific role or task communicate on a regular basis with other volunteers. Especially the board meetings take place on a regular basis but also the executive office is a focal point of interaction.

As mentioned before, the current model of organizing a premium scheme for orchard meadow farmers is not sustainable. The initiative is not able to attract volunteers to replace withdrawing members. At the same time, the communication that takes place between the head of the board and the executive officer is shaped by irreconcilable views and mutual suspicion (see section above).

The case of the FÖG shows that it is crucial to find ways how to keep an institution vivid after the first decade. Currently, a number of new initiatives arise, e.g. the Orchard Savers (see section 3), which has been set up by four young men. As for the FÖG, the challenge for these initiatives will be to organise itself in the long-term, so that it becomes independent from the few founding shoulders and at the same time still profits from motivated and skilled volunteers full of ideas.

**Positions of the different stakeholders in relation to the FÖG**

The press house is the most important cooperating partner. It guarantees to accept the harvest and to pay a premium for it (see section 4.4). It produces apple juice and uses the initiative’s name FÖG to its organic apple juice product line. The apple juice from traditional orchard meadows is a unique selling point that distinguishes the press house’ organic apple juice from the organic apple juice of most competitors. Nevertheless, if the initiative were to be dissolved, the press house would acquire organic apples from former FÖG members or other regional producers – and is already establishing contacts (oral information at one of the meetings).

NGOs such as regional branches of BUND or NABU are members of the initiative. They support the initiative financially. Individuals who are member of the FÖG as well as one of the NGOs have led to a close connection between the associations. Nevertheless, this does not result in a close cooperation between the different platforms for the protection of the environment.
Other stakeholders such as the Nature Park, or the Streuobstwiesenretter initiative have expressed to support the FÖG association and are willing to cooperate with the association in areas of common interests. These stakeholders show a wait-and-see attitude as the FÖG association needs to solve its internal issues and rebuild capacities before it could develop or participate in joint activities.

There is no wider support network that has influenced the development of the initiative in recent years. However, the stakeholder participating in the scenario development process all offered their support and explained how and in what respect they are willing to work with the FÖG association. Cooperation between initiatives with similar objectives have the potential to create win-win-opportunities. The scenario development workshops envisioned a stronger cooperation between members but also with external stakeholders. Two scenarios foresee to establish a wider network of partners. This network should ensure support of the public and from public officials but also reduce resource constraint through cooperation with other stakeholders. Additional informational support might come as well from the NABU national group as they are operating an orchard committee: They intend to stimulate exchange between orchard meadows. A LAG in the Kraichgau region foresees maintenance of orchard meadows as one of the priorities and would be willing to support with a considerable amount of funding if the FÖG applied for it. Furthermore, the two states Hessen and Baden-Wuerttemberg increasingly provide information on funding opportunities, best practices examples for new products, etc. In addition, other initiatives and entities organise apple days and markets etc. Connecting to and profit from these initiatives will depend, however, from the question if the FÖG will continue working.

**Strengths and weaknesses**

Strengths and weaknesses of the FÖG were assessed in detail during the first scenario development workshop. Members of the FÖG and partnering organisations such as the press house and other external experts had diverging views as illustrated in Table 1.

**Table 1: Strengths and weaknesses of the FÖG association**

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Internal view</th>
<th>External view</th>
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<tbody>
<tr>
<td></td>
<td>• Production of fruits</td>
<td>• Awareness raising for the preservation of orchard meadows</td>
</tr>
<tr>
<td></td>
<td>• Preservation of old species of trees</td>
<td>• Opportunity for producers to cooperate</td>
</tr>
<tr>
<td></td>
<td>• Conservation of trees/orchards</td>
<td>• Organisation of the organic audit</td>
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<tr>
<td></td>
<td>• Continues work</td>
<td>• Establishment of an executive office</td>
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<tr>
<td></td>
<td>• Knowledge and experience</td>
<td>• Reliable partner for producers</td>
</tr>
<tr>
<td></td>
<td>• Implementation according to organic standards</td>
<td>• Known initiative in a circle of experts</td>
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<tr>
<td></td>
<td></td>
<td>• High level of expertise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• High level of product quality</td>
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</tbody>
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The focus of managing and improving the premium scheme has led to a strong focus on internal processes of the FÖG. This has resulted in the following limiting factors: The FÖG lacks a public profile and has not managed to create awareness for its cause. Such a profile would, however, improve the initiative’s ability to appeal to new members and help to create a network of organisations interested in orchard meadows. At the same time, the lack of leadership is limiting the ability of the FÖG to adapt to general changes and external challenges. Currently, the FÖG suffers from a lack of trust between the head of the executive board and the executive officer. It has not been able to install a stable management, lacks a vision and engagement for implementing activities to revive the FÖG association. In addition, the workshops with the task-force Future showed that the objective of the initiative is to preserve orchards because of their ecological value or because they are valued due to historic reasons (either as family estate or cultural landscape). Social benefits of orchards are disregarded or undervalued at best. This lack of awareness regarding the benefits of orchards prevents the initiative to reach out to additional target groups.

Possible pathways for overcoming the existing weaknesses were developed during four scenario development workshops:

- **Scenario one “The legacy of the FÖG”:** The initiative fails to overcome its organizational weaknesses. In that case, the strategy aims at preserving the existing knowledge and providing approaches to those who seek to continue actively preserving orchard meadows after the FÖG ended. The actual outcome of the strategy would be a guideline edited by the FÖG initiative (possibly the executive office).
- **Scenario two “The producer’s organization FÖG”:** Establishing regional producer associations with the FÖG as parent organisation with a focus on providing services to them (organic certification and organisation of collaboration with Falter press house).
- **Scenario three “The vital association FÖG”:** Establishing regional branches to facilitate interaction between the members. Appeal to new members with activities also for supporting members, development of new products and events. Networking with other institutions and initiatives.
Scenario two and three include devolvement of responsibilities to the regional level in order to create more ownership and to stimulate exchange and collaboration as basis for new ideas and a vivid initiative. The task-force Future decided to establish three sub-regions, representing the areas Bergstraße, Odenwald, and the Kraichgau (Figure 3). Each sub-region is supposed to act independently from each other. With a decentralization of responsibilities, the members would need to play an active role in the development of their sub-region. This would lead to more frequent interaction of FÖG members, at least within their sub-region.

Figure 3: Building three sub-regions in order to devolve responsibilities and create ownership. The regions are currently in the process of being defined by the executive board in order to present the results of the workshops in the potential regions.

The establishment of a strong public profile within the sub-regions is intended as a result of the increased local anchoring. At the same time, the association would become more accessible and potentially attractive to new members as it had local representatives on the spot and not only one executive office for three regions. Sub-regions could develop additional products and marketing channels based on interest, ideas and engagement of local members.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

There are 120 traditional orchard supplier premium initiatives in Germany, which have often been initialised and supported by local conservationist groups like NABU and BUND (NABU 2015). The NABU has introduced a quality label for traditional orchard products, which is coupled to certain maintenance requirements which enhance biodiversity and issued for surcharge initiatives. The FÖG juice is sold under this label.
The set-up of the FÖG is described in section 4.1. The FÖG is an association with an executive board and an executive office run by an executive manager. The executive board is responsible for all strategic decisions, while the executive manager organises the organic certification, planting of young trees, pruning courses, payment of the supplier premium, communication with the press house, applications for funds. She is supported by some individuals in some tasks.

The initiative is still following its founding principles: providing producers with a premium marketing model to preserve orchard meadows which had been considerably declining because of lack of societal appreciation and corresponding policy incentives like grubbing-up premia (cf. section 1 and section 4.1). The supplier premium is an arrangement with the press house. The press house guarantees a fixed price for a negotiated number of tons of apples (cf. section 4.4).

Paying a supplier premium was highly innovative when it was established in 1989. The organic certification started in the mid-90s and was, at that time in the region, again innovative. It was a requirement for the collaboration with one press house – which forced in return the other press house, which is Falter, the current and only press house, to introduce an organic apple juice. The other press house was sold as a consequence of centralisation processes of press houses. The change to organic payed-off, as the certification gives a better credit of environmentally friendly production and at the same time allows to generate higher revenues compared to non-organic products – Falter would therefore keep up the organic juice product line, even if the FÖG gave up.

Key actors never considered an alternative to the supplier premium. The advantage of the approach is that it is based on the principle that the use of orchard meadows contributes to their preservation. In that sense, it is not only a traditional cultural landscape or specific habitat that is preserved, but also a form of production which provides a high amount of ESBOs (see section 2). Consumers can actively choose to support the preservation of orchard meadows and thus the provided ESBOs. Such a premium scheme can be implemented everywhere as long as a market for sustainably or regionally produced products exists. However, consumer awareness and appreciation is volatile, which is the biggest disadvantage of the approach.
Communication of the correlation is thus a prerequisite for success of the applied model. Another disadvantage is, that producers do not have to identify with the initiative’s objectives: They can simply choose to produce organic and receive a higher price for the apples – but do not necessarily have to have an interest in ESBO provision or even simply consuming the juice themselves. This is currently the case with most of the FÖG producers. In order to cure the lack of ownership and identification, communication of ESBO provision needs to raise awareness internally as well. This may relate to the need to reorganise the current structural set-up, because of the lack of volunteers (cf. section 3). One of the scenarios developed by the Task Force Future (cf. section 9) foresees changing the FÖG to a parental organisation for three to be constituted producer associations. Another scenario was reviving the association, actively work with and bring together producers and boost their appreciation and awareness of ESBO provision through orchard meadows.

Another advantageous mechanism is organic certification, which sets standardised criteria for sustainable production. The annual audit enforces this standard and ensures sustainable production methods. Organic production and certification is of course transferable to other regions. The FÖG initiative uses a third-party certification service based on the EU organic regulation. Similar services are available all over Europe. The certification process is perceived as

“[…] laborious. It requires a lot of work and knowledge. This is why our chairman doesn’t even want to have producers with only a few trees. He says it is too costly to do the certification for them.” (Interview statement managing director)

While it would be favourable to integrate even the smallest producers in order to increase preservation and maintenance of orchards, and thus ESBO provision, the administrative procedures prevent their participation in the association currently. Traditional orchard meadows generally provide a higher level of ESBOs compared to other cultivation techniques, like plantations – the compliance with organic standards will thus leverage the quality of ESBO provision to a limited extent only. Instead, it increases the prices for orchard apples, which in turn helps to keep up the interest in maintaining orchard meadows and the related ESBO provision.

The arrangements with the press house are based on a long relationship. However, a lack of communication and frequently changing responsibilities on side of the FÖG have led to a number of misunderstandings and lack of communication, which became obvious in the scenario development workshops (cf. section 9). The most important factor is that the FÖG perceives an asymmetric power relation as the press house dictates the prices and the number of tons they take. On the other hand, the press house Falter would be open for such discussions but would want the FÖG to be in general more active, especially in terms of marketing and developing new ideas.

In the region, there is a general support for the approach, as there is an increased demand for regionally produced and organic products. The FÖG juice, however, would need to be marketed better and more clearly to reach more of the potential customers. In terms of volunteer workers, the FÖG lacks support, although at the same time other initiatives and interest groups have been set-up working on the issue. The initiative failed to establish and maintain relationships to interested individuals or other organisations, because of multiple reasons like a lack of knowledge and information on potential partners, little ICT skills, lack of time and
capacities, ignorance towards certain groups or organisations. Potential partners would be e.g. the Orchard Savers (Streuobstwiesenretter), the regional LOGL association (association for orcharding, gardening and landscape management), the LAG Neckartal-Odenwald (which even foresees the preservation of orchard meadows as a project selection criterion) or the LAG Kraichgau, where traditional orchard meadows are a priority topic.

Further enhancement of ESBO provision is discussed in section 5.

4.3 The role and impact of policy in ESBO provision

The premium supplier initiative is a market-based approach and has been set-up without policy funding. Today, financial provisions through public policies are offered (Table 2).

Table 2: Funding for traditional orchards and related activities in Hesse and Baden-Wuerttemberg (based on Sterly & Hülemeyer 2015, adjusted).

<table>
<thead>
<tr>
<th>Name of measure</th>
<th>Type of support</th>
<th>Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HESSE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>agri-environment measure E2: Conservation of traditional orchards</td>
<td>6 €/tree for maintenance (cutting)</td>
<td>Organic farmers or farmers in a designated “traditional orchard meadow area”</td>
</tr>
<tr>
<td><strong>BADEN-WUERTTEMBER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agri-environment measure (EAFRD): MEPL III (FAKT): C1</td>
<td>2.50 €/tree for maintenance (cutting)</td>
<td>farmers</td>
</tr>
<tr>
<td>Directive on Countryside Conservation (Landschaftspflegerichtlinie)</td>
<td>different actions in restoration and maintenance of traditional orchards for up to 90% of the total costs – including e.g. the purchase of a mobile juice press</td>
<td>Farmers, associations and distilleries that are managing traditional orchards which are valuable from a nature conservation perspective and which are located in a designated area</td>
</tr>
<tr>
<td>Organic certification (regional funded)</td>
<td>Certification costs with 125 €/ha</td>
<td>Farmers and private individuals who are producing in accordance with the regulation on organic farming</td>
</tr>
<tr>
<td>Marketing (regional funded)</td>
<td>Promotion and marketing activities for products from traditional orchards</td>
<td>associations and press houses</td>
</tr>
<tr>
<td>Diversification (EAFRD)</td>
<td>investments for processing and storing direct juice of up to 25% of costs (minimum eligible expenditure 50,000€)</td>
<td>Press houses</td>
</tr>
<tr>
<td>Land consolidation (regional/national funded)</td>
<td>Improvement of fragmented land to facilitate maintenance</td>
<td>municipalities</td>
</tr>
</tbody>
</table>

For Baden-Wuerttemberg, the FÖG is providing support for application – 8 of 20 producers have taken the opportunity in 2015. Correspondingly, official numbers in Baden-Wuerttemberg show that only 1.67 Mio of the 9.3 Mio of trees on traditional orchards in Baden...
Württemberg have been supported by the agri-environmental programme (MLR 2009). This is due to the fact that most owners of traditional orchards are not farmers and therefore have no interest in administrative burdens of application for funding, while the support does not cover the high costs related to maintenance and care measures.

“I don’t apply for funding, it takes too much time – and is too little money anyway. In my spare time, I want to work on the orchard meadows and not sit behind my desk again” (Interview statement producer).

The FÖG helps farmers and private individuals who have not applied for the organic production measure in the FAKT to apply for refund of organic certification costs (with 125 €/ha). The land Baden-Württemberg offers a funding of marketing activities of supplier premium initiatives. The FÖG applies for funding together with Falter press house, and the money is used for marketing activities of Falter.

There are two LEADER LAGs operating in the area. In both, projects related to traditional orchards are eligible, the LAG in the Kraichgau region even foresees traditional orchards a priority topic. In the current funding period, a total of 2 Mio. € still is available for project ideas. It turned out, that the FÖG only had limited knowledge on LEADER and not tackled an application, and now feels unable to apply anymore.

“We have been thinking of doing something in the frame of LEADER, but were too late at that time – and then lost track of it. And now I think we just don’t have the capacities anymore. It is now more a question of surviving the next year. I even declined the offer to join a project in one region where they wanted to produce a new apple mix drink. Who should do the work?” (Interview statement managing director).

Other orchard initiatives have profited from LEADER funding, e.g. APfEL e.V., an association of horse riders and keepers, farmers and land-owners who have set-up a traditional orchard centre and carry out maintenance and education activities.

However, the FÖG itself has set up a funding programme, as they fund the planting of young trees. Around 100 organic apple trees per year are funded. One tree is currently around 40€, producers only have to pay 1/3 of the costs. The rest is funded through the income of the FÖG (member fees, donations). They organise pruning courses in one region, which are well visited. Participants pay 45€, fees are reduced for FÖG members to 39€. These 1-day courses provide a certificate which producers need to apply for funding in the frame of the RDP.

In recent years, the FÖG has as well funded pruning of trees for elderly producers, together with the nature park. In the last two years, however, they have not applied for this funding of the nature park anymore, and no cutting was funded. The managing director stated, that no old producer had asked for it, and that the official tree cutter they work with (the chairman of the board) has not initiated tree cutting by himself (this had been the case earlier, when he saw orchards in a poor state and talked to the individual FÖG member).
To sum up, the economic viability of the producing members of the initiative does not depend on a specific set of policies and ESBO provision would probably not be differently if it weren’t for the programmes. However, RDP and other policies are relevant for projects in the field of developing or marketing regional products. If the FÖG decided to develop additional products, these policies would facilitate such a project. As the scenario development process showed, the future of the FÖG also depends on its ability to take full advantage of the existing funding opportunities.

The PEGASUS-team provided a document, listing funding opportunities for the preservation of orchard meadows, product development and marketing as well as for cooperation projects between different actors. This is a direct answer to the obvious policy failure, which is a lack of information about available funding opportunities. Two aspects have to be distinguished regarding the aspect of information about policies: First, the target group of policies needs to know about the available programs. In the case of the FÖG association the area of operation extends covers two Länder. It is a challenge for the volunteers of the initiative to be aware of all of the available programs and eligibility conditions. Second, the initiative relies on a person who is familiar with funding programs and who is willing to invest the time and has the skills to complete applications. To most of the FÖG members grant applications appear too complex and “require an elaborate wording” and are considered as “not worth the effort” (statement of a FÖG member).

In both federal states, the county level provides support at NUTS 3 level for farmers or local initiatives such as the FÖG association. They provide information on policies and funding criteria and assist applicants in the submission process. In the case of the FÖG initiative, however, local institutions were not able to foster the adaptation of these policies. The FÖG tried to contact the responsible person at one county administration, never received a call back and gave up on this potential source of support, feeling unable to deal with the complexity of funding programs alone. However, the employee of a different county told the researcher that she had heard of the FÖG initiative and their work and that she was wondering why no one tried to make contact to take advantage of the existing funding programs. This example clearly shows that there is a lack of communication at this level between the ones responsible for the implementation of policies and the non-professional beneficiaries.

**Policy mix**

Baden-Wuerttemberg, the state in Germany with most remaining orchard meadow stands, presents its policy mix in a comprehensive Orchard Meadow Concept (*Streuobstkonzeption, MLR 2015*), which serves as a synergistic policy guideline for orchard meadow initiatives. EAFRD funds are complemented with own measures and programmes through co-funding from the federal government and state funds to provide coherent policies for the preservation of orchard meadows and the support of initiatives for marketing regionally produced products. The state of Hesse recently started to apply similar approaches and included the preservation of orchard meadows in its latest RDP (2014-2020), but has not come up with an integrated concept like Baden-Wuerttemberg.
In Baden-Wurttemberg the combination of funding sources creates a comprehensive set of policies which strengthen the ESBO provision of orchard meadows at various levels (e.g. tree regeneration, cutting, marketing of products etc.). A success factor in Baden-Wuerttemberg is the high share of orchard meadows leading to an increased societal interest (perceiving the remaining stands as part of the cultural landscape and heritage). A number of initiatives and individuals, like the FÖG have started more than 30 years ago, working on the issue. This has led in turn to an increased societal interest which is reflected in policies. Innovative policy approaches have been developed, e.g. the creation of Associations for Landscape Maintenance (Landschaftserhaltungsverbände) in Baden-Wuerttemberg, which often employ around 2 fulltime positions and are based at NUTS3 level. They explicitly care about orchard meadows as well. In addition, Orchard Meadow Educators (Streuobstpädagogen) are trained who are supposed to work especially with school classes raising the interest in and appreciation of meadows thus contributing directly to socially beneficial outcomes of orchard meadows. The development and the web-based publication of the Orchard Meadow Concept (Streuobstkonzepion) is a simple but efficient tool to give interested persons a comprehensive introduction into relevant policies.

The highest barrier by far is the administrative burden connected to the use of policies. For the FÖG initiative, which depends on the knowledge and work of volunteers, but also small scale producers the effort regarding the submission process and the documentation of activities is in no relation to the benefits.

4.4 The role of the private sector in ESBO provision and enabling factors

In economic terms, traditional orchards are of low productivity as they are labour intensive, require a lot of knowledge and, so far there is no demand for the fruit as such – which makes them subject to abandonment. The FÖG follows the idea that preservation of traditional orchards requires a continuation of their (sustainable) exploitation. As an incentive for producers, the FÖG offers a supplier premium. In addition, it helps their members to get their orchard meadows certified to organic standards and organizes processing with a partnering press house. The press house guarantees a fixed price for a negotiated number of tons of apples. The FÖG model foresees a top-up which is variable depending on the market price and the supplier premium is 7€ max, which means the higher the market price, the lower the supplier premium. Currently, supplier premium initiatives achieve a prize between 15 and 20€ per 100kg (i.e. per dt) (NABU 2015), in the last 15 years FÖG producers received in average 16.54€ (Table 3).
Table 3: FÖG production between 2003-2015 and supplier premium for the related year

<table>
<thead>
<tr>
<th>Year</th>
<th>Apple (dt)</th>
<th>€ Per 100kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>2205</td>
<td>16.34</td>
</tr>
<tr>
<td>2004</td>
<td>2548</td>
<td>13.64</td>
</tr>
<tr>
<td>2005</td>
<td>336</td>
<td>16.15</td>
</tr>
<tr>
<td>2006</td>
<td>2845</td>
<td>13.64</td>
</tr>
<tr>
<td>2007</td>
<td>833</td>
<td>17.00</td>
</tr>
<tr>
<td>2008</td>
<td>4593</td>
<td>13.64</td>
</tr>
<tr>
<td>2009</td>
<td>514</td>
<td>13.73</td>
</tr>
<tr>
<td>2010</td>
<td>1241</td>
<td>15.88</td>
</tr>
<tr>
<td>2011</td>
<td>2767</td>
<td>15.14</td>
</tr>
<tr>
<td>2012</td>
<td>1379</td>
<td>15.65</td>
</tr>
<tr>
<td>2013</td>
<td>882</td>
<td>15.78</td>
</tr>
<tr>
<td>2014</td>
<td>945</td>
<td>14.50</td>
</tr>
<tr>
<td>2015</td>
<td>1390</td>
<td>17.50</td>
</tr>
</tbody>
</table>

If the FÖG delivers more apples, these will receive the conventional price, which is usually between 5€ and 8€. Producers who are certified organic through the FÖG are obliged to deliver their total harvest except for 10% which can be retained for personal usage. Additional members who are self-certified are allowed to deliver as much or little as they want. The press house brings two different juice products to the market. The FÖG juice is marketed under the NABU traditional orchard label (see section 4.2).

The FÖG applies a private sector scheme and through it contributes to the maintenance of traditional orchards which in turn provide to a number of ESBOs as described in section 2. So we conclude that all of these ESBOs are addressed by this private sector scheme.

**Main motivation and coverage of ESBOs**

The main motivation for the establishment of the FÖG association was of idealistic nature as a direct answer to the considerable decline of the before inherent and formative existent landscape element and a perceived policy failure, e.g. expressed through paying grubbing-up premia and supporting apple plantations instead (see section 3). Protection of the cultural landscape element and its value for the natural environment was the main objective of the initiative. In other words, the FÖG initiative strongly focuses on the ecological outcomes of their work while socially beneficial outcomes are only anchored in the initiative’s consciousness to a limited extent (e.g. carrying out educational activities, but no awareness of possible contribution to rural vitality).

Three regional meetings in the FÖG area, where the scenarios and related strategies were presented (cf. section 9), helped to get a better insight in the motivation of producers. The traditional orchards are considered as family heritage, and harvesting and maintenance traditional activities to be carried out. Even though a profitable orchard cultivation would require 25€ per dt (i.e. per 100kg) (NABU 2015), the money is perceived as nice additional income. In addition, a lot of these producers has experienced food shortages after World War II and
would not want to leave the apples rotting. In contrast, their younger generations tend to show little interest in carrying out the work for the money or for family traditions. Some of them have moved to larger cities and are not available as successors.

On the other hand, there are new orchard meadow activists like the Orchard Meadow Savers. They also show signs of idealistic and opportunity-based motivations for their interest in orchard meadows, but not only with an ecological focus as their motivation is also strongly related to social beneficial outcomes: pursuing a (family) hobby in nature as a contrast to a working week in an office and giving their children the opportunity to work in and experience nature actively; contributing to rural vitality following the idea of a sustainable economy etc.; making orchards to a place to come together and interact with people of various backgrounds (age, gender, ethnicities). Often these are new families in a village interested in working on orchards, who would probably be open to work on the producers’ meadows as well, if these were willing to (cf. section 3).

**Parties in the private sector**

As described in section 3, orchard meadows were not valued by society and abandoned. Environmental activists aiming at preserving the resource system established the FÖG association to implement a premium scheme. This can be seen as idealistic act, whereas the implemented scheme uses market opportunities as incentive. Part-time farmers or private individuals owning orchard meadows can here not necessarily be considered as entrepreneurs. As described above, they do not depend on the income from the orchard meadows and their motivation is not the pursuit of profit (“It is in their family tradition, so they try to maintain it – but not for the money, which is too little anyway for all the work you do”, interview statement FÖG member). Nevertheless, the partnership with the press house and services like the organic certification are an incentive for a sustainable production and the preservation of orchard meadows.

In the context of the case study, the private sector relates to the press house. The press house is buying up the harvest of the initiative’s producers and producing and selling the juice from the orchard meadows. It benefits by the partnership with the FÖG because it enables the small, regional company to occupy a specific market niche (regionally produced organic apple juice) which offers the rather small, family owned press house a great USP to compete with the organic product lines of large scale press houses.

**The main public policy framework influencing market mechanisms** relevant for the FÖG premium scheme is the EU Organic Regulation. The press house is benefitting from EU RDP policies, which support the marketing of the FÖG juice. Besides that, the initiative does not take advantage of most of the available policies mainly due to the administrative burden (see section 4.3).

**The future of the private sector initiative and how CAP could help**

As described above (cf. section 4.1), the FÖG initiative is not robust. A rapid loss of members and the increasing unwillingness to engage as volunteer, leads to problems in filling executive board positions. The lack of leadership has a paralyzing effect: New projects or alliances are
not developed because members are focused on internal problems – reinforcing the vulnerability of the initiative.
Assuming the internal problems described above did not exist, the FÖG initiative would have the potential to continue the successful preservation of orchard meadows. The history of nearly 30 successful years and the growing demand for regionally produced organic products translates into a considerable potential for growth (like other initiatives show) or at least into a comfortable position for continuing its work.

The future pathways have been described in three scenarios, which were developed together with the PEGASUS team. While one scenario foresees the liquidation of the FÖG, another would entail changing the FÖG to a parental organisation of three producer associations. The third comprises the revitalisation of the association with a broadening of the focus to not only environmental but also socially beneficial outcomes and the widening of the range of products. All scenarios are possible and achievable.

The two latter scenarios are based on the assumption that organic certification will be continued. This goes along with the related public sector scheme of the organic regulation. The implementing regulation (EC No. 889/2008) sets out the rules for audition and monitoring, which adds to the credibility of the products. Current discussions at EU level on a new seed regulation might entail the requirement of licensing of (old) apple varieties, which would threaten the provision of ESBOs through orchard meadows as these costly processes would reduce the already low productivity of the system and thus contribute to a further decline of orchard meadows.

In general, initiatives like the FÖG can only benefit from policies, if the administrative burden is lowered to a level where the submission of applications and the documentation can be handled by volunteers and other non-professionals. In addition, there is still a lack of knowledge on funding opportunities which needs to be responded to at implementation level. Furthermore, a professionalization in terms of management would be necessary. While current policies support the establishment of premium initiatives and the development of products and marketing channels, there is no support for initiatives finding themselves in a crisis situation like the FÖG: Demographic change of members or the change of social norms and values are challenging for initiatives like the FÖG, and eventually their contribution to an ESBO provision. In summary, CAP could set-up schemes for training and professional coaching for existing initiatives, helping them responding to the numerous market and social challenges.

5 Potential pathways towards an enhanced provision of ESBOs

Strategies
The provision of ESBOs can be enhanced in various ways. First, the general conditions for initiatives like the FÖG can be adapted to improve the ESBO provision. Second, the approach that was successfully established by the FÖG could be promoted and multiplied into other regions. And third, the FÖG association could take specific measures to increase the ESBO provision on the orchard meadows it preserves. These approaches involve different actors and have different implications.
Enhancing the general conditions for initiatives such as the FÖG requires especially two things, policy support on various aspects and increased public awareness. Some federal states like Baden-Württemberg support the establishment of premium initiatives and contribute to the multiplication of premium initiatives (see section 4.3). In addition, public policies in different federal states support the development and marketing of products or the collaboration with other initiatives. Those objectives are especially relevant for well-functioning initiatives. Initiatives in a situation like displayed in the case study are strongly affected by a change of membership demographics reducing its ability to act. They already have established products or collaborations. Instead of new products, they need to develop a strategy to deal with challenges they are facing. Complementary to the above-mentioned objectives, initiatives such as the FÖG would tremendously benefit by policies supporting strategy development processes. This would enable strengthen the capacities of initiatives to deal with and adapt to structural challenges such as demographic change or internal issues like lack of leadership. In conclusion, the case study shows that established non-profit initiatives strongly depend on the capacities of its members. Policies could support volunteers by providing the means to develop viable approaches for a continuing development of existing initiatives. In addition, training could be provided to increase the management abilities and help professionalization of initiatives, which would strengthen the ability for self-help.

The familiarity of policies could be increased to reach especially those initiatives which depend on volunteers who are less familiar with specific funding programs and sets of policies. The local administrations could also develop specific events to target initiatives and promote the use of funding programs. In addition, the public administration could offer workshops to assist with applications. Measures to reduce the complexity of funding guidelines and measures to enable beneficiaries to take advantage of funding programs would help to reduce the barriers for initiatives like the FÖG.

Increased public awareness for the ESBOs agriculture as well as forestry provide and how the public can support this, would enhance the general conditions in which initiatives like the FÖG association operate. There are numerous examples for simple and small supporting activities, e.g. public administrations only cater regionally produced food and beverages in meetings, initiative to have regional product shelves in supermarkets, using orchard meadow fruit for school lunch.

The improvement of ESBO provision of the initiative itself requires the effort to improve the conditions of the FÖG’s orchard meadows. In addition, increased awareness for specific ecological benefits and the knowledge to improve them were required as much as the motivation to implement such activities (possible pathways and potentials see below).

**The ESBO Potential**

The FÖG task-force “Future” developed three scenarios with corresponding strategies for continuing the preservation of orchard meadows (see section 4.1). Based on the results, the executive board will ask the members to take a vote on the initiative’s future and decide on a strategy in the mid of 2017. The potential increase or decrease of ESBO provision depends on the strategy the current members of the FÖG choose.
• **Scenario 1** “The Legacy of the FÖG”: The participants of the future scenario development workshops expect that 50% of the orchard meadows will be lost after the liquidation of the FÖG within 5 to 10 years’ time.

• **Scenario 2** “The producer’s organization FÖG”: If all producing members stayed in the FÖG association, the ESBO provision remains at the current level. Regional branches, however, could also decide to expand or cease their production which implicates a corresponding impact on the ESBO provision.

• **Scenario 3** “The vital association FÖG”: This scenario suggests many more activities and the collaboration with other regional initiatives. Therefore, the ESBO provision is expected to grow or is at least to be saved at the current level.

**Limiting and enabling factors**

The potential of ESBO provision is shaped by limiting and enabling factors. Internal enabling factors are the established structures and processes for organic certification of farmers and the working collaboration with the press house (only relevant for scenarios 2 and 3). The support of other initiatives and stakeholders can be considered an external enabling factor (also relevant for scenarios 2 and 3).

Various internal factors like issues regarding leadership, knowledge and capabilities but especially demographic change limit the enhancement of ESBOs (see above). A structural disadvantage is the dispersion of the members within the three regions. The lack of leadership and resources has prevented the FÖG from developing activities to attract the needed new members. Little and unspecific promotional activities have not raised public recognition nor have they conveyed the idea that orchard meadows offer a place to experience and enjoy nature as part of the voluntary work (probably because the focus of current FÖG members is as well rather on the aspect of meadow orchards being “hard graft”, interview statement FÖG member).

**Strategies to overcome the weaknesses**

To involve more of the members in the further development of the FÖG, the board divided in early 2017 the large region into three sub-regions with 15 members on average, and carried out in March a consultation workshop in each sub-region. Members were provided with the opportunity to familiarise with and give a first vote on the scenarios and corresponding strategies of action. The aim of each developed strategy is the preservation of orchard meadows. However, depending on the focus of the scenario the impact is estimated to be considerably different (see section on ESBO potential above):

• **The strategy of action for scenario 1** proposes the liquidation of the FÖG association due to a lack of volunteers. It is not a strategy to overcome the weaknesses but a way to preserve as many orchard meadows as possible. The development of a comprehensive guidebook with information and contacts is the last planned activity of the FÖG. Former members will be equipped with it to support their continuing management of orchards.
The strategy of action for scenario 2 suggests to focus on offering services for producers (mainly organic certification). The responsibility for any other activities, e.g. regarding the marketing or development of products, is downloaded to three regional producer associations, which have to be established. The FÖG will serve as parental association. While producers stay members in the FÖG, supporting members will not be involved any longer.

The strategy of action for scenario 3 advocates an association that is well connected within their three to be established sub-regions. The new sub-regions are responsible for planning and implementing activities that highlight not only ecological benefits of orchard meadows but also social ones. Events and activities attract new members. They secure an independent existence of the association embedded in a wider network of stakeholders and the continuation of the preservation of orchard meadows.

All three workshops showed that almost all producing members will not engage in additional activities beyond their current involvement in the preservation of orchard meadows but have the wish to continue deliver apples and receive a supplier premium. This means scenario 1 will be highly likely as soon as further volunteers withdraw and duties can no longer be performed. In contrast, regional stakeholders (e.g. from LEADER LAGs in the region) mostly argued for focusing resources on maintaining the supplier premium model (scenario 2) or pleaded in favour of scenario 3 to share the load of activities between different actors. After all, the managing board will decide how to continue and discuss the results of the workshops on the annual general meeting with all attending members. In a plenary assembly, mid of 2017, the final decision on the future pathway will be taken.

Alternative approaches
In the area where the FÖG organises the premium scheme other initiatives and actors are also involved in activities contributing to the preservation of orchard meadows. Those actors include two LEADER LAGs, Nature and Geo-Park, the association of horse riders and farmers for the preservation of orchard meadows named APfEL e.V. and the currently most recognized initiative called The Orchard Meadow Savers (Streuobstwiesenretter).

The Streuobstwiesenretter apply a networking approach to preserve orchard meadows. They use their strong public profile to form new alliances and raise the awareness for social and ecological benefits of orchards. They connect various actors from entrepreneurs to volunteers who have ideas for projects or want to participate in activities. They support individuals with the implementation of projects, offer tree sponsorships, organise market and festivities etc. They use a mailing list to inform and invite people to specific activities. They also serve individuals as platform for advice and contacts for specific projects. They are an important platform with an extensive network of people who support or are directly involved in the management or preservation of orchard meadows.

The Streuobstwiesenretter are currently very successful and receive lots of support and media coverage. The founding members are aware that it is necessary to establish structures to distribute tasks and responsibilities among more people than today. For the long-term success,
it is important to reduce the dependence of the Streuobstwiesenretter from its founding activists. If the initiative succeeds in establishing sustainable structures, the Streuobstwiesenretter can be considered a robust association.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework turned out suitable in bringing together the ecological and social aspects within the case study, allowing for a more holistic view. In particular, it was helpful for reflecting the different categories of the SES framework in order to get a broad picture of the prevalent settings, subsystems and actors.

While it is a too complex framework for direct communication with stakeholders it was used in the participatory scenario development process for analysis of the different scenarios. The three future pathways of the initiative were translated into three SES diagrams (see 9.3). It thus allowed to analyse dynamic change of the initiative and related ESBO provision.

In line with Hinkel et al. (2015) we see a special value in the SES framework, as it looks at more characteristics of RU and RS than just subtractability and excludability. Often, the definition of what is a common good and what is a public good is not as straight forward as the non-excludability and non-rivalry criteria suggest. “In practice, each dimension (subtractability, excludability) fluctuates along a continuum. The line between common-pool resources and public goods is a fuzzy one”, ibid., p. 31). They introduce the term collective goods, which they define as “goods and services that have nontrivial costs of exclusion, irrespective of institutional arrangements” (ibid., p. 32). In addition, certain ESBOs are relevant within the SES, while others reach to other SES and/or ecosystems, which means that the boundaries of the SES are not finite when using it in our context.

To our understanding, a special focus in the application of the SES needs to be on the action situation element, as here the societal valorisation of ESBOs can be reflected. A resource unit becomes an ESBO through the assessment and evaluation by actors: Groundwater level and groundwater quality are mere numbers. The related ESBO “Achieving (or maintaining) good ecological status of surface water and good chemical status of groundwater” depends on the definition of what are good ecological and chemical stati, which depends on existing values, experiences, knowledge, possible alternatives etc. In the 1950s, for instance, traditional orchards were still highly valued by local communities because of the fruit they produced, which could be used for own consumption or sold and led to the production of apple juice and apple wine etc., while at the same time the understorey was used for the cattle as grazing land or for fodder production; there was the feeling that the use as traditional orchards was making the best use out of the land. In the 1960s, traditional orchards were considered as unprofitable, better suited for building land due to their location surrounding the villages, or the trees were considered as hampering a more efficient, mechanical use of the grassland. In the 1980s, appreciation changed again and today they are appreciated for a number of ESBOs they provide – which can change again depending on the future pathway taken.
The action-oriented approach in combination with ESBO thinking helped to see that there is a lack of awareness and appreciation of socially beneficial outcomes which in turn increased the desolate situation of the FÖG (overaging of members, lack of new members, reduced engagement of remaining members). In the two scenarios in which the FÖG follows pathways which mean a continuation of the initiative, rural vitality, education, outdoor recreation and cultural heritage play an important role as they are actively targeted and thus contribute in turn to a revitalisation of the initiative.

For the FÖG, our offer to carry out the case study on them and follow an action-orientated approach did not only increase their willingness to participate but also helped them in a situation of imminent change paralyzing them. Through the process of scenario development, they were able to open up their mind for possible future pathways instead of seeing future as the prolongation of the present. The moral downside is, that we were just able to initiate the scenario development but cannot accompany further steps. We conclude that initiatives like the FÖG facing a difficult situation should have the opportunity to consult a coach, which could possibly be funded through CAP (see section 4.4). In addition, professional exchange and network facilitation could help to prevent and better cope with critical situations.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

The SES “FÖG orchard meadows” and the related provision of ESBOs is centred on the FÖG’s supplier premium approach. Orchard meadows contribute to numerous ESBOs (see section 2). The organic production standard, which is mandatory for all members of the initiative, does not leverage quality of ESBO provision (as they are already low/no-input systems) but leads to higher prizes, thus to maintenance of traditional orchards and ESBO provision. The quantity depends on the number of orchard meadows maintained. Most of the FÖG’s members have grown old and retire from the association, producing members are increasingly not able to maintain their trees and often lack a successor for their orchards. The FÖG is not able to attract younger members. If the initiative continues loosing members, the quantity will reduce accordingly.

The strongest driver for establishing the initiative was the preservation of the traditional landscape element and its environmental value with a focus on biodiversity. Further environmental objectives were added over time, like protection of soil and water bodies, contribution to a better local climate. In contrast, socially beneficial outcomes have not been a driver so far. The educational function of orchard meadows is increasingly acknowledged, while other ESBOs like contribution to rural vitality are not considered, though these might help to revitalise the initiative (as is the case in other initiatives like the Orchard Savers who concentrate on networking of people and institutions for maintaining the traditional landscape element, carry out events like Orchard Days, organise common harvest activities etc.).

Provision of ESBOs can be increased through internal measures within the initiative, first of all continuing the initiative’s work, secondly by actively targeting socially beneficial outcomes,
and thirdly by increasing the awareness of members and of the wider public for ESBOs deriving from orchard meadows and using this for better marketing.

General conditions regarding policies as well as market dynamics are increasingly supportive for orchard meadow initiatives. Baden-Wuerttemberg provides a comprehensive policy approach for orchard meadow initiatives from informing about funding programs to support of various activities ranging from production to marketing. The federal state of Hesse has started to follow the example of Baden-Wuerttemberg as similar policies are implemented. Two LAGs offer additional funding opportunities. However, there is still a lack of knowledge on funding opportunities which needs to be responded to at implementation level (see below) and the perceived administrative and “academic” burden of funding applications and proposal-writing requires additional support. Up to now, public policies have not made a real difference for the work of the FÖG, but could be influential if the FÖG starts to revitalise and start new projects. Both the demand for regional and organic products increases steadily, which creates a positive market environment for future activities.

7.2 Key findings on governance arrangements and institutional frameworks

The supplier premium scheme of the FÖG is a marked based approach, which was established without the use of public funds. It allows consumers to actively choose to support the preservation of orchard meadows and thus the provided ESBOs. The related disadvantage is that consumer awareness and appreciation is volatile so that continuous communication of these linkages is important. Up to now the FÖG has not focussed on active communication, only the homepage contains a few words on it. Another disadvantage is, that producers do not have to identify with the initiative’s objectives, and can simply choose to produce organic and receive a higher price for the apples. This is currently the case leading to a lack of ownership and identification, which could be prevented through internal communication of ESBO provision and awareness raising.

Until today, neither the initiative’s activities nor the ESBO provision depends on policies. Nevertheless, the FÖG is using public funds to finance few individual activities. Weaknesses of the available policies are the administrative burden, low level of knowledge on funding opportunities, and a mostly negative perceived cost-benefit relationship. Policies have the potential to support the long-term success of an initiative by not only focusing on the establishment of initiatives or single activities but also assisting initiatives in crises with adaptations processes. In addition, a professionalization in terms of management could be supported. In summary, CAP could set-up schemes for training and professional coaching for existing initiatives, helping them responding to the numerous market and social challenges.

Organic certification sets standardised criteria for sustainable production, but is perceived as labour intensive and requiring knowledge. The FÖG decided to not take up small producers with only a few trees as members. As the higher price would be an incentive for them to continue maintaining their trees, from a societal point of view it would be desirable for ESBO provision to see them certified organic. Currently certification is funded but not the process of going through it – this might as well be an additional target for future funding.
7.3 Other enabling or limiting factors

Initiatives such as the FÖG strongly depend on volunteer’s work. The lack of involved members directly influences the capacities to organise activities enhancing ESBO provision. Limiting factors are a shrinking and aging membership base, a lack of attractive activities for new members, a lack of leadership reducing the capacity to adapt the own strategy to new challenges and so on. Enabling factors could be the awareness of the range of provided ESBOs in the initiative itself as well as in the wider public if communicated better internally and externally. In addition, there is an extensive support network available to which the FÖG could easily connect.

The case of the FÖG initiative shows, that an approach has to be adapted to shifting social norms. While the new idealistic and social benefits-oriented shift potentially provides the ground for an improved ESBO provision, the FÖG’s environmental focus plus a lack of recognition and understanding of these shifts coupled with the limited ability to use required up-to-date communication channels have hampered connection to these developments.

Overall, the low productivity of traditional orchards requires support measures. These may comprise public subsidies, but will only be sustainable through market based appreciation of ESBOs through supplier premium initiatives like the FÖG or similar approaches. In particular the valorization of socially beneficial outcomes will play an important future role, providing ground for social enterprises (cf. Keech 2016).

7.4 Contributions to EU strategic objectives

The initiative does not aim directly at growing in the economic sense. Its aim is to preserve orchard meadows through a supplier premium scheme, which implies the processing and marketing of products. The initiative is not creating jobs (only one part-time position in the executive office, other activities are managed by volunteers). It contributes to the creation and preservation of employment at the regional press house. Currently the FÖG is enhancing sustainability through the provision of organic apples from orchard meadows. In the current state of the FÖG, innovative approaches cannot be identified. If the FÖG were able to overcome its problems and successfully implement the developed strategies, it could bring pectin from orchard meadows to product maturity and contribute to smart growth.

7.5 How about the transferability of the approach/mechanism used?

One has to make a distinction between the transferability of the general approach of the FÖG and its specific problems and developed solutions. A supplier premium scheme is transferable as long as suppliers are interested in implementing specific standards and a consumer demand exists (or can be created through awareness raising activities). Organic certification as a means to receive a higher price for apples from orchard meadows because of its certified sustainable production is of course transferable as well.

Other mature initiatives might also be facing challenges connected with an aging or shrinking membership base. The FÖG case study shows the relevance adapting the own approach to remain attractive for new, younger members. It also shows, that an initiative is very vulnerable
to the loss of members, if only very few are actively involved. Tasks and responsibilities should be distributed in a balanced way to ensure the long-term success of an initiative. The *Streuobstwiesenretter* provide a great example for the importance of a networking approach. Joining forces means more activities with less work for one initiative.
8 References


FÖG (Fördergemeinschaft regionaler Streuobstbau, 2015): NABU research project: Answers of the FÖG; unpublished document provided by FÖG.


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9 ANNEX: Reflections on the case study methodology used

9.1 Objectives and activities undertaken with initiative/stakeholders

Several activities were implemented as part of the PEGASUS case study research. Interviews with key individuals like members of the board or regular members were conducted for steps 1 and 2. In addition, relevant information and other material was provided by the FÖG.

The first activity of the PEGASUS team agreed with the FÖG was a funding counselling to explore systematically existing support opportunities for an initiative like the FÖG, resulting in a list with relevant funding programs, handed over to the FÖG association. The second and main activity was to develop a strategy for the future of the FÖG with its members and stakeholders. To reach this objective, the PEGASUS team accompanied the set-up of a task force ‘Future’ with FÖG representatives and external experts, and organised four scenario development workshops.

![Impressions from the task force ‘Future’ at work](image)

The objective of the first workshop was to establish a common understanding for the process. The introduction of all participants was important to establish trust and credibility. Later, the status quo of the FÖG association was analysed in detail and discussed how general conditions for initiatives like the FÖG association might change within the next five years. Based on those assumptions, the participants developed three scenarios during the second workshop. The third workshop was used to consolidate the scenarios and assess their impact on the FÖG’s orchard meadows. The last workshop was used to discuss the fully developed scenarios and strategies with additional members of the FÖG and other stakeholders like the Nature Park and explore potential cooperation and networks, next steps and required financial and human resources. Three corresponding strategies were worked out.

The following groups were involved in the scenario development process:

- The FÖG: Members of the board and the executive officer as well as long standing members (final workshop only) representing the initiative.
- Press house: the processing partner and supporting member of the FÖG, interested in continuing its organic product line with FÖG apples.
- NGOs: members of BUND and NABU (at the same time members of the FÖG) representing the interest of environmental NGOs.
• The initiative “The Orchard Savers”: Two founding members and members of the board participated as external experts.
• The regional marketing initiative “BioBande” (opening workshop and final workshop only) participation as partner of the FÖG and external expert for regional marketing initiatives.

9.2 Outcomes and further steps

The outcome of the scenario development process is a paper with three scenarios regarding potential and realistic development pathways as well as corresponding strategies for their implementation. In addition, the workshops contributed to raise awareness among the members of the FÖG about the specific challenges the FÖG is facing. Misconceptions, especially between the initiative and the press house were clarified in the process and contributed to trust building between some of the involved individuals. Perspectives for potential networks were highlighted. The PEAGSUS team also provided a comprehensive list of relevant funding programs.

In March 2017, the initiative held events in the developed sub-regions with the objective to have a first vote of members on how to continue with the FÖG. The PEAGSUS presented the developed scenarios and strategies during these events to the FÖG members and the interested public and facilitated the opinion-forming discussion process among members. It became clear that the FÖG is perceived as a service provider for producers who are not willing or able to replace withdrawing supporting members to perform their tasks. The executive board will decide further steps in April 2017. It is obvious, that current operations of the FÖG cannot be sustained. Options to be discussed are the liquidation or a transformation focusing on the professionalization of services for producers, while any development in line with scenario 3 has been excluded during the workshops in the sub-regions. As the larger producers are not certified organic through the FÖG but independently, they could continue their operations without the association. The executive office prefers the professionalization option, which will be mostly attractive for small-scale producers. In this group, most of the work is done by the older generation often without clear successorship and low willingness to pay more for the certification. Even if the FÖG succeeds with implementing more professional and lean operations, this approach will not solve the problem of demographic change in regards of membership-base and individuals managing FÖG orchard meadows.

The research team transferred the scenarios into SES diagrams to use them for further analysis (see Figure 6: Outline of the main structure of the SES Scenario 1 (adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014) Figure 7, Figure 8).

9.3 Judgement on the process

The actors had a variety of expectations regarding the work of the task-force Future and its cooperation with the PEGASUS researcher team. The main hope towards the process was to develop viable solutions for the FÖG’s problems and to take a decision on how to approach the FÖG’s challenges. The anonymous feedback on the process shows that all participants were satisfied or very satisfied with the results. Most participants were highly motivated, except for the director of the executive board who expressed his scepticism. The participatory
approach was valuable at various levels. For the FÖG it was important to start an open future-oriented process. External experts and stakeholders contributed directly with their ideas and comments. This approach lead to the development of realistic and possible solutions together with experts and partners. For the PEGASUS team, it was valuable because the action-orientation led to an increased willingness to participate. In addition, we did not only receive information about the operating conditions, partners or other initiatives but were able to observe the formation of opinion and the influence of personal relationships, interests and sympathies/antipathies on the process.

The approach was very useful to experience the actual interaction within the initiative. However, the PEGASUS team was also very much depending on the cooperation and capacity of the individuals involved. The questioning of decisions or the refrain from forwarding information were not only useful indicator for the problems of the FÖG but also a challenge the researchers had to deal with and hampered e.g. the application of the develop concept for the assessment of ESBO provision. Inherent to scenario thinking is the difficulty for involved persons to think out of the box and fully open the mind for potential future developments. Even after the whole process it was still observed that stakeholders had the tendency to see future as prolongation of the present.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Figure 8: Outline of the main structure of the SES Scenario 3 (adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)
9.4 Supporting data, statistics and initial concept for quantification of ESBOs

The initiative under review, the FÖG, has a territory which spreads over two states, Hessen and Baden-Wuerttemberg. German federalism leads to the situation that different levels of data and data provision may exist – and that in both states the relevant data providing administrative entities have to be contacted. In Baden-Wuerttemberg that is the LUBW, in Hessen the HALNUG.

We started with acquiring data for Hessen and acquired the following data (see example of Birkenau, Figure 9):

- DLM 25 contains traditional orchard meadows (red shaded), and traditional orchard fields
- Biotope mapping contains traditional orchards (green shaded)
- forest with climate protection function (only available for state forests and for forests which are ministered by HessenForst (yellow dotted)
- landscape protection areas (violet shaded) (no data on protected landscape elements)
- Habitats directive area (blue shaded)
- Birds directive area (turquoise shaded)
- Water protection area (shaded blue)

In order to check the usefulness of the available data, we produced a map for the nine communities in Hessen (see the example of Birkenau, Figure 9). Looking at the map it is striking that orchard mapping in the frame of DLM25 and orchard mapping within the biotope mapping of Hessen diverges so much. We expected more overlaps. Not every orchard mapped in DLM25 needs to be necessarily contained in the biotope mapping, as certain minimum criteria exist for declaration as biotopes. We cannot explain however, why a considerable number of orchards mapped as biotope is not contained in the DLM25. This was not checked with the respective authorities, as it turned out that the concept was not applicable at all (see below).
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633814.

The PEGASUS research team developed a concept for assessment of ESBOs. Indicators for levels of provision and demand were developed (see Table 4). The idea was to further acquire necessary data and then sit down together with the FÖG and locate the orchards in order to have a spatial reference. The FÖG was not able, however, to provide us with the exact location of the FÖG orchards due to a chaotic information management and lack of personnel. Thus, it made no sense to further follow the initial concept.

Table 4: Indicators for levels of provision and demand

<table>
<thead>
<tr>
<th>ESBO</th>
<th>Indicator for levels of provision</th>
<th>Indicators for demand/appreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable and sufficient</td>
<td>Apples produced (in dt), apple juice produced (in l), number of trees? (related to the total area of the FÖG, related to number of producers)</td>
<td>Consumption and sales figures of the press house</td>
</tr>
<tr>
<td>production of food</td>
<td></td>
<td>Water protection areas (the fact that there is a law shows appreciation)</td>
</tr>
<tr>
<td>Water quality and supply</td>
<td>difficult to assess, lack of data, water protection areas as approximation?</td>
<td></td>
</tr>
<tr>
<td>Climate adaptation</td>
<td>Improvement of the local climate: Fresh air corridors as contained in landscape plans</td>
<td>Landscape plan (the fact that there is a law shows appreciation)</td>
</tr>
</tbody>
</table>

Figure 9: Data availability and check of usefulness on the example of the community of Birkenau (own illustration).
<table>
<thead>
<tr>
<th>ESBO</th>
<th>Indicator for levels of provision</th>
<th>Indicators for demand/appreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate mitigation</td>
<td>Carbon sequestration (cp. Plieninger 2011), hard to assess and differentiate exactly for the territory</td>
<td>no demand – maybe on higher policy levels when reporting at state level: they could count orchards separately as carbon sequestration is higher than on grassland but currently they are probably added to grassland</td>
</tr>
<tr>
<td>Achieving (or maintaining) good biological and geochemical condition of soils</td>
<td>Low input cultivation (if grazing then low livestock density) and FÖG certified organic</td>
<td>Demand for organic products?</td>
</tr>
<tr>
<td>Soil protection</td>
<td>Avoiding soil erosion (hard to assess if trying to do by counterfactual, because a lot of factors would be relevant like steepness of slopes, type of soils etc.)</td>
<td>no demand but generally a number of regulations show that there is a high interest in preventing soil erosion (e.g. Codes of Good Practice)</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Existence of protected biotopes and endangered species and red list of threatened species (probably hard to get data on species, biotope data and NATURA2000 data available)</td>
<td>Again the fact that there is a law shows appreciation, in addition it is the most cited fact on traditional orchards (habitat for more than 5000 species), demand for organic products?</td>
</tr>
<tr>
<td>Pollination</td>
<td>number of beekeepers/hives (but Beekeeping Associations refuse to issue the numbers)</td>
<td>Sales figures of beekeepers (but Beekeeping Associations refuse to issue the numbers)</td>
</tr>
<tr>
<td>High genetic diversity</td>
<td>Number of apple varieties</td>
<td>Currently no demand (but could be as there are varieties which would be suitable for allergic people), no availability of fruit in supermarkets, pomologists dying out; maybe number of single-variety products produced/sold?</td>
</tr>
<tr>
<td>maintaining and enhancing landscape character</td>
<td>Protected landscape areas, but not necessarily applied on all where it would have been relevant; carrying out an own visibility analysis would be too laborious but could lead to valuable insights on contribution to distinctiveness of the landscape</td>
<td>Same as outdoor recreation? (see below)</td>
</tr>
<tr>
<td>Outdoor recreation</td>
<td>Recreational forests, designation as area with priority function in regional plans, hiking trails (no data available)</td>
<td>Number of tourists? How to assess one-day visits and local recreation?</td>
</tr>
<tr>
<td>Educational activities</td>
<td>Number of orchard pedagogues</td>
<td>Number of schools in the area which do courses on orchards, number of orchard pedagogue events</td>
</tr>
<tr>
<td>Rural vitality</td>
<td>Traditional orchard events</td>
<td>Traditional orchard events (championships, parties, harvesting events etc.)</td>
</tr>
</tbody>
</table>
CASE STUDY

GRASS-FED BEEF (ESTONIA)

D4.3 | Final Version | March 2017

Argo Peepson, Merit Mikk

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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1 Introduction: What is the case study about?

This case study (CS) is about the whole chain approach (production-processing-marketing) of organic grass-fed beef, targeting the following ESBOs: biodiversity, landscape, carbon sequestration/storage, rural vitality and animal welfare.

The main aim of this private initiative – led by farmers NGO Liivimaa Lihaveis (Beef of Livonia) – is to be independent from the mainstream processing and marketing system, to give more added-value to the products and to offer better prices for their members and related producers. The promotion of the consumption of grass-fed beef and the environmental benefits related to this (e.g. management of grasslands, including biodiversity-rich semi-natural grasslands) are very important for the whole approach.

NGO Liivimaa Lihaveis, the only NGO of its kind in Estonia, established in 2010, is a non-profit organisation led by producers of beef cattle from different locations across Estonia. The NGO was founded by 11 producers of Aberdeen Angus and Hereford breed beef cattle. Since 2014 all members are also certified organic. The NGO unites individual farmers and agricultural companies, different in terms of farm size and production volume: from smaller farms with about 50 animals, up to big farms with 2000 hectares of land and up to 500 beef cattle animals. In 2010, some founders of the NGO established also a private limited company (Nordic Beef) whose main function became distribution of grass-fed beef meat under the officially registered trade mark “Liivimaa Lihaveis”.

Figure 1: Logo of Liivimaa Lihaveis.

The NGO Liivimaa Lihaveis initiated and developed the national food quality scheme “Grass-fed beef” which was certified by the state in 2014. A good price for the beef provided by Liivimaa Lihaveis and the need to increase the marketing volume attracted other beef producers to join the grass-fed beef quality scheme. More than 30 organic farms/enterprises (in addition to the members of the NGO) from different parts of the country have joined the quality scheme since 2014 and the total number of farms who are part of the quality scheme and marketing their products under trademark “Liivimaa Lihaveis” is currently 43 (as of December 2016, see Figure 1). The state certified grass-fed beef quality scheme is opened for new producers who follow the requirements of the scheme.

1 In the following text “Liivimaa Lihaveis” is used for simplicity, but it consists of NGO Liivimaa Lihaveis (production), private limited company Nordic Beef (distributor) owned by some members of NGO, Luha meat factory, and all farms belonging to grass-fed beef quality scheme and marketing their products under trademark of “Liivimaa Lihaveis”.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814.
The grass-fed beef quality scheme\(^2\) unites producers of Aberdeen Angus, Hereford and Simmental breed beef cattle (or cross-breeds). All farms must be certified organic. According to the quality scheme, cattle must be grazed on grassland throughout the grazing period, during the winter period they must have the freedom to move freely. 50% of pastureland used for grazing should be permanent (not ploughed or cultivated). Feeding any grain to the cattle is not allowed.

In 2016, some founders of NGO Liivimaa Lihaveis became owners of a meat processing private limited company (Luha Lihatööstus) where currently all the grass-fed beef products are processed. Luha Lihatööstus is now also owner of trade mark “Liivimaa Lihaveis”.

The total area of organically managed farmland of these 43 farms is now about 16 000 hectares, including about 12 000 hectares of grasslands (mostly permanent grasslands), of which about 3000 hectares are valuable semi-natural habitats (about 10% from total area of managed semi-natural habitats in Estonia; EARC, 2015) located mainly on Natura 2000 areas. Farms belonging to the grass-fed beef quality scheme have in total more than 6000 beef cattle animals (about 8% of total number of Estonian beef cattle, see annex 9.4.1).

**Figure 4: Beef cattle of Liivimaa Lihaveis on grassland.**

Products under the trade mark “Liivimaa Lihaveis” are sold in different retail channels and provided to restaurants/cafes and some schools, in more than 150 places in total. Recently they started introducing the products in the hotel/restaurant/café (HoReCa) sector of Latvia and Sweden. Around 50% of the produce is currently exported. Liivimaa Lihaveis is cooperating with more than 20 well-recognised Estonian, Latvian and Swedish chefs. Very high attention is paid to increasing the consumer’s awareness and of the benefits related to this type of production.
The case study is focussing on environmentally and socially beneficial outcomes (ESBOs) under the broad categories of: 1) high levels of biodiversity, 2) protecting landscape character and cultural heritage, 3) climate change mitigation through carbon sequestration/storage in managed grasslands, 4) preserving and enhancing rural vitality, 5) high levels of farm animal welfare. Other ESBOs to which CS is related include sustainable and sufficient production of food, timber and energy; healthy, functioning soils; high water quality and ensuring water availability, and public recreation, education and health.

The CS report will build on previous work carried out during WP4 steps 1-2 (Peepson and Mikk, 2016b). To deepen the analysis, additional literature review and data collection were carried out. The most important source of information came from the series of interviews and meetings with main actors and stakeholders, including:

- 18 farmers (members of Liivimaa Lihaveis/grass-fed quality scheme)
- 2 co-founders of Liivimaa Lihaveis/Members of the Board (Liivimaa Lihaveis/Nordic Beef)
- 4 restaurant chefs
- 4 retailers
- 1 agricultural adviser

In this report, all quotes and other information are sourced from interviews and meetings with key actors, unless cited otherwise.
### BASIC FACTS

#### Table 1: Overview

<table>
<thead>
<tr>
<th>Country</th>
<th>Estonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td>n.a.</td>
</tr>
<tr>
<td>Main Farming/forestry system</td>
<td>Agriculture: extensive organic grass-fed beef production</td>
</tr>
<tr>
<td>Area (ha) of initiative</td>
<td>~16,000 hectares (incl. ~12,000 hectares of grasslands, of which about 3,000 hectares semi-natural habitats) (as of December 2016) across the country</td>
</tr>
<tr>
<td>Key ESBOs</td>
<td>Biodiversity, landscape character and cultural heritage, carbon sequestration/storage, rural vitality, animal welfare</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>43 (as of December 2016)</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Main actors: NGO Liivimaa Lihaveis, Nordic Beef Ltd, Luha meat factory Ltd, members of grass-fed beef quality scheme; other key stakeholders: slaughterhouses, retailers, restaurants and other caterers, chefs</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Private, CAP, other EU measures, national</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>2010</td>
</tr>
</tbody>
</table>
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

Figure 6:
Case study “Grass-fed beef” Social-Ecological system
(after McGinness and Ostrom, 2014)
The current CS is not directly related to a certain geographical area. We would not divide the system artificially into arbitrary parts and thus the resource system (RS) and resource units (RU) are considered as one complex.

Achieving (or maintaining) the presence of diverse and sufficiently plentiful species and habitats (ecological diversity) within RS/RU in this case is reached mostly through management of (semi-natural) grasslands. Farms related to this CS are managing more than 12 000 hectares of grasslands, from which a significant area (about 3000 hectares in total) are semi-natural. Semi-natural grasslands are the result of a centuries-long moderate human impact – mowing and grazing. The area of semi-natural habitats has decreased dramatically in Estonia during the last century for several reasons: intensification of agriculture (new machinery and techniques, amelioration), collectivisation of agriculture during the Soviet period and land reforms. At the beginning of 20th century, it is estimated that there were about 1 800 000 hectares of semi-natural habitats in Estonia. For now, about 130 000 ha have been preserved (State Audit Office, 2015; EMoE, 2013) and during 2007-2014 only less than 30 000 hectares of semi-natural grasslands were actively managed (and supported through Estonian RDP; Statistics Estonia 2015). These habitats are very rich in biodiversity and they are threatened in Europe as well as in Estonia. For example, about 700 plant species can be found on the Estonian semi-natural habitats and the biggest diversity of plant species has been found on wooded meadows – as high as 74 different plant species per m² (EMoE, 2014). Semi-natural habitats can be preserved only if continuously managed and beef cattle is very suitable for management of several of these habitats (e.g. coastal and floodplain meadows, wooded pastures). Currently around half of all managed semi-natural habitats in Estonia are grazed by beef cattle (Estonian Fund for Nature, 2014). Management of (semi-natural) habitats also has great value for protecting landscape character and cultural heritage while helping to preserve traditional open agricultural landscapes.

The governance system (GS) builds on organic farming, the quality scheme legislation and its rules. Farm animal welfare standards are higher in organic farming compared to conventional agriculture, and grasslands provide an excellent environment for grass-fed beef cattle.

The case is also significant in order to achieve climate change mitigation objectives through carbon storage. Grasslands act as carbon “sinks” and are therefore important in the effort to reduce levels of greenhouse gases (GHG) in the atmosphere. According to the Intergovernmental Panel on Climate Change (IPCC), 89% of agriculture’s global GHG mitigation potential is from carbon sequestration (IPCC, 2007). Grasslands store approximately 34% of the global stock of carbon in terrestrial ecosystems (European Commission, 2008). For example, in the UK, the potential sequestration is said to be 670 kg C/ha/year (Soil Association, 2009).

The actors (A) and action situations (AS) of this approach support the preservation and enhancement of rural vitality through the provision of employment for local people who otherwise might leave the countryside. The higher prices the farmers get through this approach helps to sustain the production. Cooperation with local caterers helps to sustain local businesses.
2.2 Description of the SES

For better understanding of the functioning of the SES, it is important to mention that production and consumption of beef (and in particular grass-fed beef cattle breeds) has not been traditionally common in Estonia and is still relatively modest. Production of beef cattle breeds started more widely in Estonia only about 15-20 years ago. The case is thus developing the whole beef sector, including the culture and habits of beef consumption in Estonia.

Central to the SES has been the notion of the Estonian beef producers that in order to influence the current system of production and processing, common action, co-operation and initiative was needed. According to the representative of Liivimaa Lihaveis: “The market situation in 2010 was unfavourable and the price provided by the market leader of the Estonian meat industry and the holder of the trademark “Estonian Beef” was very low, like for cull cows, breeds of Angus and Hereford did not meet the requirements dictated by the industry thus it was economically unprofitable to sell the animals there. We wanted to be independent from manufacturing pricing decisions and provide a more value-added and diversified production”.

The high share of grasslands, especially semi-natural habitats, in Estonia and in all the farms who founded Liivimaa Lihaveis, was considered as a good basis for differentiation and marketing. Together with organic certification this ensures the highest possible price: “Grass-fed beef and organic production is our opportunity and speciality which in the long-term provides the highest possible price”. With the creation of the Liivimaa Lihaveis, they are able to control the whole chain and get a higher price for their products (about 20-25% higher compared to the market average price) This in turn safeguards continuation of production and is directly related to provision of ESBOs related to this approach.

This SES consists in total of 43 individual farmers and agricultural companies all over Estonia. Members of Liivimaa Lihaveis organise jointly the slaughtering, processing and marketing. The slaughterhouse service is bought in from 2 slaughterhouses, one of them in Latvia, and processing is taking place in newly owned meat factory. Liivimaa Lihaveis is providing training and information for its members and to other beef producers interested in joining the grass-fed quality scheme. For example, study trips to USA, Argentina and Uruguay were organised for learning and to “widen the horizons”. A common interest of the Liivimaa Lihaveis is to develop the domestic market, especially the HoReCa sector, and also expansion in Latvia and Sweden and to start development of the market in Lithuania and Finland.

NGO Liivimaa Lihaveis as beef cattle provider, Nordic Beef as distributor and Luha Lihatööstus as processor are led by the board (2 board members of all organisations are the same) implementing strategic decisions taken by the general meeting of the NGO (organised once or twice a year) and responsible for everyday management of the organisations, including communication and making agreements with butcheries, retailers, caterers and other customers, and organising promotional activities. Day to day communication with members of the NGO is by phone and e-mail.

Liivimaa Lihaveis is taking an active part in different networks and is a member of several organisations such as the Estonian Chamber of Agriculture and Commerce, Estonian Organic
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Farming Platform and NGO Maitsev Lõuna-Eesti (a local small-scale producers’ network). Several recommendations and notes (e.g. related to quality schemes, cooperation measures, water regulation) made by Liivimaa Lihaveis have been taken into consideration by ministries. Members of the quality scheme are not only selling their beef cattle through Liivimaa Lihaveis, but are also involved in development of the whole production side of the approach.

The whole system is organically certified by the state and inspected by the Agricultural Board (production) and the Veterinary and Food Board (processing, marketing). As for the production side, management of grasslands in protected areas is regulated by environmental law, the authorities involved are those under the Ministry of Environment (Environmental Board, Environmental Inspectorate). Several of the semi-natural grasslands used by the farms are rented from the state (State Forest Management Centre).

A good synergy within the SES is achieved through co-operation with restaurants providing high quality meat and through organising different events in order to promote grass-fed beef consumption and cooking. A restaurant chef who was interviewed said: “Although the average Estonian consumer is looking for cheaper products and is not used to consuming beef, the number of more aware people who appreciate food produced sustainably and responsibly is increasing. We have many loyal customers asking especially for organic beef from grassland.” At the same time the knowledge of most chefs about the production methods of the raw ingredients they use in their food (and its quality) needs further development.

There are some tensions in the SES about the contribution by everyone to achieve the common goals. Successfully reaching the commercial goal of the approach – i.e. to give more added-value to the beef they produce – depends largely on farmers’ willingness and motivation to concentrate (and invest) into increasing the value of their animals. Export of young living animals does not need much investment and gives quite a good price thus many farmers are often choosing the “easiest way”. Also there are rising concerns about animal welfare issues when exporting living animals over long distances, and also the political instability of some export markets (Turkey, Lebanon). Some farmers of the quality scheme seem unsatisfied with the current payment period (up to three months) provided for their cattle by Liivimaa Lihaveis. It is a known issue and the leaders of Liivimaa Lihaveis are aware of it. Still, to keep farmers motivated, this obstacle needs to be solved.

Tensions related to the SES are also related to a dispute on the use of a label for grass-fed beef (a green coloured label with beef cattle). As the label of the quality scheme is not a trademark and it is not possible to register it as trademark, one of the Estonian meat factories took advantage of it and has registered a trade mark extremely similar to one used by Liivimaa Lihaveis (state certified grass-fed beef). While products marketed by Liivimaa Lihaveis under the label ensure that beef cattle is feed with grass only, the competitor allows a proportion of grain in the feed. That is why Liivimaa Lihaveis considers it misleading to the consumers (Äripäev, 2016c). Therefore, Liivimaa Lihaveis had to stop using the previous label and introduced a new one. The whole situation is further complicated by the fact that the meat factory involved in the dispute was previously a cooperation partner of Liivimaa Lihaveis (slaughtering service provider). On the other hand, this dispute shows that grass-fed beef is already well known in market, trusted by the consumers and there are competitors willing to “pick up the fruits” of the hard work of developing the whole grass-fed beef sector by Liivimaa Lihaveis.
2.3 Levels of ESBO provision, trends and determinants

**ESBO provision**

No specific data is available in order to assess the quality and quantity and level of provision of ESBOs provided specifically by this case, therefore assessments and judgements are based on interviews with stakeholders or general data and statistics available at country level. Quantitative data collection on key ESBOs studied within this CS would require intensive special field work (e.g. species diversity and abundance of semi-natural habitats, landscape character assessments etc.) and this was not possible within this project.

The status of the Estonian environment is monitored through the state environmental monitoring programme, which includes among other aspects monitoring of air, ground- and surface water, biodiversity, landscapes and soils. Valuable information about the environmental and socio-economic status and trends is also collected through on-going evaluation of Estonian RDP measures conducted by the Agricultural Research Centre (Axis 2 measures) and the University of Life Sciences (Axis 1 measures).

For the judgement on levels of **biodiversity** (species and habitats) provision, the national monitoring data of semi-natural habitats and related species could be used. The general state of some types of the habitats (e.g. coastal and floodplain meadows) has improved in recent years thanks to management and restoration works (ARC, 2015). The CS actors have made significant contribution herein. As many semi-natural habitats have been left out of management (overgrown with trees and bushes), biodiversity related to these habitats has declined. Data shows for example, that a decline has been registered in the abundance of some species related to semi-natural habitats (e.g. Natterjack Toad). The abundance of birds on coastal meadows (e.g. Common Dunlin, Ruff and Common Redshank) is moderately declining, the abundance of Northern Lapwing and Common Ringed Plover is stable, and the abundance of Black-tailed Godwit and Black Turnstone is strongly decreasing (ARC, 2015).

Grasslands store rather significant amounts of carbon and are therefore important for reducing GHG levels in the atmosphere. Inventories and research on soil **carbon sequestration and storage** has been done by several research institutions (e.g. Estonian Environmental Research Centre/Estonian Environment Agency, Estonian University of Life Sciences, University of Tartu, Agricultural Research Centre). A study by Kõlli et al (2007), indicates 39.9 ±8.0 Tg of soil organic carbon (SOC) is sequestered in Estonian grassland soils. And a study of University of Tartu, SEI Tallinn and Estonian Fund for Nature (2013), indicates carbon storage of grasslands reaches up to 160 000 t CO$_2$-equiv.

The need for the maintenance of **rural vitality** is commonly appreciated and agreed in Estonian society. The preservation of rural vitality consists in the provision of employment and income, and also maintaining local communities, knowledge and traditions – keeping people in rural areas. The case study actors contribute through their activities (provision of employment and income, management of grasslands etc.) to the maintenance of vitality. Without marketing opportunities, many of them would have to stop farming and move to towns and cities which would have direct impact on rural vitality. Marginalization of rural areas – i.e. impoverishment in part of the territory and the movement of the population to the cities or...
abroad – has been accelerated significantly in the last few decades in Estonia, mainly due to
the loss of jobs, the aging of the rural population and negative population growth. More than
50% of Estonian municipalities (with a total population of 140 000) and more than 50% of
Estonian territory can be considered as marginal (Raagmaa, 2011). The number of agricultural
holdings has decreased substantially in Estonia, from 2003 to 2013 by about 49% (from 36 792
to 18 755 agricultural holdings respectively; Statistics Estonia). There are several surveys con-
ducted in order to assess the marginalisation process in Estonia (Estonian Ministry of Internal
Affairs, 2009; Estonian Co-operation Assembly, 2010) which include assessment of social vi-
ability in rural areas. Klimask and Sepp (2015) have made analysis of socio-economic data and
indicators for assessing the vitality of settlements using the settlements vitality index\(^3\) which
includes several population parameters (number of inhabitants, age structure). However, the
population trends, assessments and analyses conducted are not capturing the social charac-
teristics related to rural vitality like the sense of community, social capital and trust, and
“sense of place”.

**Appreciation and demand of ESBO provision**

According to the most recent environmental awareness survey (EMoE, 2016) 89% of the pop-
ulation see Estonia’s state of the environment as good and 7% as very good. Among the three
environmental areas needing the most attention, the most frequently mentioned were purity
of the inland waters and the sea, followed by protection of natural values, forest management
and sustainable use of natural resources. Although biodiversity is considered to be one of the
policy priorities when talking about the environment, surveys do not confirm that this is also
important for the wider public. The Eurobarometer survey (European Commission, 2015)
shows that only 11% of respondents in Estonia see the decline and possible extinction of ani-
mal and plant species, habitats and ecosystems as a very serious problem and around half
(49%) think that this is a serious problem to some degree. Agriculture and forestry, intensive
farming, intensive forestry and over-fishing are considered as very much threatening biodi-
versity by 33% respondents in Estonia.

The Agricultural Research Centre (ARC) has conducted a study (2015) to collect the opinions
of farmers receiving support from RDP Axis 2 measures, notably agri-environment measures,
incl. support for the management of semi-natural habitats. Most of the producers who were
responding to the survey (86%) considered livestock grazing important for the management
of habitats. At the same time about 50% of farmers thought that the increase of biodiversity
was not needed on their own agricultural land, as it is high anyway and only about 30% of
farmers felt that biodiversity could be higher on their agricultural land while about 20% did
not have an opinion on that issue.

For the case study actors, the most important ESBOs provided are the environmental benefits
related to sustainable production based on grasslands management (biodiversity, landscape),
healthy and high quality food and animal welfare, the latter two are especially important for
consumers while the farmers interviewed mentioned landscape management the most. Also,

rural vitality is considered to be important as the “higher price and increased marketing opportunities of the produce sustain production for more farms in rural areas” and “farmers should get for their work what they deserve”.

**Main determinants of improvements in ESBO provision and key limiting factors**

Consumer’s awareness is crucial throughout the beef supply chain. By increased consumer awareness there is good potential that more and more consumers choose beef and the whole concept of this case can be widened. The organic label gives additional benefit, as organic is becoming increasingly popular despite higher prices.

Consumer’s interest in high quality beef meat is not very high in Estonia for many reasons. Beef is not commonly eaten, consumers do not have knowledge about the preparation of beef and have preconceptions about beef meat. Also, the retail price of beef is relatively high, especially compared to pork or chicken and the purchase power of the consumers is at the same time relatively low. The awareness of the “average” consumer about the advantages of beef (e.g. environmental benefits, animal welfare) is relatively low.

At the same time consumers have become increasingly aware of what they are buying and appreciate the domestic quality products – 74% of Estonian consumer’s claim to prefer domestic food (Estonian Institute of Economic Research, 2017). However, Estonian consumers are price sensitive and the price is still one of the most important aspects when making buying choices. The price of beef cattle meat has been increased 30% compared to 2010 (Äripäev 2016a) and the price has increased much faster compared to other meat: beef is 1.9 times more expensive than pork and 3.9 times more expensive than poultry (EMoRA, 2016).

Specific data on grass-fed beef consumption in Estonia is not available – nor any other specific statistics related to beef cattle breeds of meat (e.g. amount of production and consumption etc.). Data is only collected about the whole cattle sector. Consumption of beef (incl. beef meat from dairy cattle) in total has decreased about 50% in Estonia from 2006 to 2013, since 2013 consumption is increasing slightly again and amounts to 8.1 kg per capita per year (Figure 3), but is still significantly less than eating of pork (41.8 kg per capita/year) and poultry (24.7 kg per capita/year). Eating of both pork and poultry has increased compared to 2006, especially poultry, which has increased about 50% (Statistics Estonia, 2016).
Currently considerably more beef is produced than consumed in the domestic market. The predominant current market of beef cattle in Estonia is the export of live animals. One of the reasons here is that retail channels often prefer to sell imported beef with lower production costs and better prices (e.g. from South-America). In 2015, the export of live animals accounted for more than 9000 heads, therefrom nearly 5000 young animals (EmoRa, 2016; Noorkõiv, 2016). Live animals were exported to 12 different countries, mostly to Turkey, Poland, Lithuania, Slovenia, Hungary, the Netherlands, but also Lebanon, Uzbekistan and Georgia (EMoRa, 2016). Selling living animals to Turkey and other countries has increased prices in the Estonian market and interest in raising beef cattle.

- Main determinants of improvements in ESBO provision include:
  - availability and stability of available support measures and incentives, especially related to organic farming, quality schemes, co-operation, promotion and marketing, innovation and export;
  - shift in farmer’s attitude towards recognising the importance of domestic market, organic grass-fed beef production is speciality and niche, providing best price for the products in long term. This leads to expanding the number of farms of grass-fed beef quality scheme, which in turn enables increase in area of sustainably managed grasslands (incl. semi-natural grasslands), helping to enhance also related ESBO provision;
  - shift of policy from agricultural policy towards food policy with support systems and legislation supporting environmentally, economically and socially sustainable supply chains;
  - changes in consumer’s behaviour and knowledge about the origin and production methods of the food and related benefits.
Key limiting factors in ESBO provision include:

- selling living animals to Central-European countries and Turkey which has increased prices in Estonian market (and thus negatively affects the purchasing power of consumers) and interest in raising beef cattle with the aim to export of young living animals;
- lack of strategic long-term thinking in agricultural sector and missing of more foresight strategies;
- legislation which does not favour innovation and untraditional thinking and slow preparation of new legislative acts and constant changes of legislation;
- inconsistencies in policy objectives (e.g. climate change vs biodiversity) and related legislation;
- administrative burden and bureaucracy related to support measures: too many inspections, too detailed reporting, making needed changes in applications is sometimes very difficult etc. thus the efficiency of the measures could be increased;
- lack of financial capacity in order to compete with real estate and other big companies on purchasing land and limited access to credit in order to develop and expand the production;
- sometimes negative attitude to organic farming;
- low consumer’s awareness, low purchase power and interest in consuming high quality food.

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

Strategy Europe 2020 consists of three priorities: 1) smart growth – developing an economy based on knowledge and innovation, 2) sustainable growth – promoting a more resource efficient, greener and more competitive economy and 3) inclusive growth – fostering a high-employment economy delivering economic, social and territorial cohesion (European Commission, 2010). Grass-fed beef production through this CS approach is in line with the Europe 2020 priorities and contributes to enhancement of sustainability, strengthening of innovative capacity as well as creating employment.

The contribution of the CS to the sustainability objectives was described above. To create and sustain working places in rural areas is crucial for keeping people in rural areas and thus helping to preserve rural vitality. If we consider that about 10 000 jobs have been lost from rural areas during last 10 years (Hani, 2015), jobs related to this approach are quite remarkable for rural employment: whole employment (farms/NGO/Nordic Beef) supported through the system is estimated to be ca 160. Related slaughtering and processing provide additional jobs, for example, there are more than 20 people employed in Luha meat factory.
3 Shifting societal norms, collective learning and voluntary actions

Shift of societal norms is a long-term process. Given that this CS approach started only seven years ago, it would be too early to expect any major societal changes. Some trends can be still underlined.

Interviews with CS actors and farmers show that the CS approach has been shifting thinking and behaviour among farmers and consumers about beef production and the whole related value chain. The term “grass-fed beef” itself in Estonia is strongly linked with Liivimaa Lihaveis and the CS actors have been successfully increasing consumer’s awareness and interest in environmental and animal welfare benefits. If not considering market and policy instruments, an important trigger for changes has possibly been wider (global) trends of healthy living, (local) food trends and environmental concerns. But still, there are a lot of consumers who are not aware of the difference between this meat and imported beef often sold in supermarkets.

As common for post-soviet countries, Estonian farmers are sceptical to cooperation and common action. Although lack of cooperation is something that is always mentioned by policymakers and also by the farmers themselves, real action to change this attitude is missing. At the same time there are also many good examples of well-functioning cooperatives in Estonia, the current CS is certainly among them, but probably more time, collective learning and inspiration through presenting positive examples is needed before a real societal shift will take place.

Farmers increasingly value beef meat more and they like to talk about the production and related benefits. Many farmers who are not actually part of the quality scheme are selling “grass-fed beef” as they see the value and benefits for the consumer. As one interviewee put it: "Even people who usually do not eat meat, often eat grass-fed beef as they know it is coming from happy animals raised in a clean environment!" One chef said that changes need time and the older generation is definitely much less open to changes and that is why particularly high attention should be paid to the younger generation and children.

As mentioned above, awareness raising and constant collective learning among all the actors in the SES are fundamental. For increasing the consumer’s awareness information is shared through the website (www.liivimaalihaveis.ee) and Facebook page of Liivimaa Lihaveis, video-clips about grass-fed beef production and semi-natural habitats as well as about cooking the meals from this meat have been made. Liivimaa Lihaveis is participating in domestic and international food fairs, e.g. in Nordic Organic Food Fair in Malmö (Nov 2016). In 2015, “Beef Month” was organised in 40 Estonian restaurants as well as a beef grilling contest. In autumn 2017, a short TV-series about grass-fed beef, its production on semi-natural grasslands and how to cook beef will be launched on national public broadcast TV. Liivimaa Lihaveis is also participating in different innovation networks (grasslands, manure management, climate).
Co-operation with chefs includes constant training about the quality and preparation of grass-fed beef, and about the values and benefits. Liivimaa Lihaveis is organising meetings and information exchange with butchers and food bloggers from different countries around the world.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

The structure of the collective action, leadership, networking and communication between stakeholders was described in section 2.2. When we talk about the wider support for this CS approach among actors of the beef sector, then the attitude has been somewhat careful but positive in general and some “sceptics are coming to realise that the whole supply-chain approach can be successful”. Activities of Liivimaa Lihaveis are acknowledged by other stakeholders like different organisations related to food, rural development, agriculture and environment and by the consumers.

The strength of this initiative, as confirmed by many farmers we interviewed, lies in the existence of enthusiasm among the initiators who started the whole approach and who develop it from day-to-day. At the same time, it is also the weakness, as in the case when the initiators do not want or are not able to continue, the whole system might be affected and the future of the approach and thus the provision of related ESBOs might be in danger. There are no clear pathways for overcoming this weakness, as it is related to abilities and characteristics of personalities which cannot be easily “transferred”.

There are no ongoing similar actions in Estonia. A running Swiss-lead project “Baltic Grassland-Beef” through which the Estonian beef is exported to Switzerland (and to which the ongoing dispute about the label described in section 2.2 is related), differs considerably from the approach of Liivimaa Lihaveis (not organic, production requirements allow also grain as feed, no whole-chain approach) and are therefore not really comparable.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

Governance of this approach was described in section 2.2. The whole governance arrangement developed by the CS is a new one and built up from scratch. The initiators of the whole approach did not consider any other governance mechanism and found that a combination of NGO (Liivimaa Lihaveis, production) and private limited company Nordic Beef (distributor) in organising the whole process from production to marketing works well. But it also became clear that buying in the slaughtering and processing service based on agreements without any relation to these companies does not guarantee enough flexibility for the expected fast development. Therefore, some of the members recently became co-owners of the meat factory and can now influence directly the decisions made. This step is further strengthening the control over the whole production-processing-marketing chain.
At the beginning, the initiation of quality schemes was only foreseen for cooperatives and not for NGOs, but this requirement was later changed (partly also because of action taken by Liivimaa Lihaveis).

As mentioned above, the role of the leaders in whole approach is extremely important, but it is also important that all farmers who are part of the approach feel that they can influence decision-making and strategic developments are decided together. Wider development of the whole beef sector needs collective action and cooperation between all actors from farmers to policy makers.

We can say that the provision of ESBOs is central for this approach and ESBOs related to this case (e.g. biodiversity, animal welfare) are always in the foreground when communicating with the public. Further enhancement of ESBO provision is described in section 5.

4.3 The role and impact of policy in ESBO provision

Liivimaa Lihaveis is actively using the policy support measures available and is searching constantly for additional funding to be used for promotional activities. Overall agricultural production is obviously influenced by CAP Pillar 1 and several measures of the Estonian Rural Development Plan (ERDP) 2014–2020, e.g. “Organic farming” (M11), “Co-operation” (M16; support for short-supply chains), LEADER (M19) and “Establishment of producer groups and -organisations” (M09). Management of semi-natural habitats is supported by the ERDP measure “Support for the maintenance of semi-natural habitats” (M10.1.7). Additional financing related to restoration of semi-natural habitats on protected areas is provided by the Ministry of Environment.

Marketing and promotion activities are supported by several other measures, including “Market development support” (national), “EU information provision and promotion measures” and ERDP measure “Quality schemes” (M03) – only two national food quality schemes have been developed, "Grass-fed beef" and "Onion Lake Peipus". NGO Liivimaa Lihaveis was one of the organisations who established an innovation cluster in 2015 on beef production to be able to apply RDP support for innovation activities under the co-operation measure (M16), the project was accepted in the second application round in 2016 and starts in March 2017.

In the table 4.3.1 main policy measures influencing activities of Liivimaa Lihaveis and their relation in ESBO provision are summarised.
Table 2: Main policy measures and their relation in ESBO provision.

<table>
<thead>
<tr>
<th>Main policy measures</th>
<th>ESBOs involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP Pillar I</td>
<td></td>
</tr>
<tr>
<td>Direct area payment (+cross-compliance and greening)</td>
<td>All</td>
</tr>
<tr>
<td>RDP</td>
<td></td>
</tr>
<tr>
<td>Agri-environment measures (incl. support for the maintenance of semi-natural habitats)</td>
<td>Biodiversity, landscape character and cultural heritage, carbon sequestration/storage, rural vitality</td>
</tr>
<tr>
<td>Organic farming support</td>
<td>All</td>
</tr>
<tr>
<td>Co-operation measure: support for short-supply chains; innovation cluster</td>
<td>Rural vitality</td>
</tr>
<tr>
<td>Quality schemes</td>
<td>Rural vitality</td>
</tr>
<tr>
<td>LEADER</td>
<td>Rural vitality</td>
</tr>
<tr>
<td>Establishment of producer´ groups and -organisations</td>
<td>Rural vitality</td>
</tr>
<tr>
<td>Natura 2000</td>
<td>Biodiversity, landscape character and cultural heritage, carbon sequestration/storage</td>
</tr>
<tr>
<td>EU</td>
<td></td>
</tr>
<tr>
<td>EU information provision and promotion measure</td>
<td>Indirect</td>
</tr>
<tr>
<td>National</td>
<td></td>
</tr>
<tr>
<td>Market development support</td>
<td>Indirect</td>
</tr>
</tbody>
</table>

All above-mentioned measures promoting sales of grass-fed beef contribute to increasing consumer interest and thence the number of farms engaged which, in turn, are impacting ESBO provision.

National market development support was applied from 2011. In 2015, Liivimaa Lihaveis received about 75 000 euros support for marketing and promotion of beef and have also applied to the EU Information and promotion measure. In 2015, a 3-year and 600 000-euro project started for promotion and marketing activities in neighbouring countries’ (Latvia, Sweden). Through these support measures and self-contribution about 1 million euros is committed until 2018 (Liivimaa Lihaveis; Äripäev, 2016a). Support measures and projects are considered crucial for marketing the beef.

The importance of support measures has increased since the establishment of the Liivimaa Lihaveis, for example, in 2015 supports made already about 24% (~158 000 euros) of the total revenue (~670 000 euros) of the Liivimaa Lihaveis⁴ (Commercial Register; own calculation).

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⁴ Includes only NGO Liivimaa Lihaveis, as Nordic Beef as private limited company is not eligible for the support measures related to promotion.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
This case is also demonstrating that preservation of grasslands and especially valuable semi-natural habitats which are highly supported by the public policy (incl. cross-compliance, targeted measures for semi-natural habitats management) is much more efficient when one can sell (with normal price) the products related to the management of this land. Support does not work by itself, adding value to the production is equally important and they should be developed interwoven.

Most of the policy measures influencing the provision of ESBOs have been in place for the last 10 years. The current 2014–2020 financial period pays much more attention to innovation, co-operation and short-supply chains. If one imagined that the policies of the last 10 years had not been implemented, then all the farmers interviewed agreed that the management of semi-natural habitats (more expensive and less yielding compared to intensive grasslands) would be considerably more difficult and most probably the area of managed semi-natural grasslands would be much smaller. As different support measures play important roles in farms' income, continuation without any support would be questionable. Many farmers were a bit frustrated, as compared to the previous programming period, as payment rates for some of the production-related RDP measures are reduced (e.g. organic farming payment rate for permanent grasslands). Furthermore, CAP Pillar I support for suckler cows is not paid any more since 2017.

The current crisis in dairy and pig production sectors (low milk price, African swine fever) is influencing other sectors like beef cattle production (which is doing in general quite well). As credit institutions often tend to see all agricultural enterprises as the same group, they may be limiting possibilities for beef producers to obtain credit for development. At the same time most of the attention of policy makers is targeted to these sectors in difficulties, leaving beef producers who need aid in order to develop and grow without support.

Moving to coherence of policies, farmers belonging to the grass-fed beef quality scheme and the adviser to whom we spoke agreed that there might be some conflicts and lack of clarity in regulations among different policy objectives and rules, especially environmental objectives like biodiversity (management needs of grasslands), water and soil protection (e.g. pasturing on the shores of inland waters, grazing density, manure management and handling etc.) and climate change mitigation which all are related to this CS. For example, pasturing was recently only allowed on coastal areas whereas on the shores of inland waters it was not allowed, although from biodiversity point of view pasturing is needed in some semi-natural habitats. This restriction caused many difficulties and additional costs and efforts to many beef farmers. Unquestionably, conflict will rise with provision of ESBO “water quality” when the rules are not followed. Similar contradictions have been in regard to manure storing and management – for now some of the rules have been changed and more suitable for beef producers. The CS actors have been actively involved in making the proposals for the change of legislation and at the same time they are aware that careful planning of manure handling and investments (e.g. shelters for winter period) are important to avoid e.g. water pollution and soil degradation.
Recently there has been discussion emerging about environmental impact of grass-fed beef production, especially considering climate change mitigation and GHG (esp. methane) emissions related to (grass-fed) beef production. It has been claimed by some researchers, that organic farming and beef production emits more methane compared to dairy production. By Kaasik (2007), global methane emission by beef and other cattle is about three times higher compared to dairy cattle (50.16 million tonnes and 15.69 million tonnes respectively). Higher methane emissions are simply related to digestion process where digestion of forage (only feed of grass-fed beef) produces more methane compared to digestion of starch-based feed (forms up to half of feed ratio of dairy cows). However, as the total number of Estonian beef cattle represents only a negligible share of global beef cattle, concentration per area is low and fast growing breeds are used mainly, the total methane emission and general environmental impact is very little (Kaasik, 2016). Also, the stocking rate of beef cattle is much lower in beef cattle farming than in dairy.

Representatives of Liivimaa Lihaveis argue that although it is a fact that beef cattle produce methane, blaming organic grass-feed beef cattle production on environmental pollution is distorted and short-sighted. The broader picture should be looked at and if all the positive aspects related to grassland management and grass-fed beef production and negative aspects of dairy cattle feed production are taken into account then the opposite picture is clearly shown (Kass, 2016; Kaasik, 2016; Äripäev 2016b).

All CS actors agree, that bureaucracy and administrative burden related to policy measures should be substantially reduced and solutions should be found (e.g. cross-use of national databases) to avoid time and effort spent for reporting and accountancy related to support measures. For example, reporting related to EU promotion measure of farm products is extremely detailed and making changes in application is complicated – all this is taking disproportionally amount of time and reduces significantly the interest of applicants to use this measure.

**4.4 The role of the private sector in ESBO provision and enabling factors**

Mantino et al (2016) found that existing private sector initiatives are evidence of a societal demand for ESBOs like sustainable use of natural resources, biodiversity and social cohesion. In most cases, private initiatives seem to be driven by market and are response to more (environmentally) aware consumer’s demand, e.g. different food labelling and certification schemes like organic farming. Also, this case is an example of market-driven initiative triggered by the interest of producers in order to get better price for their produce. Provision of organic and quality scheme labelled products is accompanied by provision of wide list of ESBOs. Private sector initiatives seem to be often related to extensive and niche production, responding to changes in consumer needs and expectations. Based on this CS, we can say that private initiatives are quickly able to adapt with market changes, are more open to non-traditional thinking and less bound with administrative-bureaucratic frames which seem to characterise public initiatives.

At the same time, private schemes related to ESBO provision are often supported by public policies in a complementary way and within particular SES there is always a mix of different
policies (environment, climate, CAP) contributing to the ESBOs (Mantino et al, 2016). This is particularly true also in this CS. Although the Liivimaa Lihaveis beef brand has achieved consumer recognition and certainly improves general image of beef in Estonian market, consumers might perceive private labelling (and certification) less reliable. Therefore, label of “state certified grass-fed beef” is used in parallel, which gives additional reliability, especially in foreign markets. Organic farming in Estonia has also state certification system.

When looking at the whole list of ESBOs defined by PEGASUS (Maréchal et al, 2016), it is clear that there are several ESBOs (e.g. water quality, air quality, climate change) where provision of ESBOs is not adequately covered by private sector initiatives. Moving to benefits and risks related to the provision of ESBOs through private initiatives, one can conclude that risk of private initiatives is its sometimes strong linkage to market and possible instability related to market fluctuations. Public sector schemes are on one hand more stable, but entail often also burdensome bureaucracy and responsibilities and sometimes controversial expectations and desires which do not always consider the needs and possibilities of key actors like farmers.

Public policies related to ESBO provision do not ensure that the objectives will be achieved. This CS is an example showing that combination of public policies and activities of private initiative might be the best way in order to safeguard long-term provision of wide spectrum of ESBOs.

5 Potential pathways towards an enhanced provision of ESBOs

In Estonia, due to the natural preconditions, there is potential to double the current number of beef cattle and increase it up to 100 000–150 000 heads (Vaan, 2016). This means there is a lot of room for expanding the whole beef sector and the development of the domestic market as well as finding new export markets.

The leaders of the Liivimaa Lihaveis expect to see over a 10-year period that the enhancement of the provision of ESBOs will be achieved through expanding and enlarging the number of farms participating in the quality scheme and thus also the area (especially grasslands) managed. During this 10-year period, it is hoped that the number of farms (and the related managed area) could be increased up to 3-fold, e.g. up to 150 farms. Such an increase would significantly contribute to the goal set in the state Nature Conservation Development Plan for 2020, to maintain 45 000 hectares of semi-natural habitats nationwide (EMoE, 2013).

The current CS initiative definitely has good potential to expand. Although currently only a draft idea, the initiators of the CS are planning to start a similar quality scheme for sheep. As the production of sheep is also suitable on grasslands and the market situation is similar to beef (lamb is even less consumed in Estonia than beef), this quality scheme could create additional synergy and would additionally contribute to ESBO provision. Expanding the product line of their newly acquired meat factory with lamb, and also with other types of organic meat (pig) and game meat will further strengthen their position on the market.

The main limiting and enabling factors to further enhancement were described in section 2.3. To overcome the main limiting factors (exporting of living animals, limited possibilities to buy
or rent land for development of production, low interest and awareness of consumers, bureaucracy) a constant shift in the thinking of farmers and the awareness raising of consumers are central. To overcome the problem with limited access to credit to buy land, tools like state guarantees and/or subsidised interest rates come into consideration.

Several non-governmental organisations (e.g. Estonian Semi-Natural Communities Association, Estonian Fund for Nature) have projects and initiatives targeted to management of (semi-natural) grasslands, or trying to build up local farmer-consumer networks, but as mentioned before, there are no other comparable collective actions which have the potential to enhance the provision of the same set of ESBOs in a complex way.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

For the current CS, the SES approach was difficult to apply, as the whole concept is based on the assumption that a certain geographical area is analysed, but the current CS was not directly related to a certain geographical area, but analysed the private initiative – whole chain approach (production-processing-marketing) of grass-fed beef – as such. For this reason, we did not use this framework in relation to stakeholder engagement. Also, the use of an action-oriented approach in the Estonian context is new and not very much used. That is why stakeholders and actors feel more comfortable when using more “classical” ways of communication, data collection etc. (e.g. interviews vs focus groups).

From the conceptual point of view, we feel that Ostrom’s SES approach divides the system artificially into arbitrary parts (e.g. resource system and resource units should not be divided as they are one complex) and the link between ESBOs and their role in the SES framework seems difficult to apply, also because some ESBOs (like biodiversity, landscape, water, climate, rural vitality etc.) are not only related to some SES, but also with other systems. Also, boundaries between actors, actions and governance are not straightforward. The concept might also not fully capture the dynamics, historical developments and complex of initiatives under investigation.

However, the strength of the SES framework is that it enables integration of ecological and social aspects and shows the interrelations between resources, actors, actions, and governance, although it might be difficult to find the right balance of details to be displayed graphically.

The term “ESBO” (Environmentally and Socially Beneficial Outcomes) is adequate in order to bring together public goods and ecosystem services concepts, by adding important social dimension. While it is understandable and useful in English, it is very difficult to translate it into Estonian (“beneficial outcomes” = “goods” = “benefit”).
7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

This case is exploring the innovative private initiative of grass-fed beef production and marketing. Liivimaa Lihaveis is actively promoting the consumption of grass-fed beef. The main aim of the approach is to give more added-value to the beef they produce and to control better the whole supply chain by organising production, processing and marketing.

Grass-fed organic beef production relies on grasslands, and provides related ESBOs like biodiversity, landscapes, carbon storage, rural vitality and also ESBOs related to organic farming (soil, water quality, animal welfare). Without adding value to the production (in this case beef) the system is not sustainable in long-term.

Private initiatives, like this CS approach, are strongly related to the market and respond to consumers’ demands, often in an innovative way. At the same time, private initiatives are more unstable compared to public sector schemes. Public sector initiatives in turn are not able to fully meet the needs of e.g. farmers, not to mention bureaucracy, lack of flexibility and untraditional thinking. Any SES consists always of the mix of policies which support the private initiatives, and in relation to ESBO provision. This approach is a good example of the good working combination of market-oriented private initiative and public support measures which makes it possible for farmers to valorise their ESBO provision in markets through price premium for beef produced under organic and grass-fed beef quality scheme rules. There is high potential to increase the provision of ESBOs when the number of participating farms and the area they manage) increases. Additional synergy and enhanced ESBO provision could be created when expanding the grass-fed beef quality scheme to sheep production.

Management of permanent grasslands, especially semi-natural habitats is very important for maintaining biodiversity (species and habitats) and for protection of landscape character and cultural heritage. Liivimaa Lihaveis is providing marketing opportunities for producers and increasing the awareness of the consumers about benefits related to this kind of production and this allows participating producers to continue the agricultural production and stay in rural areas. Maintaining/increasing employment opportunities in the countryside is helping to preserve rural vitality. Preservation of grasslands is highly important also in terms of carbon storage.

Consumer awareness and interest to buy grass-fed beef is very important for this approach – the more knowledge and interest to buy the products provided, the higher the success of the approach, and the wider interest of farmers to join the scheme and as a result the increase in ESBOs provided. This means that the marketing and promotion should include education and awareness raising. Awareness of the consumers on how the products are produced and what are the related benefits – and thus demand for such products – is increasing, certainly a lot thanks to the work (e.g. information sharing, events, trainings) of this case study actors. Further awareness raising and provision of ESBOs needs systematic and constant action in a number of different directions and involving all key actors, but also a shift of policies from agricul-
tural policy towards holistic food policy and respective support measures (supply chains, quality schemes, co-operation, innovation). Attitudes of farmers should change towards valorisation of produce and provision of related benefits instead of going the so-called 'easiest way' (e.g. exporting young living animals). But policy measures need to support this shift in thinking.

One particular issue related to the production of grass-fed beef and a serious obstacle in order to increase ESBO provision is the limited access to credit to buy land in order to develop and expand the production and to compete with real estate companies who are buying the land in rural areas. This can only be solved through policy intervention whether through some financial instruments (e.g. state loan guarantees, subsidised interest etc.) or other measure(s). For example, if the state is renting or selling the land, previous experiences and commitments in management of grasslands (related to animal husbandry) in the same region should be taken into account when organising public bids.

7.2 Key findings on governance arrangements and institutional frameworks

Controlling the whole value chain and the smart use of available policy measures makes this approach successful. The strength and the weakness of the whole system at the same time is its dependence on a few leaders, e.g. the enthusiasts who started the whole system and take responsibility for its development. Governance of this case is simple as all main components of the approach are led by the same persons and it does not include a wide number of actors, different levels of governance etc. Although the everyday management and development of the approach is the responsibility of the board members, all the strategic decisions are discussed and taken by the general meeting of the NGO and all important aspects are discussed among the participants – this is appreciated by all parties and is important in order to guarantee that everyone feels that this is a common effort. For the development of the whole beef sector in Estonia cooperation and common action is needed not only by farmers, but it should be also supported by the policymakers.

The case study actors agree that some policy objectives and related legislative frameworks (e.g. biodiversity, water protection, climate change mitigation) are inconsistent in that it is characteristic for Estonia that objectives and actions taken by the Ministry of Environment and the Ministry of Rural Affairs often seem uncoordinated. There are several difficulties and problems related to e.g. management of semi-natural habitats which is one of the key resources of this CS (esp. manure handling and pasturing on the shores of waters). Also, harmonisation of legislation and keeping the administrative burden (incl. inspections, accounting) as low as possible should be considered when developing governance arrangements. For example, reporting and making changes related to the EU promotion measure is made way too complicated and bureaucratic requiring too much time to be invested by the applicants.

Speaking of CAP, the changes compared to the previous programming period are seen as positive in general, more attention (and support) is given to the food chain, innovation and cooperation, all affecting ESBO provision in a positive way. However, reduction of payment rates of some production-related RDP measures and withdrawing of Pillar I support for suckler cows was noted by many farmers as a negative development.
Moving even more towards comprehensive approach of food production is also step towards increasing ESBO provision. Topics central to this CS (supply chains, the role of agriculture in environmental and climate change objectives and contributing to the development of rural areas) are also main areas of discussion about CAP 2020+. In order to safeguard the sustainability of the CS approach in the long-term political support and appreciation for this kind of approach is very important and awaited by the CS actors.

7.3 Other enabling or limiting factors

In addition to the enabling and limiting factors described above, there is another production-related factor influencing provision of ESBOs, namely (financial) stability. Farmers need stability to be confident about this CS approach and grass-fed beef production and it should be possible for them to sell consistently through this approach. Stable sales also require investments to have a sufficient amount of grassland and the ability to keep the animals all year round (shelters, feed provision and storage etc.). Investment measures together with easier access to credit could help to solve the investment needs. In Estonia, considerably more beef is produced than consumed in the domestic market and that is why export of beef (esp. living young animals) is prevailing in the beef sector. Although development of export and finding new markets is important, more attention should be paid to valorisation of the products e.g. exporting meat and meat products or breeding cattle instead of young living animals. Valorisation is also key when developing support measures. Valorisation of the products gives more stability to whole system as export markets of living animals (e.g. Turkey) might easily disappear.

7.4 Contributions to EU strategic objectives

Europe 2020 strategy aims to accelerate economic recovery and job creation and sets three priorities in order to fulfil the goals: smart, sustainable and inclusive growth. Grass-fed beef production through this CS approach is in line with the three priorities of Europe 2020. As an innovative full-chain approach, it is contributing to smart growth. It is contributing to sustainable growth through efficient management of resources and provision of ESBOs. Inclusive growth is crucial in rural areas with an ageing population and lack of working places. This CS approach is contributing to the continuation of production and is providing employment thus supporting the objective of inclusive growth.

7.5 How about the transferability of the approach/mechanism used?

This CS is an example of a well-functioning approach and innovative collective action in Estonian conditions. When discussing the transferability of the CS approach, we can assume that this approach as such – controlling the whole supply chain together with consumer’s awareness raising – is transferable to other products groups, contexts and countries, but has high potential to expand also in Estonia. But yet, there are several context-dependent aspects to consider, starting with natural conditions which are favourable to beef production. There is a much higher share of semi-natural grasslands in Estonia compared to most European countries. The Estonian food market is relatively small, dominated by big supermarkets. Direct marketing, short supply chain approaches, and other types of cooperation and common action
are much less developed than in many other EU countries. Consumer’s habits and awareness about beef are considerably lower.

The starting point of new approaches like this is usually dissatisfaction with the current situation, and motivation, which is typically economic – a better price for beef in this case. The basis is the presence and motivation of leaders who are able and willing to start and develop a similar approach, finding the best development strategies and actions within certain SES. For making the right decisions and choices for starting a similar approach somewhere else, it is crucial to understand thoroughly the planned field of action, trends, needs and expectations of all participants. At the same time, it is extremely important that people acknowledge new ways of thinking and are willing and able to find new ways of doing things. To this end, constant learning of all parties is needed.
8 References (including projects docs, evidence reports etc.)


This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814


**Websites**

Agricultural Board: www.pma.agri.ee (organic register)

Estonian Beef Breeders Association: http://www.lihaveis.ee/en

Estonian Commercial Register: https://ariregister.rik.ee

Liivimaa Lihaveis: www.liivimaalihaveis.ee
9 ANNEX: Reflections on the case study methodology used

9.1 Objectives and activities undertaken with initiative/stakeholders

It was agreed with key actors, that the best way to communicate will be in meetings and interviews. In total 29 interviews were conducted with key persons (farmers, leaders of Liivimaa Lihaveis, restaurant chefs, retailers and an agricultural adviser). Information collected through interviews during previous WP4 steps and WP3 was also used. Meetings with key actors were combined with other meetings they had in order to reduce the time spent.

9.2 Outcomes and further steps

It was agreed with key actors, that the results of the CS can be used for development purposes, e.g. as a background paper for development strategies, project and support applications etc. It was also agreed that CS report can be used as input for discussions with policymakers (change of legislation, development of CAP/RDP and environmental measures etc.).

9.3 Judgement on the process

Although key actors of this CS are extremely busy with the everyday development and management work of the grass-fed beef approach, they were able to take part in this research and gave invaluable input. Expectations of the actors towards the research process were mainly related to influencing the policy-making and forwarding the messages to policy makers.

There were no major issues during the whole process, if we exclude the “usual” lack of time of the case study actors.

9.4 Supporting data and statistics

Development of beef cattle breeding in Estonia

![Figure 8: Number of beef cattle in Estonia 2003–2016. Source: ARIB; own compilation.](image)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Table 3: Meat production in Estonia, 2006–2015 (thousand tonnes)

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>14.8</td>
<td>15.4</td>
<td>14.3</td>
<td>14.2</td>
<td>12.9</td>
<td>12.2</td>
<td>12.3</td>
<td>11.5</td>
<td>11.9</td>
<td>12.6</td>
</tr>
<tr>
<td>Pork</td>
<td>41.6</td>
<td>42.9</td>
<td>46.2</td>
<td>46.1</td>
<td>45.8</td>
<td>50.2</td>
<td>48.8</td>
<td>49.5</td>
<td>48.7</td>
<td>50.1</td>
</tr>
<tr>
<td>Sheep and goat</td>
<td>0.5</td>
<td>0.6</td>
<td>0.9</td>
<td>0.8</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>Poultry</td>
<td>12.5</td>
<td>11.5</td>
<td>13.2</td>
<td>14.9</td>
<td>16.0</td>
<td>17.5</td>
<td>16.5</td>
<td>18.1</td>
<td>19.5</td>
<td>19.8</td>
</tr>
<tr>
<td>Total</td>
<td>69.4</td>
<td>70.5</td>
<td>74.6</td>
<td>76.0</td>
<td>75.4</td>
<td>80.6</td>
<td>78.4</td>
<td>79.8</td>
<td>80.7</td>
<td>83.2</td>
</tr>
</tbody>
</table>


Figure 9: Revenue of Liivimaa Lihaveis 2010–2015
Source: Business Register; own compilation, 2017

Websites

- Agricultural Registers and Information Board (ARIB), animals register: http://www.pria.ee/images/tinybrowser/useruploads/files/veiste_statistika.xlsx
CASE STUDY

VOLVIC WATER CATCHMENT PROTECTION (FRANCE)

D4.3  |  Final Version  |  March 2017

Colas Chervier, Christophe Déprés, Hai Vu Pham

Volvic Plant Location with the Auvergne Regional Natural Park
Crédit photo: parcs massif central

TRANSFORMING APPROACHES TO RURAL LAND MANAGEMENT
Stimulating long-lasting improvements in the delivery of social, economic and environmental benefits from EU agricultural and forest land

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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1 Introduction: What is the case study about?

The target area is the catchment of Volvic Waters (also called impluvium hereafter), owned by Danone, which covers 3800 Ha across four communes of the department of Puy-De-Dôme located in the surrounding of Clermont-Ferrand City (Map 1). These 4 communes all belong to the community of communes, or intercommunity, called “Volvic Sources et Volcans” (VSV) encompassing 7 communes and 18,000 inhabitants. Danone is one of the main regional employers (about 1000 employees on-site) and a significant source of local tax (about 40% of the VSV annual budget). Since 2007, the company has initiated a water catchment strategy that involves public stakeholders and land managers (farmers in particular) in order to prevent water from pollution, water shortage and improve its brand reputation.

The catchment area of 3800 hectares is mostly covered with forest (53%) and agricultural land (41%). Forest resources are dominantly private (86% of forests) and unmanaged. Agricultural land is mainly pasture supporting extensive cattle raising (mostly for meat production but also dairy). Agricultural production is generally not transformed locally and marketed outside the territory through the conventional market (only 2 farmers sell their meat under an official quality sign). The remaining 6% of the watershed correspond to urban areas.

The catchment is located at the piedmont of an old volcanic area (La Chaine des Puys) with a medium altitude of 500m above sea level, and the highest point at 998 m. Despite the proximity with the Clermont-Ferrand agglomeration (300 000 inhabitants), the average density of population is low at only 63 inhab/km², with a concentration in the commune of Volvic (162 inhabs/km²) and a high dispersion in the rest (30 inhabs / km²).

The primary ESBOs are related to groundwater services. They correspond to water quality and mineral content stability on the one side and availability of regular water supply on the other hand. These primary ESBOs are linked to land-uses. Water quality depends on forestry and agricultural practices on the impluvium, while availability of water supply could be affected by the forest-agriculture equilibrium (eg: increase of forest’s surface reduces the volume of groundwater, and inversely).

Two other ESBOs that have been identified after the step 3 and 4 of WP4. They correspond to maintaining the landscape specificity of Volvic territory, and rural vitality. La Chaine des Puys (the whole volcanic area) is candidate to become UNESCO world heritage, while rural vitality

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1 Volvic: 1300 ha, Charbonnières-les-Varennes: 1500 ha, Saint-Ours: 500 ha, Pulvérières: 500 ha.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
is important for this low population density area. Having economic activity is vital for its existence. The catchment’s exploitation, especially from Danone Water Company, contributes directly to maintain the rural vitality, while agriculture helps to keep the landscape attractive and accessible for tourists. The last identified ESBO is the biodiversity preservation. It concerns a few endangered “flagship” species (secondary ESBO), in particular the protection of red kite (*milvus milvus*) and few other species of bats who are in the EU bird and habitat directive list. Important for Danone and local authorities, but this ESBO was not fully shared by other actors in the participatory workshop.

All 5 ESBOs are interconnected, meaning that changes in the provision level of one ESBO could impact the others. Groundwater is more depending on landscape and biodiversity than other interconnected links among 5 ESBOs. The resource system is hence complex, because there’re mutual dependencies between groundwater and surface resources (forest, biodiversity, landscape). But groundwater is the most valuable economic resource.

Two main downstream stakeholders have rights to use and distribute the water from the aquifer and thus depend directly on the water-related ESBOs (quantity and quality). 1. Volvic Waters Company (owned by Danone) uses 15% of the aquifer water flow per year. 2. The SMUERR – a public syndicate in charge of drinking tap-water distribution – uses 35%. Members of the SMUERR are local government agencies and authorities. It supplies drinking water for about 60,000 downstream households living outside the water catchment. The rest 50% of Volvic aquifer remains unused. It is worth noting that land-users do not use this specific aquifer groundwater (e.g. for irrigation purpose) and are thus not considered as beneficiaries from water services in this study.

In France, the legal framework (ownership rights, special rights-of-use defined by public authorities) plays an important role. In our study area, private and public ownerships are defined for land (see section 2.2. for more details). It is worth noting that there is no specific public regulation restricting the use of private land located in the impluvium with the aim to increase the supply of water services (farmers are free to choose their activities and practices). On the other hand, groundwater can be considered as a common resource of which exploitation rights-of-use are granted to Volvic waters company and to the SMUERR (withdrawal right in the approach of Ostrom and Schallager) by the government.

Two new local governance arrangements emerged and frame more or less the local management of ESBOs. The first and most important one manages the relationship between downstream local authorities (Volvic municipality and VSV) and Danone Company. This resulted in the creation of CEPIV (Environment and protection committee of the Volvic water catchment area), a local committee gathering the 4 municipalities of the watershed and Danone. The mission of the CEPIV is to collectively develop suitable policies for the management of the water catchment area. CEPIV’s members are key actors in the process of governance. The second governance arrangement is the forestry charter that governs the exploitation of public forest in a compatible way with landscape and groundwater. The forestry syndicate SMGF

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2 This figure was provided by the deputy mayor of Volvic commune
supports a forestry charter: it gathers mayors of all communes having public forest within the VSV (Volvic Source and Volcanos) intercommunity.

It is worth noting that land users (farmers, forest land owners) are not directly involved in these new governance arrangements aimed at enhancing the provision of ESBOs (see discussion in sections 2 and 3). One potential reason is that they are not organized. Farmers will probably be engaged in the future as Danone intends to invest more effort in encouraging them to change their farming practices. However, it is unlikely that private forest owners will be engaged in the governance of ESBOs because they possess small plots (2060 owners for about 2000 ha) and are mostly absent (living in other places, sometimes not being aware that they own forest plots in the impluvium).

A quick overview of historical data shows that it has never been any significant problems regarding groundwater services (e.g. water pollution, water shortage). Besides, up to now, the main threat toward groundwater services is rather associated with urban areas (e.g. obsolete water sanitation facilities) and infrastructures (ex. traffic accident involving trucks transporting hazardous waste). However, it is worth noting that traces of atrazine were found in Volvic water in 2012, reminding that the risk of pollution is not null and could potentially be linked to land-use practices3. Besides, the legislation for the mineral water license is stricter than legal requirements regarding quality standards of drinking water, as it requires stability of mineral content. Finally, risk associated with drastic land-use changes is expected to increase in the coming years in a context of increasing tensions on agriculture (ex. low prices). The sustainability of the overall system could thus be at threat if the link between agriculture and territory is not strengthened. This short description of the context explains why the current management strategy focuses on preventing the resource from potential contaminations (risk management) but also (see later sections for further explanations) about managing public image of Volvic water.

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3 Some suppose that pollutions might come from maize cropping in this particular case, while others think that they come from railway chemical weeding by SNCF, the national company of rail transports.
**Main Volvic CS characteristics**

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Main Farming/forestry system</th>
<th>Area (ha) of initiative and CS if different</th>
<th>Key ESBOs covered</th>
<th>Total no. of farmers/foresters involved</th>
<th>Other key stakeholders involved</th>
<th>Source(s) of funding</th>
<th>Start date of initiative</th>
<th>End date of initiative</th>
</tr>
</thead>
<tbody>
<tr>
<td>France; Auvergne-Rhône-Alpes region; department of Puy-De-Dôme; community of communes, or inter-community, called “Volvic Sources et Volcans” (VSV); 4 communes: Volvic, Charbonnières-les-Varennes, Saint-Ours, Pulvérières</td>
<td>Farming (41%): extensive – permanent pasture-beef cattle. Forest (53%): mostly (86%) private unmanaged forest (marginal fuel wood collection) and extensively managed public forest for timber (14%)</td>
<td>3800 Ha</td>
<td>Groundwater quality Groundwater quantity Biodiversity conservation (birds, bats) Rural vitality (employment, agriculture decline) Landscape beauty (land uses highlighting geological formations)</td>
<td>2606 private forest owners 20 farmers owning land in the water catchment</td>
<td>Private company: Danone Local authorities: the 4 municipalities and the intercommunity Conservation NGO: LPO Research / academic institutions: VetAgro Sup</td>
<td>Danone (at least 300,000€ per year, not only for land-use interventions) Municipalities (100,000€ per year) CAP payments (1st and 2nd pillars) (but no condition regarding the provision of ESBOs). Probably other EU/national / regional agricultural subsidies</td>
<td>2005 (creation of CEPIV)</td>
<td>Still going on</td>
</tr>
</tbody>
</table>
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES

CASE STUDY: Volvic - France

Key ESBOs considered:
1. [Water quality]
2. [Availability of Water supply]
3. [Original Landscape]
4. [Rural vitality]
5. [Protecting Flagship Species]

RESOURSE SYSTEM
Annex 1 Volvic aquifer system,
Annex 2 Land use system agriculture-forest in the water catchment (impluvium)
Annex 3 Original Landscape (UNESCO classification)

RESOURCE UNITS
- Underground water
- Local streams
- Livestock
- Pasture
- Flagship species (Red kite, bats, etc.)
- Pests (vole)
- Trees (private and public)

ACTION SITUATIONS
1.1. Pasture fertility and animal waste management → use stabilized products in correct amount.
1.2. Permanence of pasture → long term care against pasture abandonment and farming decline (on-going discussion)
1.3. Public Forestry practices (ONF’s management) kept in a compatible way with local resources.
1.4. Conservation of flagship species

GOVERNANCE SYSTEM
Annex 1 Regulatory framework, including property rights/tenures
Annex 2 Institutional arrangement between Danone and local authorities: CEPIV
Annex 3 Institutional arrangement among communes having public forest: VSV forestry charter
Annex 4 Financing schemes in EU and regional public policies (with private support)
Annex 5 Market’s drivers (employment, tourism)

ACTORS
Annex 1 Local authorities (mayor from Volvic Catchment area and of the VSV intercommunity)
Annex 2 SMUERR
Annex 3 Danone / Volvic water
Annex 4 Farmers
Annex 5 Private forest owners
Annex 6 Public forest owner (ONF)
Annex 7 Environmental associations (LPO, CSA)
Annex 8 Local deconcentrated services of the State

MACRO-ISSUES
Impact of milk and beef markets on the sustainability of local agriculture

Figure 2:
Summary of the SES framework for VOLVIC case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

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2.2 Description of the SES

Resource system
The main resource system of the SES is the aquifer, currently exploited by the SMUERR and the Danone Water Company. This ground resource should be considered as part of a larger system composed by both ground and surface resources. Surface resource concern firstly agriculture and forestry activities. Water quality depends on agricultural practices, while water availability is depending on the agriculture-forest equilibrium. These surface resources are embedded in a larger landscape “Chaine des Puys et failles de Limagne”, which was presented twice (unsuccessfully) for being labelled as a UNESCO world heritage label. The specificity of this landscape is the fact that the distribution of land-uses (particularly forest and agriculture) highlights the geological interest of the site (volcanoes, rift). Tourists are also attracted the combination of natural and human areas in the landscape. We can say that there’s mutual dependence between ground and surface resources. Hence, a complex mechanism of human activity’s coordination is needed to maintain this whole system on work. Without going in detail of the governance mechanism, it is important at this step to describe main human activities on the zone, and their interactions with the resource system.

Agriculture
Farmland covers 41% of the water catchment area (so about 1600 ha) and is mainly pasture. There are about 10 Ha of crops only. Beef cattle is the dominant farming system in the water catchment. Current agricultural practices, and more specifically the management of effluents, don’t have any consequence on the quality of groundwater. The average nitrogen pressure is very low (on average 64 Kh / Ha) and generates only very limited risks (12 Kg / Ha maximum). However, this general situation can be threatened in case of a sudden change in practices, and thus recommend to implement risk prevention measures. Available water quality tests seem to confirm these results: levels of nitrates are high as compared to other mineral waters but below thresholds and traces of pesticides are found but at infinitesimal levels.

Forestry
Forest covers 53% of the watershed (2185.6 Ha). It is further composed as follows: 47% of deciduous forest, 23% of coniferous forest and 30% of young forests populated by pioneering species. 86.8% of the forest is private and is mostly unmanaged (only 65Ha have been coordinated under a management plan - GIEEF). The rest is public forest, which is managed by the national forest office (ONF).

Forest cover plays a major role in regard to the water availability in the aquifer. A scientific study showed that an increase of 10 % of the forest area will reduce the flow of downstream sources beyond 2% (LIFE SEMEAU project⁴). This because forests absorb more raindrop water on its surface than pasture does. Forest practices are also important, because converting coniferous forest (425 ha) in deciduous forest could increase the source flow rate of 9%. Changes

⁴ LIFE-SEMEAU (2009 - 2012) is an EU-funded project, which core objective was to model underground and aboveground hydrological systems in Volvic water catchment. Part of the research aimed at modelling the relationship between forest management, agricultural practices, and water quantity and quality. The robustness of the hydrological model was tested against local historical data (precipitation, water flow).
in forest practices, particularly an increase in timber/firewood extraction might induce risks on water quality (increased human motorized activity and risk of hydrocarbon pollution).

The ratio Forest-Agriculture is thus fundamental in the equilibrium of the system. A simulation in the LIFE SEMEAU project show that in case of agricultural decline’s pursuit, a 80% territory cover by forest area might reduce the flow of the source of 6%. Conversion of young forest regrowth (390 ha) in extensive grasslands would increase the flow of the source of 5% and would not influence the water quality. Forest tend to increase naturally when agriculture decline.

**Tourism**

Tourist activities are managed by the regional authority (e.g at a larger geographic scale). Local authorities have invested in consolidating or creating country paths (or road) to facilitate hiking. With agriculture, tourism helps to limit forest development and contribute indirectly to the avoidance of groundwater’s scarcity.

![Figure 3: Illustration of Volvic’s resource system](image)

**Actors**

The involved actors are the SMUERR and the Danone Water Company, local authorities from the 4 communes of the water catchment area and from all communes belonging public forests in the VSV intercommunity, farmers, the State and other local public administrations, private forest owners, public forest owner (ONF), and environmental associations (LPO, CSA).

*Local authorities* pay much attention to the water quality and availability because they are in charge of water supply for local inhabitants. Problems in water quality or availability imply consequences in their legal responsibility, at least in terms of water supply cost (cost of water treatment). From their perspective, preserving biodiversity helps to protect groundwater and also the landscape. Local authorities receive indirect benefits in terms of local tax, local employment, and tourism development.

*Danone* contributes actively to the preservation of the underground water, but for its own interest. The company is a significant local tax payer (level of tax depends on the number of bottles sold in France) and a significant local employer. The annual tax amount varies around
2-3 million Euros. Danone has progressively paid attention on what happens on human activities and lands in the impluvium. With local authorities, the company co-contributes to their maintaining, such as project of improvement of hiking paths, and on the preservation of biodiversity (through CEPIV’s budget). Danone starts questioning the future of farmers since they know that changes in agricultural activities are likely and could negatively impact groundwater. In a close future, the risk is to lose its mineral-water license. Worse case scenarios could theoretically happen in the middle or long-term, particularly in case of agricultural intensification, which would result in the increased use of chemical inputs.

*There’s 16 farmers* in the zone of study. Although being significant water-related ESBO suppliers, upstream land-users are not direct beneficiaries of target ESBOS (water services, biodiversity, landscape). Most farmers produce cattle (dairy and meat) or to a smaller extent poultries (for details on the values-chains, please see section 7.3). We did not notice any significant conflict/tension between farmers and stakeholders distributing the aquifer. They display rather cooperative behaviours. However, we also noticed that this relationship is weak. Indeed, they are not really considered as key partners by Danone. In particular, they are not involved in the new governance arrangements aimed at enhancing the provision of ESBOS, despite being actual ESBO suppliers and despite being generally aware that their practices can eventually have an impact on local employment and income redistribution. Another key feature is that farm economic performance is weak. Thus, the future of agriculture in the area is reported to be uncertain. Farmers maintain their activities thanks to less favour zones payments from the CAP 2nd pillar (ICHN in French). These subsidies are of huge importance for maintaining farming systems in the Auvergne Region. Indeed, the Auvergne Region is, by far, the leading region in terms of ICHN payments with a total of 257 million € for the period 2014-20. Moreover, for the full CAP 2nd pillar, the Auvergne is the region benefiting (in France) the most from the European subsidies estimated at 52 720 € per worker in agriculture.

The issue of economic importance of agriculture and its decline is again a key issue here illustrated in the tables below.

*Table 1: Data*

<table>
<thead>
<tr>
<th>Total Agricultural Surface (ha)</th>
<th>1970</th>
<th>1979</th>
<th>1988</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>63092 - Charbonnières-les-Varennes</td>
<td>1266</td>
<td>1177</td>
<td>957</td>
<td>445</td>
<td>572</td>
</tr>
<tr>
<td>63290 – Pulvérières*</td>
<td>771</td>
<td>916</td>
<td>1235</td>
<td>1621</td>
<td>1774</td>
</tr>
<tr>
<td>63381 - Saint-Ours</td>
<td>1772</td>
<td>1724</td>
<td>1905</td>
<td>1895</td>
<td>1769</td>
</tr>
<tr>
<td>63470 – Volvic</td>
<td>488</td>
<td>571</td>
<td>497</td>
<td>549</td>
<td>383</td>
</tr>
<tr>
<td>Total 4 communes</td>
<td>4297</td>
<td>4388</td>
<td>4594</td>
<td>4510</td>
<td>4498</td>
</tr>
</tbody>
</table>

*Note: a large part of Pulvérière’s surface is outside of the Volvic catchment perimeter
Source: National Agriculture Census– Agreste, RSA 2010.*
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Table 2: Overview

<table>
<thead>
<tr>
<th>Total farmers</th>
<th></th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>63092 - Charbonnières-les-Varennes</td>
<td>56</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>63290 - Pulvérières</td>
<td>38</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>63381 - Saint-Ours</td>
<td>73</td>
<td>57</td>
<td>42</td>
</tr>
<tr>
<td>63470 - Volvic</td>
<td>32</td>
<td>23</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Farmers in Beef / sheep growing</th>
<th></th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>63092 - Charbonnières-les-Varennes</td>
<td>33</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>63290 - Pulvérières</td>
<td>28</td>
<td>24</td>
<td>19</td>
</tr>
<tr>
<td>63381 - Saint-Ours</td>
<td>59</td>
<td>51</td>
<td>33</td>
</tr>
<tr>
<td>63470 - Volvic</td>
<td>11</td>
<td>9</td>
<td>7</td>
</tr>
</tbody>
</table>

We can see that agriculture has declined sharply from 1970, both on available surface and on used surface. Data on number of farmers confirm this decline.

Finally foresters seem to contribute a little to ESBOs provision, despite its dominancy in terms of land-use. As mentioned above, 86% of forest surface are private belonging to 2606 owners. Most of the time, these owners are not present on the territory and their exploitation are unmanaged. Public forester has a more active presence (creation of a public forestry charter), but their actions are quite modest comparing to that of Danone and local authorities. Forest surface tend to increase naturally if other human activities decline, which from a water availability point of view is not a good thing (the objective of Danone is to maintain the current balance between agricultural land and forests).

**Governance system**

The governance system in our case study has two important aspects. The first one is the property rights regime, which is central in actor’s relationships in France. The second one is the construction of collective action mechanism, which regulates the use of Resource system in complement with the legal framework. We make a short description of juridical framework in France at first, before going to the governance structure supporting local collective actions.

In France, private ownership is an exclusive right. It give absolute rights-of-use to land-owners inside the perimeter of ownership (Article 544, Civil Code). This rights concern every movable properties which could exist on land (e.g livestock or crops) or under the land. Hence, land-owners are free to use their property as they want, as long as this use doesn’t go against a legal prohibition. For example, non-access rules or chemical input use could be put in Volvic farmland in our case, if the farmer-landowners have willingness to do so.

Water is an open-access resource: everybody could theoretically have access-right to water in France (Article 2, Water Law). But this regime concerns more surface sources than groundwater, which has a confusing status between a res-communis and a private ownership. Since
2006, the French water law supports the 1st position (*res-communis*)\(^5\), but many peoples have still been considering that land ownership prevails on underground resource as a traditional custom (article 552, civil code)\(^6\). To limit the scope of land ownership, the State can impose a regulation plan - meaning a special legal restriction - to land-owners, in order to conciliate their activities with the protection of groundwater. Such regulation, if existed, covers only a limited area surrounding the point of catchment in reality. It only gives a protection of groundwater’s safety, at the access point. In our zone of study, NO restriction of land use exist over the Volvic aquifer.

Other institutional arrangements are then needed to complete uses of groundwater, and to avoid potential conflicts in some manner. The most important governance mechanism identified is the CEPIV, which is the Environment and Protection Comity of the Volvic water catchment. The CEPIV comity gather 3 representatives of the commune of Volvic, 3 other mayors of 3 communes in the watershed, and 3 representatives of Danone. The mission of the CEPIV is to collectively develop suitable policies for the management of the water catchment, in harmonisation with the landscape and the economic development of the zone. Please note that farmers have not been involved in this governance structure. 

A second identified governance structure is the public forest charter, which regroups mayors of communes having public forest in the VSV intercommunity. The charter aims to drive forest exploitation in a compatible way with other local resources. Traditionally, forest management in France follows sectorial strategies, which come from the national level. The creation VSV forest charter is the first experience of managing in a territorial approach (meaning with multifunctional objectives). The charter also transfers the management rights of local public forest (municipal owned forests and some public open-access forests) to ONF – the national forest office to facilitate management’s performance. The forestry charter concerns only public forest, which stand for only 17% of forest in our study zone. On the contrary, its scope is much larger than the study zone (all the Volvic Source and Vocanno intercommunity). There’s quite no connection between the CEPIV and the forestry charter. The only potential connection is the deputy mayor of Volvic, who is present in both structure.

Other informal links are likely to exist, but are not explicitly mentioned by actor of the participatory workshop. We identified some sponsorship agreements between Danone and the LPO, which corresponds to different ways to organize the demand side of ESBOs and facilitates coordination of activities and the mobilization of ESBO suppliers.

**Financial support**

The annual budget dedicated by CEPIV to activities contributing improving the management of the water catchment is about 300k€. Danone provides 2/3 of this budget, and local authorities 1/3. Local authorities reported that Danone is able to top up this budget when needed, especially for large projects.

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\(^5\) For example, data on catchment water quality are of free access to the public: [http://www.ades.eaufrance.fr/](http://www.ades.eaufrance.fr/)

\(^6\) The jurisprudences are lacking, and don’t help to clarify
Other activities are funded by public policies, and come as a complement to CEPIV activities. They are: purchase of de-compacting machine (state), support to conversion to organic agriculture to control vole populations (state), biodigester program (VSV). Besides, VetAgro Sup/CEPIV are currently supporting farmers to fill files in order to be eligible to FMSE (National agricultural fund for sharing sanitary and environmental risk) funding for vole control measures.

Farmers in this zone do not receive CAP’s territorial agro-environmental payments, but only ICHN – the less favour area payments.

**Actions**

A number of actions are taken in order to induce changes in agricultural practices. On the other hand, it is worth noting that the forestry sector remains largely untouched so far. These interventions are aimed at reducing the use of chemical inputs in the area and improving the management of cattle effluents:

- CEPIV covers some of the composting costs (windrow turning).
- CEPIV provides subventions to support conversion to organic agriculture, topping up government subventions.
- CEPIV and VSV initiated and are co-funding a communal bio-digester program, which would be fed by effluents from the water catchment farms.
- CEPIV funds drinking through for cattle along the main stream of the water catchment.
- CEPIV supports measures for organic control of voles: they pay a vole hunter operating in the water catchment, they support the purchase of some communal machinery (de-compacting machine), ...
- CEPIV supports individual investment that would help delivering water services: for example they paid for some options of an effluent spreading machine.

In terms of decision process, these activities are either initiated by the demand side itself (CEPIV and VSV), which promotes models such as organic agriculture and biodigester in a rather top-down fashion; but also, in some case by farmers themselves that share their requests/needs with CEPIV (ex. Vole control, options on individual equipment). CEPIV’s approach is rather based on economic incentives and awareness-raising. Indeed, the goal is not to impose its ideas (participation is voluntary), as the expected changes are beyond legal standards (no legitimacy to impose rules). In turn, we distinguish two main approaches: (i) to compensate farmers for the individual extra costs associated with the implementation of pro-environmental practices; (ii) to support investment in equipment/plants that allow improving the provision of ESBO. CEPIV also relies on co-funding from public sources (ex. State subventions for conversion to organic agriculture).

**Key drivers**

Market drivers play an important role on Governance system. Danone wants to sustain its business while local authorities want to sustain a significant source of local tax and the landscape. The commune of Volvic receives about 2.5 million euros per year from Danone (tax perceived by communes based on the number of bottles sold in France by an enterprise located within their boundaries), the intercommunity VSV receives also a local tax. Besides, Danone is also the main local employer (about 1000 employees on-site), fulfilling one key aspect
of one major political goals, economic development. It is worth noting that other municipalities besides Volvic have less interest in managing the water catchment as compared to Volvic commune as they perceive less taxes (this could be explored further in the next steps of PEGASUS project). For example, while Volvic updated its urbanization master plan to remove plots located inside the water catchment from the list of constructible areas, some others seem to continue urbanizing the water catchment (like Pulvérières for instance; evidence in table on demography: page 15 of this report).

Public policy is another key driver of the governance mechanism, even though it seems to be less powerful than the market driver. As mentioned above, local authorities have engaged in the protection of the landscape and the biodiversity, which are mostly funded by the 2nd CAP pillars. The most important measure is the less favoured area subsidy, which allow farmers to maintain their activities in the zone. Others CAP 2nd-pillar measures do exist without being really mobilized by farmers. They are for example Agro-Environmental Measures, aid for conversion to organic farming, aid to develop quality value-chains. Only one farmer get benefit from the aid for conversion to organic farming. While we haven’t got full explanation for this inertia until now, it is interesting to observe that the CEPIV starts to discuss them in its future actions. Discussions seem to come from Danone’s initiative. These policies contribute both to EU objectives (rural development policy) and Danone objectives.

Lastly, private interest could also be considered as a driver. Public image is essential for Danone business: the ecosystems and land-uses located in the water catchment have to be perceived as healthy, the water catchment has to look well maintained. Danone is very active in seeking public fund to co-contribute to its public image. Several interviewees confirm that a lot of activities involving the CEPIV are narrowly linked to the communication strategy of Danone. For example, this explains why Danone agreed to engage in a sponsorship agreement for the red kite conservation. They see that these participations are valuables for their public image (link between red kite prevalence and the state of the ecosystem). In result, the red kite is now displayed on the Volvic bottles.

### 2.3 Levels of ESBO provision, trends and determinants

**Water quality and scarcity**

Historical data about water quality is available from different sources, mostly public. It includes in particular the state agency for groundwater data (ADES) and the communes / water distributing institutions (mixed association: SMUERR). Volvic’s station pumps the water very deep (as compared to other pumping stations for drinking water). There is no available information about the quality of this particular water, besides punctual analysis carried out by WWF and a national consumer association (The “60 millions de consommateurs” association)\(^7\).

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\(^7\) In a 2015 survey, the “60 millions de consommateurs” Association reported that they found measurable traces of atrazine, a pesticide prohibited since 2001, in Volvic bottled water. Although levels are below legal threshold, it threatens Danone’s public image. It seems that meetings were organized with farmers in the water catchment in order to identify the pollution source: it appear to be residual pollution from maize cropping that was formerly carried out in the area.

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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Public data on groundwater quality show that the state of the water quality table is good although infinitesimal residues of various molecules have been found. Besides, it is worth noting that Volvic water has a high content in Arsenic, which stays above the legal threshold. Public drinking water receives then treatments to be free from arsenic, but we don’t know whether Danone does the same (they probably do all the more as this treatment is legal). The presence of arsenic is linked to the characteristics of the geological system and not the result of land-use practices. Please note that the CEPIV was created in order to take in charge this problem. Most of CEPIV spending is to carry out sewage water treatments to filter arsenic.

Historical data about water quantity are available on ADES’ website\(^8\): we haven’t had the capacities, resources and time to compile and analyze this raw dataset yet. The EU Life-SEMEAU project uses the historical water flow of the water table to calibrate their hydrological model. This indicator can be used as a proxy of water availability. Its evolution over time show that the observed flow of water was significantly higher in the 70’s (550 l/s against 150 l/s in the 90’s and 2000’s). LIFE-SEMEAU postulates that the decrease could corresponds to measures errors. Since 2000, this indicator has been quite stable. According to LIFE-SEMEAU researchers, variations of water flow are correlated with rainfall patterns, and not to “climate change” or changes in upstream land-uses. In overall, it seems that the level of provision of water services has historically been satisfactory, both from a public service perspective (reports from the public water agency classify Volvic watershed as of good quality) and from a private perspective. The demand for water quality and availability is stable. Interventions to protect groundwater is to manage both future risk of pollution, and current brand image for Danone.

**Landscape:** The Volvic’s landscape is considered to be original. Indeed, it is part of the larger “Chaine des Puys” volcanic area, which applied twice (unsuccessfully) to become a UNESCO World heritage site. Volvic catchment area is located on the piedmont zone of Chaine des Puys but is widely associated with this larger landscape. The attempted classification as a World Heritage site is an indicator for and contributes to the awareness of landscape value. It also shows that preserving this landscape has become a politic objective. It is however difficult to measure the levels of provision of this ESBO. In absence of direct indicator for landscape quality, we decide to use a proxy, i.e. the number tourists visiting the area. Another issue is that data is only available at a larger scale than our study zone. We thus provide data for the target area of the Unesco application (Chaine des Puys). This area received 536 300 tourists in 2015. Besides, there are 31 hôtels (754 bed), with 14 camping zones, 418 to-rent accomodations with functionnal fournitures, 9 service areas for camping-cars, 71 restaurants, 10 % of local producers and 11 % of service suppliers of the department;

The target area of the UNESCO application stands for 28 % of total number of visiting nights in the department of Puy-de-Dôme in 2015. Concretely, it accounts for 26 % of profit-run visiting nights and 28 % of non-profit-run nights (meaning that night spent without paying for accommodation).

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\(^8\) [http://www.ades.eaufrance.fr/ExportData.aspx?id=06447X0002%2Fs&type=2](http://www.ades.eaufrance.fr/ExportData.aspx?id=06447X0002%2Fs&type=2)
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 633814

Figure 4: Topography of the zone and location of the PEGASUS’s workshop

Estimate of economic impact of the Unesco candidate perimeter in 2015

Table 3: Estimate of economic impacts from tourist sector inside the Unesco zone

<table>
<thead>
<tr>
<th>Unesco candidate perimeter</th>
<th>Number of beds</th>
<th>Number of nights</th>
<th>Economic impact for the whole area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit-run accommodations</td>
<td>13 800</td>
<td>1 300 000</td>
<td>130 000 000 €</td>
</tr>
<tr>
<td>Non-profit-run accommodations</td>
<td>13 900</td>
<td>2 900 000</td>
<td>98 000 000 €</td>
</tr>
<tr>
<td>Total</td>
<td>27 700</td>
<td>4 200 000</td>
<td>228 000 000 €</td>
</tr>
</tbody>
</table>

Table 4: Share of Profit-run and non-profit run nights inside the Unesco candidate perimeter

<table>
<thead>
<tr>
<th>Unesco candidate perimeter</th>
<th>Number of nights</th>
<th>Economic impact for the whole area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit-run accommodation</td>
<td>31%</td>
<td>57%</td>
</tr>
<tr>
<td>Non-profit-run accommodation</td>
<td>69%</td>
<td>43%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
We have no idea about expected economic impact of tourism in case that the Unesco’s candidate is approved. Finally, one should be cautious considering these figures. Indeed, they are only estimates of current economic significance of local tourism and that they are aggregated at the Unesco application perimeter, not at the Volvic catchment area level.

**Rural Vitality**

We first use data from the national statistical office to analyse the evolution of population size in the target area.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Charbonnières-les-Varennes</td>
<td>32</td>
<td>838</td>
<td>895</td>
<td>909</td>
<td>1177</td>
<td>1215</td>
<td>1478</td>
<td>1627</td>
</tr>
<tr>
<td>Pulvéries</td>
<td>15</td>
<td>361</td>
<td>312</td>
<td>293</td>
<td>307</td>
<td>308</td>
<td>361</td>
<td>397</td>
</tr>
<tr>
<td>Saint-Ours</td>
<td>56</td>
<td>1011</td>
<td>983</td>
<td>1053</td>
<td>1230</td>
<td>1370</td>
<td>1556</td>
<td>1657</td>
</tr>
<tr>
<td>Volvic</td>
<td>28</td>
<td>3030</td>
<td>3253</td>
<td>3587</td>
<td>3930</td>
<td>4202</td>
<td>4594</td>
<td>4425</td>
</tr>
<tr>
<td><strong>Volvic Source and Vovanos (VSV) inter-community</strong></td>
<td><strong>167</strong></td>
<td><strong>10503</strong></td>
<td><strong>11149</strong></td>
<td><strong>12893</strong></td>
<td><strong>14355</strong></td>
<td><strong>15323</strong></td>
<td><strong>17396</strong></td>
<td><strong>17368</strong></td>
</tr>
</tbody>
</table>

Data show that the demographic trend is slightly positive, particularly since 1999. Pulvéries is least populated commune and experienced population loss before 1999. The trend for Volvic is quite stable, probably thanks to the settlement of Danone water factory and proximity with the city of Clermont-Ferrand.

![Figure 5: Demographic evolution in the Volvic catchment's municipalities (base 1968)](image)

We don’t have access to other data or variable that could be used as proxies for rural vitality, such as number short value-chains or number of EU funded projects in the rural development framework.
**Biodiversity**

Volvic commune conducted a thorough biodiversity (fauna) survey in 2013: 4400 samples were collected on about 328 species. This initiative was supported by Volvic commune, a national biodiversity fund and CEPIV. The replication of this experience in the whole water catchment is under discussion but faces some reluctance from some local authorities (who do not understand the purpose of it). Specimens of various endangered species in Europe were recorded in the municipality during the biodiversity survey, such as “cuivré des marais et la petite coronide (des papillons), l’engoulevent d’Europe (un oiseau), le Grand Murin et le Rhinolophe Euryale (des chauves-souris) ou encore le chat forestier”. Specific monitoring of flagship species is also carried out inside the water catchment and beyond, which allows estimating the potential future re-population of the watershed. Monitoring is essentially organized by environmental organizations, LPO and Chauve-souris Auvergne (CSA). It seems that local population don’t understand the role of biodiversity on local resource. There’s a clear demand for biodiversity conservation (ESBO) on the impluvium; at the beginning, it was addressed by the LPO association but this ESBO has also been considered by Danone in integrating biodiversity into the company’s image. This makes a real economic valuation of biodiversity in their bottles in sale.

2.4  **Ancillary economic and social benefits provided ‘on the back’ of ESBOs**

No specific information and data provided on this section.

3  **Shifting societal norms, collective learning and voluntary actions**

Main changes in the perception of local population over environmental benefits occurred and have been identified. Before 2005, local elected people didn’t really understand that the environment is a part of the resource system they have on the territory. When Danone bought the Volvic water company, it also imported the culture of watershed protection from its previous experience in other sites. A local mayor said: “*Danone has brought the Evian enterprise culture to here*”. Evian is the name of another bottled water owned by Danone in the French Alps. This is when local stakeholders (farmers, local authorities, Volvic representatives) became aware of the link between land use practices and water quality/quantity and of the importance of protecting the watershed.

In particular, farmers and local authorities are well aware of the link between watershed protection and the maintenance of local employment in the area. Farmers reported that they are considering the potential consequences of their agricultural practices on local employment when making technical choices because they are aware of the link between groundwater quality and rural vitality.

This social value share explain why farmers work on a cooperating way with the CEPIV despite the fact they are not involved in the mechanism of governance.
4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

We decided to merger sections 4.1 and 4.2 as things are concretely intertwined (for example it’s difficult to analyse in separate sections the issue of organisational capacities and governance arrangements and mechanisms.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

The central governance mechanism of ESBO production is the CEPIV. The structure of governance could be described as following:

**GOVERNANCE STRUCTURE**

**CEPIV : COMMITTEE OF ENVIRONMENT AND PROTECTION OF THE VOLVIC IMPLUVIUM (WATER CATCHMENT AREA)**

- 3 representatives of the commune of Volvic
- 3 representatives of the Community of communes VSV : 1 of each commune except Volvic (Charbonnière, St.Ours and Pulvérière)
- 1 president (M. Chansart, mayor of the commune of Charbonnière)
- 1 secretary (Cathy Lehec, Danone)
- 1 staff (Daniel MAUGE, employed by the Volvic Water Company)
- Annual Budget: about 300k€
- 1/3 tax (the so-called « Cols tax ») collected by the Commune of Volvic
- 2/3 from Danone
- Actions undertaken to protect the water basin
- 3 representative of DANONE / Volvic Waters Compagny (VWC)
- Funding
- Farmers, foresters, households (sewage water treatment...), craftsmen, the National Railway Companyn (SNCF), etc.

**Figure 6: Governance Structure**

The CEPIV is organized between two poles: Danone on one hand, and local authorities on the other hand. We were said (one elected people) that Danone took the lead to run the CEPIV, despite the fact that representatives of local authorities have a majority of presence (6/9 vs. 3/9). CEPIV was firstly created to handle arsenic filtration’s problem. Interviews reveal that projects come from different CEPIV member’s initiations. A project of “water trough” has been initiated by a mayor. Another project “biodigester” which is on discussion comes from Danone. However, the protection of the impluvium come from Danone generally. [Insert information from Guilgot interview]

Danone’s strategy is to mobilize the institutional arrangement rather than legal framework. For example, they don’t want to buy land over the aquifer to have a better protection. Becoming land owners would give a good legal protection but will be very costly from an economic point of view. Besides, forestry and agricultural practices have important role on groundwater,
while Danone would not have necessary competence to manage these activities, even if they were land owners. A governance mechanism such as the CEPIV is clearly an option for Danone and for every local actors. However, all actors have not been presented in this governance, which raise questions on its long term sustainability.

![Diagram showing coordination system among local actors](image)

**Figure 7: Coordination system among local actors**

The scheme (see above) shows the governance system in the study zone. It highlights the fact that farmers and forest owners’ connections to the CEPIV are very weak. Farmers are not directly connected with the CEPIV but rather indirectly through weak link with local authorities. Indeed, farmers receive regional and EU subsidies, particularly ICHN, in which local authorities play a minor role. ICHN come from the Ministry of Agriculture, meaning at national level, while other 2nd pillar’s subsidies come from regional level (Regional council). Hence, local authorities don’t give aids directly: they are only involved in the process as an intermediary actor.

The existence of farming activity in the zone is questioned in the future. Data show that agriculture decline pursuits its trend, as competition in EU market of milk and beef meat is very rude. Extensive farming in territory like Volvic become highly inefficient from a pure economic perspective. Farmers obtain low economic return if their products are sold in conventional value chains. During the workshop, farmers said that “the economic performance of their farm is fragile “. The weak influence of farmers within the governance system could question its stability in the long run. Under such economic competition and pressure, new discussions should be engaged because some farmers are thinking about changing their farming systems. And we know that if this happens, the groundwater will be immediately affected.
During the workshop, a farmer asked Danone to recognize the positive externalities of agriculture on groundwater’s quality⁹, and suggested that farmers deserve to be compensated for these efforts. This position is quite clear, and it shows that farmers (at least some of them – the leaders in a way) understand very well that they contribute to the Resource System but haven’t been enough considered in the Governance system yet. The representative of Danone and this farmer have engaged in a small debate over the topic. The Danone representative recognized that agricultural activities provide good (ecological)-services for the groundwater. However, he tried to minimize the issue of compensation saying that “farmers should not be fully dependent on public subsidies as a patient under perfusion”. The answer comes immediately after: “it is not about perfusion, but a fair compensation for services, which are given freely until now”.

Concerning forest activities, it is a bit amazing to see that they are not organized in the territory, and also not integrated to the governance structure. Public forestry are coordinated inside a forestry charter, which aims to exploit sustainably the forest resource. However, this charter focuses more on forestry topics, and almost nothing on the underground resource like groundwater. We hoped to find out at least a (modest) coordination between the CEPIV and the forestry charter. In fact, these two structures don’t have links, and the sole information shared is probably done by the deputy mayor of Volvic, who is representative in both of them. Members of the forestry charter have also very few actions that could be identified as beneficial to the 5 ESBO in this case study.

The workshop reveals that the link between farmers and local authorities is very weak, while the link between Danone and farmers is rather inexistent (see Graphic below). For the moment, we did not identify any informal network. All discussions seem to happen inside the formal framework of the CEPIV.

4.3 The role and impact of policy in ESBO provision

This section could be considered as one of the weak point of our report. We did not really have time to analyze this aspect. In order to better understand the role and impact of policy in ESBOs provision, we have launched a new internship starting in April to investigate more deeply this dimension of the project. 

*Please see appendix 1 for details on this internship proposal.*

Nevertheless, several hypothesis could be put forward.

The first one is about the role played by the CAP. CAP have deeply influenced the farming and livestock system in this (mountainous) Auvergne Region and the Volvic territory. Breeders have long benefited from EU payments in the framework of the second pillar of the CAP (ICHN payments for less favoured zones with a weak density of animals per hectare). This aid suits well local farmers and has likely contributed to sustain their activity on the territory.

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⁹ Citation in French « *On travaille proprement* » which could be translated by « *Us [as farmers], our work is clean*”!
The second hypothesis is about the impact of local economic policies that should be analyzed in-depth. Indeed, a fundamental question that was raised by some interviewees is whether induced changes in the SES system actually address an actual potential risk or are just to be used in Danone’s communication strategy: according to farmers, the risk that farming systems become intensive is very low. Answering that question would require going into more details into technical aspects, which we did not have time to do. On the other hand, the rate of adoption of new practices and the level of farmers’ support to pro-environmental initiatives seem to be heterogeneous: only one farmer is now engaged in a conversion to organic agriculture while most farmers agreed to engage in biological vole control activities. It becomes crucial to understand underlying drivers. Local financing opportunities seems to be a key driver that incentivize farmers to adopt pro-environmental practices. However, these changes are also more likely to receive farmers’ support if they are economically/technically interesting/relevant for their farm but also if the process of diffusion/adoption is participatory and guarantees freedom of decision. Once again, although the regulatory framework and public policies framing forest and agriculture land-uses are generally consistent with the objective of increasing the provision of target ESBOs, they do not play a key role in influencing local changes and decisions: the earlier is generally not as strict as the industrial requirements while the latter are rather seen as co-funding sources for local initiatives.

4.4 The role of the private sector in ESBO provision and enabling factors

The main and obvious private driver is the market for bottled mineral water which is of huge economic importance in France and, to a lesser extent, throughout the world. In France, this market represents in 2015 about 2 billion € (source: French Ministry of Ecology 2014). This is a very profitable business with a high growth rate (+7.1% in 2015 announced by Danone for all its Water Brands in the world including Volvic and Evian as the main brands in terms of volume and value-added). The market is also oligopolistic with 2 main big private actors in Europe (Nestlé and Danone), and other smaller national or public-owned companies. Danone itself ranks second in the world with 4.7 billion € of revenue in 2015 with four of the most famous and profitable French brands: Volvic, Evian located in the Alps, Badoit located close to Lyon and La Salvetat located in South of France.
At last, in the short run, the territory might benefit from the policy conducted by UNESCO under its world heritage programme. Currently, the labelling process is still on-going for the territory.

5 Potential pathways towards an enhanced provision of ESBOs

Among the stakeholders, two visions (at least) were confronting.

(1) A technical point of view defended by Danone, some of the local elected people and CEPIV representatives who tried to solve technically the risks of contamination. Here, the main risks identified and related to agriculture, is the livestock effluents management and the pesticides spread over cereals (maize and wheat).

(2) A more economic point of view defended by the farmers and backed (to some extent) by experts/researchers. Here the main risk identified is agriculture decline and changes in land-use (from agriculture to forest) with a potential impact on water availability.

5.1 The technical vision defended by Danone

Here, the vision is technical and Danone is confident in technical progress to solve the polluting issues in agriculture. In a way, Danone is convinced that it is possible to make the current strategy more effective environmentally speaking by adopting new technologies or technical practices to fight against potential risks of contamination.

The first potential pathway is a better management of livestock effluents. The real risks (nitrates and phosphorus) of contamination of the water resource had been considered as very
weak by a recent study of the Chamber of Agriculture (2012) but “the lack of knowledge of the regulations and the lack of predictive reasoning (plan of fertilization) can lead to risks of excessive intake on certain plots” (study Life-Semeau 2012). This explains why, despite the risk is low, Danone promotes technical innovations for farmers to modify the way they manage individually their livestock effluents. After having promoted in vain (only 2 or 3 farmers involved) composting effluents for a few years (at least 5 years), the current project in Volvic is to settle a collective biodigester plant to treat the livestock effluents coming mainly from cows and poultry of all the farms. This project is directly imported from Danone’s previous experience in Evian where the company launched, in 2015, “Terragr’Eau as the first collective biodigester plant dedicated to protecting water and developing agriculture” (see Press release, Evian, October 16, 2015 http://www.danoneaunaturel.fr/).

The second potential pathway is a drastic reduction of pesticides used in agriculture (notabene: the use of pesticides by the communes or spread out on railways had been considered in a former programme led by Danone from 2005 and 2012). Here, the main risk is herbicides used for cultivating cereals. The way Danone intends to solve the problem is to conceive and promote the adoption by farmers of a new agro-environmental scheme focusing on pesticides reduction (or ban?) at the impluvium scale. This project is in line with the way Danone acts in the framework of the CEPIV: a technical angle to mitigate a pollution hazard. Although this risk is currently considered as very weak (see the results of the study conducted in 2016 by VetAgro Sup), several factors lead Danone to pay a higher attention to this issue. Actually, one considers that lands cultivated in cereals are likely to increase by a significant rate in the coming years. This could be caused by:

- The impact of climate change: a warmer climate would make cereals cultivation easier for the farmers on the territory; “Here, 15-20 years ago, we could hardly harvest cereals before mid-September though today the harvest can easily starts from mi-August!” (a farmer said);
- The fact that farmers are seeking for autonomy to lower their production costs: this strategy would be achieved more easily in cultivating more cereals on their farms;
- The recent changes in consumers’ behavior illustrated by the fact that French people are slightly shifting their habits in terms of meat consumption (minus 3% over the past ten years; source: http://www.la-viande.fr/economie-metiers/economie/chiffres-cles-viande-bovine/consommation-viande-bovine). As a farmer said during the workshop, “whether “BOBOs” (ie a French word meaning rich, hipster and urban people) stop consuming meat and become vegan, then we [the farmers] have no choice but plough our lands”.

5.2 The vision shared by the participating farmers

The vision defended by the farmers who participated in the workshop is more radical. The vision is to shift from a farming practices (technical) focus to a more global reflection on the evolution of the farming system in Volvic. In a way, it’s a kind an ideal scenario where (in the farmers’ opinion) the strategy would be collective and backed (and funded) by Danone. That’s important to understand that French farmers have long focused on income in agriculture and
what they call the “right [fair] price to pay their work” including externalities provided for the society (source: FNSEA, the main farmers’ union).

In Volvic, this focus on revenues could be explained by the current livestock crisis in France leading the participating farmers to be convinced that they need to find (local) solutions to raise the price of their products (especially meat). They (at least some of them – the leaders) seem convinced that the city, the urban people, the industry can afford paying more and buying their products at a higher price (compared to the price given today on the market). Given the context, here in Volvic, it’s even more true, and while Danone spoke about “stopping the subsidies logic in agriculture” saying that they didn’t want to pay directly the farmers for ages (as it is the case in the framework of CAP), the farmers themselves spoke about “compensations” when they debated with the representative of Danone insisting of free positive-effects (ie. Externalities) of their farming activities (landscape beauty, water protection...).

Thus, the main risk identified here by the farmers is agriculture decline and possible changes in land-use (from agriculture to forest) with a huge potential impact on water availability (as a reminder, +10% of forest on the territory would mean a reduction of water availability by 2%; source: Life-Semeau Project).

In order to fight agriculture decline, farmers suggested three tentative solutions:

- To make young farmer’ settlements easier and help them to access to land ownership; (more than 50% of the farmers have stopped their activity on the territory over the last thirty years);
- To cut production costs by reducing purchases of raw materials (cereals forage to feed the herds);
- To better valued the products provided by the farmers: one example quoted by a participant is the set-up of a new and original labelling “Volvic Beef Meat” that could be run with the accreditation of an official quality sign (like “red label”).

In conclusion, there is a need to make the provision of ESBOs more effective. Even if it’s difficult to express in quantitative terms the potential increase in the provision of specific ESBOs (in a 10-year period), we can state that a potential of improvement does exist in the view of participants. So far, there is no alternative collective action (apart from the CEPIV) that has the potential to further enhance the provision of the ESBOs. In a way, CEPIV is a new arrangement (set-up in 2005). Its potential has not been fully explored yet in particular with the agricultural sector. Several options (technical and more global and systemic) are considered by stakeholders and it seems obvious (for the participating farmers met during the workshop) that it is the CEPIV role to undertake those actions. A change could happen as the main public actor has recently evolved: VSV community of communes merged in January 1st, 2017 with two other communities, becoming a bigger, richer and more powerful actor of the governance system.
6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework allows organizing in a systemic manner a complex situation that mixes various governances systems, stakeholders, etc. It was also design to facilitate the analysis of a huge number of case studies. In this sense, it is a relevant methodology for PEGASUS project in general and for our case study description in particular (although more emphasis should be put on better characterize the common-pool / public good nature of target resource systems, including ESBOs).

However, we found it hard to use (at least some of) the second-tier variables and more time should be dedicated to understand how they can be of use for PEGASUS in the light of the research questions targeted. In Ostrom’s research program (Mcginnis and Ostrom 2014), these variables were instrumental in finding regularities in factors affecting the successful local management of a common-pool resource.

7 Main conclusions derived from the Steps 3-4 analysis

Just conclude on the basis of the analysis and discussion in previous sections. The bullet points are only examples of some relevant questions.

7.1 Key findings on the particular SES and the provision of ESBOs

The resource system in Volvic case study is composed by ground resources (aquifer) and surface resources (both forestry and agriculture). Five ESBOs have been identified: water quality, water availability, landscape, rural vitality, biodiversity. They are all interconnected, but water related ESBOs are more depending on the rest. The specificity of this study case is that resource system is used by a private company that understand that groundwater’s value come partly from intrinsic characteristics of water, and partly from the whole resource system (value of the natural environment). That’s why Danone supports the protection of both ground and surface’s resources. Market’s drivers play a central role in the production of the ESBOs. Main contribution of agriculture in the provision of ESBO are the maintaining of extensive agricultural practices, which preserve groundwater’s quality. Agriculture is maintained in the zone thanks to less favor areas subsidies ICHN.

With agriculture, the forest cover largely the land over the aquifer. Agriculture – Forest balance is the key factor to keep resources systems on work sustainably.

- What are the main findings regarding the appreciation and demand side of ESBO provision?

The demand side of ESBO is a relatively stable and predictable, thanks to market drivers. The combination Nature-Agriculture-Forest has a firm market support. Concerning the landscape and rural vitality, the demand is very clear from a politic standpoint, but less clear for an ordinary citizen, especially those who have income problems (farmers for ex.)
• How can the awareness and provision of ESBO be increased in this particular case?

The provision of ESBOs cannot be increased in quantity, and may be no more in quality. The objective of ESBO management is to maintain the current level of ESBO supply and thus to manage the risk of potential harmful changes in the system. The water’s quality is of particular local concern (especially when dealing with agricultural land-uses). Awareness about these ESBO has been raised from many years and people know well the ESBO that they benefit from. However, the situation could be degraded in the future, because local farmers face economic difficulty. In case of agriculture decline, the resource system could be seriously affected. Farmers should be involved in the governance system, instead of being isolated as they are at present.

7.2 Key findings on governance arrangements and institutional frameworks

The growing interest about the management of the water catchment, particularly since the mid-2000’s resulted in the emergence of new governance arrangements based on public-private and private-private partnerships (CEPIV, the partnership between Danone and the LPO, etc.). These new arrangements organize the demand side of ESBOs and lead to concrete actions targeting farmers. The CEPIV structure appears really original and innovative in the French context (and maybe European).

The impact of new governance arrangements and subsequent interventions cannot be measured in terms of additional effect on ESBOs provision, particularly for water services. The main reason being that preexisting levels of ESBO supply were relatively high and that the main goal of interventions is risk and reputation management.

Recently, the institutional framework changed in France and it has led to the evolution of the key public actor (VSV community of communes). On 1 January 2017, Volvic Sources and Volcaines merged with the communes of Riom Communauté and Limagne d’Ennezat to create a new community of communes called Riom Limagne and Volcanoes. 31 municipalities are nowadays associated in this new community of communes and bring together 64,907 inhabitants. This is one of the consequences of the latest legislative evolution (law NOTRe of August 7, 2015) with new schemes of inter-municipal cooperation envisage the merger of two communities out of three communes in France. This merger is likely to change the relationship between the private sector and the public one as the new community of communes is bigger, more powerful and richer. (Issue to be tackled in the next steps of Pegasus)

7.3 Other enabling or limiting factors

One important limiting factor is the fact that farmers are isolated, with a weak bargaining power and relatively marginalized in the local political game. Moreover, their number is shrinking, their economic importance declines without any collective strategy to enhance their products. For those reasons, farmers are more or less excluded from the governance system. They are a key stakeholder in terms of impacts, activities within the territory but, so far, they have not been associated to the main governance structure (CEPIV) set up to protect the water resource (ie; the CEPIV).
The issue of economic importance of agriculture and its decline is again a key issue. To go further, just have a look at farmers’ main productions and commercial strategies to understand more deeply the issue (please see table just below).

In fact, among the 16 farmers cultivating lands and breeding cows on the territory, a very small number of them (only 2) have developed a real and clear strategy to enhance their products outside the traditional supply chains (meat and milk) in order to get a higher price compared to the standard market price.

Table 6: How farmers have tried to better valued their production?

<table>
<thead>
<tr>
<th>Farmers</th>
<th>Main productions</th>
<th>Specific Supply Chain and Official Quality Sign</th>
<th>Additional sources of income</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Beef meat</td>
<td>none</td>
<td>Part time position (volvic plant)</td>
</tr>
<tr>
<td>F2</td>
<td>Beef meat</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Beef meat and milk</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Beef meat and cereales</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Beef meat</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>Beef meat and poultry</td>
<td>Label rouge &quot;poultry&quot;</td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Beef meat</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F8</td>
<td>Beef meat and cereales</td>
<td>none</td>
<td>Short-term-Contracts (points abreuvement) with CEPIV</td>
</tr>
<tr>
<td>F9</td>
<td>Beef meat</td>
<td>OF conversion (under discussion)</td>
<td></td>
</tr>
<tr>
<td>F10</td>
<td>Milk</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F11</td>
<td>Beef meat and poultry</td>
<td>OF (on-going / conversion) Label rouge &quot;poultry&quot;</td>
<td>Alternative food network</td>
</tr>
<tr>
<td>F12</td>
<td>Beef meat</td>
<td>OF conversion (under discussion)</td>
<td></td>
</tr>
<tr>
<td>F13</td>
<td>Beef meat</td>
<td>OF conversion (under discussion)</td>
<td>Part time position (truck driver)</td>
</tr>
<tr>
<td>F14</td>
<td>Beef meat</td>
<td>none</td>
<td>Wood seller</td>
</tr>
<tr>
<td>F15</td>
<td>Milk and sheep</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>F16</td>
<td>Beef meat and cereales</td>
<td>none</td>
<td></td>
</tr>
</tbody>
</table>

Three ways have been followed by those farmers:

- Converting the farm to organic

So far, only one farmer (beef breeder) has converted his farm to organic. Actually, the conversion process is on-going (for 2 years) and has not been achieved yet. Surprisingly, though most of the farmers (listed in the table above) are close to the European organic code of practices,
only one farmer has converted to organic (conversion process has been engaged for two years). However, three more farmers think of converting their farm to OF and the initiative is encouraged by CEPIV/DANONE (only in words!).

- Enhancing the product by adopting a specific and constraining codes of practices (The official quality and origin signs)

Two farmers have been accredited “Red label” which is a guarantee that the product is of superior quality and adopted (at the same time) a protected geographical indication “Auvergne Poultry”. This enables those farmers to get additional revenue by breeding poultries during the winter period where the agenda is quieter for them.

- Seeking additional sources of income

One farmer currently participates in an alternative food network enabling the sale of its products (essentially beef meat and poultries) directly to consumers. This is the same farmer who converted his farm to organic.

(See the picture here showing the farmer website used to sell its product – it is explicitly mentioned on the webpage that animals breed on the farm benefited from the protected and natural environment of the Volvic Impluvium)

Four farmers have undertaken additional activities (outside the farm) like part-time position working in local plants or directly employed by Danone or selling woods to local people to heat their houses.

In conclusion, pathways to enhance products (to better valued the products) do exist for farmers. Three options have been explored so far (OF, official quality signs, additional activities). But few of farmers have really engaged their farm toward a clear strategy in this line. This explains that so far, no collective strategy has been set up by farmers or encouraged by Danone; we see individual trials to enhance local products but no real collective effort and reflection to find a new economic model to sustain local agriculture.

7.4 Contributions to EU strategic objectives

Here, it has not been possible, so far, to assess how the Volvic initiative and the related provision of ESBOs through agriculture and forestry contribute to the EU objectives by creating employment, enhancing sustainability or strengthening innovative capacity.

That would mean that we still need to explore the existence of concrete data/evidence and cross-reference relevant studies at the impluvium scale or/and at a broader scale.

For instance, evaluation could be done on jobs creation linked to ESBOs. We think in particular of farming activities, jobs in tourism sector (accommodation and restauration) or jobs related to the Volvic plant itself. This case study is an example about how the involvement of private
sector and more specifically a public-private partnership can contribute to enhance water protection or at least prevent from a risk of degradation in situations where both public authorities and private companies share common interests. It is worth noting that private sector plays a leading role in this case.

### 7.5 How about the transferability of the approach/mechanism used?

One obvious transfer of the approach of water protection and governance system developed in Volvic is for Danone itself. Indeed, as stated earlier in the report, apart from Volvic, DANONE owns three of the most famous bottled water brands in France: Evian, Badoît and La Salvetat.

For instance, in La Salvetat, DANONE launched in 2013 the PEP’S association (standing for Policy, Environment, Protection, Salvetat) dedicated to the protection of the impluvium. The governance rules are very similar to the CEPIV ones in Volvic with representatives from Danone and local elected people without associating explicitly farmers in the structure (VetAgro Sup, 2016b).

Further researches led us to understand that this approach has actually been developed by **DANONE France Waters** for each sources of bottled water belonging to the company (interview with Cathy LeHec, head of Danone France Waters, March, 2016). Of course, differences exist between local contexts. If Evian was the first experience in this field in early 2000 with highly productive and polluting dairy farms located on the impluvium, Volvic was the most recent and successful experience followed recently by La Salvetat and Badoit. This policy followed by DANONE has been reinforced since 2013 with successive scandals on drinking water contaminations (with pesticides especially) highlighted by a French consumers association ([http://www.60millions-mag.com/2013/03/25/qualite-de-l-eau-potable-difficile-d-echapper-aux-polluants-7854](http://www.60millions-mag.com/2013/03/25/qualite-de-l-eau-potable-difficile-d-echapper-aux-polluants-7854)).

Actually, the transfer of knowledge is twofold in the case of DANONE:

- A technical transfer: for example, the biodigester experience in Evian is transferred to Volvic;
- A transfer in terms of how to govern the technical change and intervene in the local political game: the governance structured set-up in Volvic from 2005 is now developed in Badoit and La Salvetat.

Moreover, in a broader reflection on drinking water protection in France and in Europe, the approach developed by DANONE could be beneficial for local public policy-makers. On the contrary of Nestlé in Vittel (see Chia, Brossier and Benoit 1992), DANONE has not engaged a PES (direct payments for ecological services) approach which is a very costly policy (about 25 million € invested in Vittel by Nestlé waters to protect an impluvium equivalent in size), not affordable for local public policy-makers. Indeed, a recent report released by the French Ministry of Environment (2014) estimates the damages caused by farming activities (mainly nitrates) to the water resources management (used mainly for tap-water) up to one billion € per year.
At last, this experience could be particularly useful in cases where there is a strong private interest for water quality: industries such as thermal water or other pharmaceutical companies could be interested. However, it would be useful to explore other case studies where private sector involvement in watershed management is going on.
8 References (including projects docs, evidence reports etc.)

8.1 Appendix 1: List of stakeholders interviewed

- Jean-Christophe GIGAULT, permanent member of CEPIV, director of LPO regional office, deputee-mayor of Volvic commune (4 meetings: August 28, 2015; January 7, 2016; June 10, 2016; February 24, 2017)
- Pr. Yves MICHELIN, VetAgro Sup; professor in geography, expert for the Unesco World Heritage project, conducts research on vole pullulating in Volvic water catchment (2 meetings: May 31, 2016; June 9, 2016)
- Elodie PERROT, PhD student in ecology working on vole management in Volvic catchment area, DANONE and VetAgro Sup (1 meeting in January 2016)
- Marie FORET, Director, Union Régionale des communes forestières (1 meeting on June 5, 2016)
- Yves POSS, former public servant at ONF (administration in charge of the management of public forests), researcher in social science on forest use (1 meeting on June 6, 2016)
- Jacques BARBECOT, farmer, mayor of Pulvérières, treasurer of CEPIV (1 meeting on June 3, 2016)
- Patrick LACHASSAGNE, hydrogeologist, Danone, coordinator of LIFE+ SEMEAU project (1 meeting on June 15, 2016)
- Daniel MAUGER, Danone, in charge of the sustainable management of Volvic water catchment (1 meeting on April 27, 2016)
- Group Meeting at Communauté de communes de “Volvic Sources et Volcans”: Cécile CHAPUT (in charge of economic development), Noémie FAVRE and Lucie VAESKEN (in charge of environment, including forest management) (1 group meeting on June 13, 2016)
- Jean-Michel HERMENT, farmer in Pulvérières (1 meeting on 19/07/2016)
- Florent TIXIER, farmer in Charbonnière les Varennes (1 meeting on 20/07/2016)
- Bernard PRANAL, farmer in Pulvérières (1 meeting on 22/07/2016)
- Alain ROBERT, vole/mole buster (1 meeting on 25/07/2016)
- Frédéric LANTIER, in charge of tourism at CONSEIL DÉPARTEMENTAL DU PUY-DE-DÔME (one phone-call on February 22, 2017)

8.2 Appendix 2: References

PEGASUS Reports quoted

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Regulations, Projects documents, evidence reports

Arrêté n°2015-155 portant sur l’obligation de lutte contre le campagnol terrestre dans certaines communes.

Programme de développement rural 2014 – 2020 de l’Auvergne.

Le plan régional pour une agriculture durable Auvergne (2012) : présentation générale et plan d’action (2 documents).

Projet d’aménagement et de développement durable (SCOT Grand Clermont).

Natura 2000 - Formulaire standard de données - FR8301052 - Chaîne des Puys.


Orientations Régionales de Gestion et de conservation de la Faune sauvage et de ses Habitats (ORGFH) – Auvergne (2005).


Charte forestière du site classé de la Chaîne des Puys.


Arrêté n°2014332-0006 autorisant au titre de l’article L214-3 du code de l’environnement la société des Eaux de Volvic à exploiter la ressource en eau minérale des forages F1 à F5 sur la commune de Volvic.

Arrêté préfectoral n°2014336/0003 du 2 décembre 2014 autorisant la société des Eaux de Volvic à exploiter sur la commune de Volvic, en tant qu’eau minérale naturelle l’eau de source "Clairvic" à des fins commerciales, sous la désignation commerciale de "Volvic".


ONF, et CRPF. « Schéma directeur de desserte forestière - Communes de Charbonnières-les-Varennes, Pulvérières, St-Ours-les Roches et Volvic ». LIFE-SEMEAU, s. d.

Studies on agricultural sector
CEPIV, SCE et VetAgro Sup (2013). Diagnostics d’exploitations agricoles (5 diagnostics individuels agricoles conduits sur la zone par un bureau d’études “SCE” en 2013 pour le compte du CEPIV).

Studies on forestry

Other studies (in particular dealing with governance...)


9 ANNEX: Reflections on the case study methodology used

9.1 Objectives and activities undertaken with initiative/stakeholders
Apart from individual interviewed carried out during summer 2016, we set up a participatory workshop in December 2016 gathering a good number of stakeholders living and working within the water catchment area (essentially farmers, DANONE and CEPIV representatives).

Table 7: Methodological itinerary

<table>
<thead>
<tr>
<th>Tools used</th>
<th>Exploratory interviews / visits / field trip</th>
<th>Individual meetings and interviews (semi-structured)</th>
<th>Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td>Early 2016</td>
<td>Summer 2016</td>
<td>Late 2016</td>
</tr>
<tr>
<td>Objectives</td>
<td>To be in touch with local actors</td>
<td>To survey and meet farmers and local policy-makers</td>
<td>Participatory process (workshop)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff and/or stakeholders involved</td>
<td>C. Déprés mainly</td>
<td>C. Chervier mainly and C. Déprés</td>
<td>All the team, students and Claire (facilitator)</td>
</tr>
<tr>
<td>Data provided/output</td>
<td>Interviews reports</td>
<td>WP3 report France Intermediary report on the Volvic CS</td>
<td>See below</td>
</tr>
</tbody>
</table>

Participants of the workshop

Stakeholders
- Farmers (4)
- CEPIV (2)
- Elected people (1)
- Representative of Danone (1)
- Involved Staff and scholars
- Christophe Déprés, PhD in Economics (Volvic CS coordinator)
- Marielle Berriet-Solliec and Hai Vu Pham (Pegasus French Team, WP4 coordinator)
- Claire Planchat, PhD in Geography, VEDI Agency Director
- Colas Chervier, PhD in Economics (3-month contract on the project)
- Elodie Perrot, PhD Candidate in Geography (permanent staff at VetAgro Sup working with farmers around Volvic)
- Pr. Yves Michelin (grand témoin), Pr. Geography (permanent staff of VetAgro Sup)
- Elora Sepulcri, master student in Agronomy
- Marie Vigneau, master student in Agronomy
- Corentin Fuéri, master student in Agronomy
Supporting documents (produced before the workshop in order to frame the debate)

- Facilitating guidelines
- Workshop agenda (including schedule and unfolding of the evening)
- Observation sheets
- Pictograms (referring to farming practices)
- Invitation mails to the workshop

Raw material collected during the 1st participatory workshop in December

- Pictures (about 30 pictures taken during the workshop showing participants discussion)
- Pictograms and diagram of the territory (stakeholders)
- Individual notes (by researchers)
- Observation sheets (filled by students and researchers)
- Vocal recordings

Secondary data collected:

- Complete transcription of the vocal recording (in French)
- Maps/Cartography
- Workshop Report 06/02 (written by Claire Planchat) (in English)
- Report on agriculture development trends on the territory (students from VetAgro Sup) (in French)
- Leaflets (to be sent to the participants after the meeting) (in French)

9.2 Outcomes and further steps

The outcomes of the process (documentation, strategic plans, etc.)
A comprehensive overview of the process (and its outcomes) is available in the report quoted in appendix (Planchat and Déprés 2017)

Further steps in terms of research
Two steps are considered for early 2017

1. A trainee employed from April 2017 to collect data on policy drivers and carrying out interviews with local state agency and local public authorities
2. A 2nd workshop

After the 1st workshop in December, participants agreed to contribute to a 2nd workshop during the spring time.

Objective: to enlarge the audience and involve more farmers and participants. The objective is to share ideas debated during the 1st workshop and open the discussion to further issues and potential environmentally-friendly changes with beneficial impacts on the water resource.

Three options have been considered by the participants (still in progress) with different degrees of ambitiousness (from the lowest one to the highest one):
1) A workshop focused on technical solutions to be promoted in the future at the farm scale
2) A workshop focused global solutions to be elaborated in the future at the territory scale to better valued agricultural products (meat especially)
3) A workshop at a broader scale focusing a concrete action to develop an alternative food network linking Volvic employees and farmers. This workshop could be held in May-June 2017 and would be entitled a “Consumption Actors Workshop”. Indeed, the potential for a local value-chain is huge as the main Volvic plant employed about 1.000 employees on-site.

_How will the results be used after finalisation of the case study?_

So far, the CS (including participatory approach) has been used by DANONE as a mean to trigger discussions with farmers on “hot” (sensitive) issues for them: agriculture decline, polluting practices, impacts on water, farmers’ reluctance to adopt new practices promoted by DANONE (like composting effluents), etc.

That’s clear that the connection between DANONE and the farmers could be improved in many ways, including from a technical point of view. We were puzzled for instance to know that the representative of DANONE in charge of CEPIV administration is not at all agronomist. He lacks knowledge about agriculture realm and do need external expertise. Clearly, the research team played as a tierce-party facilitating the dialogue.

_9.3 Judgement on the process_

_Expectations of actors towards the process_

After the workshop, farmers had the feeling (maybe shared by all of the participants for the first time) that Danone and elected people really listened to them and understood their problems. Consequently, they want CEPIV to pay attention to their difficulties and not only the problem of water quality as, in their view, agriculture has a weak productivity (repeated several times by farmers during the debate) and does not pollute the environment at all. They would rather like Danone/CEPIV to tackle the problem of economic decline of agriculture instead of still debating of pollution hazards.

_The added-value, in our researchers’ view, of the participatory approach_

A participatory appraisal leading to a common understanding of the key issues and main ESBOs. Apart from water quality and biodiversity, farmers insisted a lot on the scene beauty of this territory and the fact that they are proud of living and working there. Wastes were often quoted as a problem as well.

The workshop reinforced the mutual confident between farmers, stakeholders and researchers.

The workshop enabled to overcome the reticence of Danone since “PEGASUS” (and its research team) has been seen from the very beginning of the project as a new “insider” in the bargaining process with local authorities and the farmers.
From a research-oriented point of view, we would also say that the participatory workshop was an opportunity to rebuild or formalize in concrete words and graphics the implicit relations and networks between stakeholders (see in annex the report of the workshop; Planchat and Déprés 2017). To some extent, the current governance (around the CEPIV) and existing coordinating devices had to be explicated and debated during the workshop.

In terms of research, one important lesson is that the process of understanding the CS is still in progress. Indeed, several unsolved key questions need to be tackled in the following months.

The most important of them are:

- Why farmers are not represented in the current governance and CEPIV association although the objective is to protect the impluvium from potential contaminations especially from agriculture (pesticides, nitrates)?
- Why technical improvements or technical changes (like composting of livestock effluents, biodigester, organic farming) promoted by Danone, CEPIV and experts are not really adopted by farmers? Which rationale for farmers’ choices? (Economic, environmental, agronomic?)
- Why doesn’t exist a collective dynamic among farmers settled on the territory? (or the contrary, why should you think that a collective dynamic could have been emerged here?)

9.4 Supporting data and statistics

We access to data freely and available from the French agricultural census [https://stats.agriculture.gouv.fr/disar/](https://stats.agriculture.gouv.fr/disar/)
10 APPENDIX

10.1 Internship proposal (from April 2017)

February 14, 2017

Internship Proposal - 6 Months - Master or Graduate Students

Territorial Plan and Governance of the Volvic water catchment area

Dans le cadre du projet européen H2020 PEGASUS, VetAgro Sup Clermont propose un stage universitaire de niveau Bac +5 en partenariat avec l’UMR CESAER de Dijon.

Contexte

Depuis un certain nombre d’années, l’Union Européenne soutient à travers la Politique agricole commune (PAC) les pratiques agricoles qui, en synergie avec leur environnement naturel, produisent des bénéfices pour la société. Le concept de bénéfice socio-environnemental (ESBO) renvoie aux avantages sociaux et environnementaux que l’agriculture produit avec son écosystème. Le projet européen PEGASUS cherche à comprendre plus finement le processus de production des ESBO par l’agriculture et la forêt en Europe. Une des études de cas d’étude de ce projet porte sur la gestion des ressources en eau de Volvic en région Auvergne-Rhône-Alpes. L’hypothèse qui sous-tend l’étude est que le mécanisme de gouvernance territoriale joue un rôle central dans la définition des règles d’usages « raisonnables » de la ressource. Il impacte ainsi directement le niveau de production de l’ESBO.

Objectifs du stage

L’objectif du stage est de comprendre les modes de gouvernance qui sont susceptibles de définir ou qui contribuent à définir les règles d’usage autour des ressources en eau de Volvic. Les usages principaux sont l’exploitation privée de l’impluvium de Volvic (sources exploitées par DANONE), l’agriculture (principalement l’élevage extensif) mais aussi l’exploitation publique par un syndicat de distribution d’eau potable. Plus concrètement, il s’agit d’inventorier les principaux dispositifs de gouvernance ou de planification territoriale existants sur le territoire (PLU/PLUi, SCOT, PCET, SRCE, SAGE, Charte PNR, agenda 21 etc…) susceptibles de conditionner, d’encourager ou de mettre en difficulté la gouvernance des acteurs publics et privés du territoire autour de la ressource en eau de l’impluvium. Ces dispositifs touchent soit directement à la question de l’eau (comme le SAGE), soit indirectement comme ceux régissant les activités agricoles, les infrastructures urbaines (habitat, transport), la protection des ressources naturelles (SRCE…). Il s’agira enfin d’analyser la pertinence de ces dispositifs, dans la perspective de la production de deux ESBO principaux sur le territoire de VOLVIC :

1. La conservation d’une bonne qualité des eaux souterraines
2. La pérennisation d’une agriculture (élevage) durable sur la zone d’étude
**Missions:**

- Recensement et analyse des principaux dispositifs de gouvernance et de planification territoriale qui existent : analyse à faire des stratégies et orientations des documents de planification, de la compatibilité des orientations entre échelles territoriales concernées, etc.
- Identification des acteurs clés de la gouvernance territoriale et enquêtes auprès de ces acteurs (DRAAF, DREAL, Agence de l’eau, Parc Naturel Régional, chambre d’agriculture…)
- A partir des comptes rendus d’entretien, production d’une note de synthèse relevant la pertinence de chaque dispositif et la manière dont ils s’articulent (ou non) pour favoriser (ou pas) la production des ESBO étudiés.
- Une note de synthèse en anglais pour le projet scientifique H2020.
- Une note didactique, c’est-à-dire destinée à communiquer les résultats de l’étude aux acteurs du territoire.

**Conditions**

- Période du stage : 6 mois au cours de l’année 2017 à compter de début avril
- Le/la stagiaire sera basé(e) à VetAgro Sup sur le campus de Clermont-Ferrand, accueilli au sein de l’UMR Territoires
- Indemnité de stage de l’ordre de 550 €/mois
- Possibilité d’utiliser un véhicule de service ou de se faire rembourser ses frais kilométriques ou trajets SNCF (pour les entretiens)
- Encadrement : Christophe Déprés (contact ci-dessous) en collaboration avec Salma Loudiıy (maître de conférences en géographie)
- Accueil : département « territoires et sociétés » de VetAgro Sup campus de Clermont

**Profil**

- Master 2 en géographie, aménagement, développement rural/territorial, science politique, économie ou ingénieur agronome ;
- Bonne connaissance des dispositifs de planification territoriale ;
- Compétences et goût pour les techniques d’enquêtes ;
- Intérêt pour les enjeux d’aménagement, les politiques de l’eau et de gestion des ressources naturelles ;
- Capacité à rédiger en anglais (notes de travail à rédiger dans le cadre du projet H2020)
- Permis B souhaité (mais pas indispensable).

**Contacts**

*Envoyer lettre de motivations et cv à:*
Christophe DEPRES, maître de conférences en économie à VetAgro Sup Clermont  [Christophe.depres@vetagro-sup.fr](mailto:Christophe.depres@vetagro-sup.fr)
VetAgro Sup - UMR Territoires (AgroParisTech, Inra, Irstea, UCA, VetAgro Sup)
Campus agronomique
89 Avenue de l'Europe - BP 35
63370 Lempdes
Tél : + 33 (0) 4 73 98 13 30 (ou 13 24 pour le secrétariat)
CASE STUDY
PROCESSING TOMATO OF NORTHERN ITALY (ITALY)

D4.3 Final Version March 2017

Barbara Forcina, Francesco Mantino

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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1 Introduction: What is the case study about?

The “processed tomato supply chain of northern Italy” is a market-driven case study, characterized by an innovative governance system (Inter-branch Organisation) guaranteeing both vertical and horizontal cooperation and coordination within the supply chain and production and processing adaption to environmental and economic sustainability requirements. Main ESBOs investigated are healthy functioning soil and water quality and quantity, whose provision is driven mainly by increasing demand for sustainable food products and for quality, social and environmental certifications but also supported by policies with indirect and direct focus.

The whole processed tomato supply chain of northern Italy covers four Regions (Emilia-Romagna, Lombardy, Piedmont, Veneto) and an autonomous Province (Bolzano), accounts for 39,000 hectares under tomato, comprises 2,000 producers grouped in 15 Producers Organisations (PO) and 24 processing companies operating in 29 plants, processes almost 3 million tons of tomatoes into concentrate, pulp and paste that represent 50% of the overall Italian processing tomato, 25% of the European production and 6.5% of world production.

Three quarters of the total area belongs to Emilia Romagna (provinces of Parma, Piacenza and Ferrara) and our analysis is limited to 37 municipalities belonging to the Provinces of Parma and Piacenza where historical roots and core business are mainly located.

Figure 1: The case study area (in orange) and the supply chain area (in yellow)

The Po Valley suffers from very high environmental pressure from agricultural activities and livestock manure, but also from industrial and human activities. And open field processing tomato production is no exception since it requires highly intensive soil and water management, since plant growth and tomato quality and yield depend both on the soil structure for physical support and anchorage and on nutrients and water supply.

However, in the northern Italy supply chain a favourable convergence of attitudes, policies and market conditions occurred and allowed over time fruitful interactions between main private stakeholders and public authorities aiming, initially, at maintaining soil and water quality by minimising degradation and maintaining good biological and chemical conditions and, at a later stage, at reducing the quantity of water employed for production and processing, thus
combining the need for adequate water supply for irrigation and processing and minimum volume and flow of streams.

This course of events is characterised by the introduction of relevant innovation in agricultural practices and processing techniques that created the necessary conditions to reduce soil depletion and water consumption while paying due attention to economic sustainability.

In particular, faced with the pressing need to tackle the challenges of environmental, economic and social sustainability, the supply chain found a collective response marked by two major turning points in farming and technological innovation: the introduction and the widespread application of integrated production in the early ‘90s and microirrigation in the early 2000s. And also organisational innovation ensued: the standardisation of criteria and procedures among the Regions involved favoured increased attention to reduced impacts on the environment at supply chain level and changes in markets and policies required progressive organisational adjustments which led to the establishment in 2007 of the association “District of industrial tomato” between Producers Organisation, processing firms and their representative associations, local institutions and local research centres and in 2011 of the Inter-branch Organisation (IO) recognised by the Region and the European Union.

Therefore, in the tomato supply chain of northern Italy innovation has always gone hand in hand with organisation and social cohesion and more and more its essential feature is the commitment to support long-term economic growth while safeguarding environmental and social sustainability and market stability.
Table 1: Key features of the case study on processing tomato of northern Italy

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Region Emilia Romagna, focused on 37 municipalities belonging to the Provinces of Parma and Piacenza.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Agriculture, mostly arable crops (tomato, wheat, maize) and forage. But also significant livestock farming.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; Case Study)</td>
<td>The whole northern Italian supply chain accounts for 39,000 hectares under tomato, whereas the case study is focused on 37 municipalities of the Provinces of Parma and Piacenza (Emilia Romagna Region) with 14,000 hectares under tomato (nearly 40% of the supply chain).</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Soil protection and functionality and water quality and availability</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>About 600 tomato farms based in the case study area</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Producers Organisations and Cooperatives, Processing Farmers Cooperatives, Processing firms; support from local institutions (Provinces, Chambers of Commerce, Region) and from key professional organisations in the sector (confederations of farmers and of industries); involvement of local research centres (Experimental Farms, Experimental Station for the Food Preserving Industry, local university).</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Public support through Common Market Organisation (CMO) and regional funds (Rural Development Plans, Regional laws)</td>
</tr>
</tbody>
</table>
| Main steps of the processing tomato supply chain | Mid/End-1800s: start of open field tomato cultivation (parallel rows of tomato plants tied up to stakes stuck in the ground) and of tomato industrial processing  
From 1970s: widespread use of bush varieties of tomatoes and mechanization  
From 1970s: association of tomato producers in Producers Organisations  
From early ‘90s: shift from conventional farming to integrated production  
From early 2000s: widespread use of microirrigation  
From 2007: association “District of industrial tomato” between Producers Organisation, processing firms and their representative associations, local institutions and local research centres and then, in 2011, Inter-branch Organisation recognised by the Region and the European Union |
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES

2.2 Description of the SES

Soil protection and functionality and water quality and availability are the main ESBOs in the processing tomato chain and they cannot be dealt with separately, since soil structure and conditions are fundamental for decisions concerning water management, water saving and irrigation infrastructures. Moreover, tomato is a high-input crop (nutrients but also water) and
irrigation water levels are strictly related not only to irrigation methods but also to the needs of the crop. The provision of ESBOs related to water and soil is indirectly delivered through productive and investment choices of the supply chain actors. Producers and processors were urged to guarantee production and processing viability by dealing with severe emergencies related to soil and water (mainly nitrate pollution, drought, floods, competition for natural resources) and to gain competitive advantage by meeting new consumers’ demand (certified quality food, environmental-friendly productions).

Widespread use of innovation initially depended primarily on economic decisions of private actors, lured by the savings that could be made by reducing pesticides, water and energy consumption, rather than on a general focus on environmental concerns. However, fortunately, anticipating critical issues affecting the whole tomato supply chain, private needs coincided with increasing attention to reducing pressure on natural resources and environmental impact. Furthermore, the increasing national and international demand for high environmental performance products entailed a willingness to reward farmers and processing firms for their role in safeguarding the environment by paying higher prices for foods produced/processed under stringent rules: among other recommendations, the Statute of the Inter-branch Organisation commits all producers to follow, promote and guarantee regional integrated or organic production specifications and all processors to reduce the impact on the environment and to reuse by-products and waste water, also for energy purposes.

In particular, considering that soil and water are the natural resources more susceptible to effects associated to the tomato supply chain, two major innovations can be identified.

As for soil functionality and water quality, the adoption as of early '90s of integrated production (and other services related to it) brought a reduction of pesticides which meant lower costs for treatment but also lower residues in tomato and lower impact on soil and water.

As far as water saving is concerned, instead, from the ‘90s onwards, industries started to introduce techniques aimed at reducing water consumption levels, such as recycling and reuse of waste water, aseptic filling, capture of evaporation water. But it was the adoption of microirrigation in the early 2000s to bring a breakthrough. The benefit for tomato producers has been twofold since the reduction in quantity of water used to irrigate not only meant lower costs for water but also lower moisture near the tomato plant, lower possibility of mildew development and lower plant protection treatments (and costs).

### 2.3 Levels of ESBO provision, trends and determinants

Tomato production and processing is highly resource-intensive: outdoor tomato production typically calls for ploughing to a depth of 40 to 50 cm before sowing and on average, in order to obtain yields around 80-100 tons per hectare, there is a need of nutrients supply of 180-200 kg per hectare of nitrogen (N), 100-120 kg per hectare of phosphorus (P₂O₅) and 150-200 kg per hectare of potassium (K₂O), and of seasonal water supply of 4000-5000 m³ per hectare depending on rainfalls and temperature.
But soil and water are under increasing pressure also driven by a large number of other human activities, such as industry and urban development, and nitrogen pollution and water footprint of animal husbandry is considerable (mostly in Parma area).

It is therefore hard to assess the contribution of the tomato sector to local concentration of pollutants (see Figure 3 for comparison between distribution of outdoor fresh vegetables and nitrogen inputs in the study area) and to environmental pressure since the study area is located in the Po Valley, which is one of the most important industrial and agricultural areas in Italy and has a population density among the highest in Europe.

However, soil quality and functions and water quality and quantity are strictly interconnected and the supply chain of northern Italy has as a long-standing commitment in this regard, with the aim of maximising yield, reduce waste, increase productivity and quality while reducing the impact on the environment.

Priority has long since been given to cultivation and processing methods respectful of the environment and to investing in research and innovation not only to enhance wealth by producing more (granting of a better balance between input cost and output value and at avoiding fluctuations of output prices and increase productivity and profitability) but also to enhance human health and the environment by means of practices and technologies aimed at minimising the impact on human health and making the most of natural resources and at improving soil fertility and water quality (Table 23 in 9.4).

Producers Organisations played the most relevant role in promoting and implementing environment-friendly practices, however the beneficial outcomes provided are linked not only to agriculture, but to the whole supply chain. Initially it was a rational technical and economic choice, but since good soil and water conditions are essential for granting good crop yields, farming methods have more and more been aimed at balancing environmental protection and
competitiveness and agricultural production has started to pay particular attention to protection from erosion, minimisation of the use of pesticides and fertilisers, incorporation of organic matter to the soil, crop rotation, progressive reduction of water quantity to give to crops.

The first major turning point in the provision of beneficial outcomes on soil and water was with the adoption of integrated production in the 90s and of microirrigation in the years 2000. And public policies fostered and supported the change of attitude already begun.

Whereas the European framework directive on the sustainable use of pesticides and the mandatory application of integrated pest management in all European farms came into force in Italy just in 2014 with an Inter-ministerial Decree approving the National Action Plan on the sustainable use of pesticides, in Emilia Romagna Region the transition from conventional agriculture to sustainable agriculture had already started in the 1980s with pest management provisions, and went through successive steps that resulted in integrated crop management schemes aimed not only to reduce the use of chemicals and to respect the environment and human health, but also to minimise water and energy consumption without undermining product quality and competitiveness.

In the 90s, regional technical standards for integrated production in industrial tomato cultivation were defined in cooperation with research centres and producers organisations and from then on updated every year, in order to guarantee the best possible use of all the most advanced farming practices with a view to both ensuring competitiveness and to providing sounder guarantees of the quality of product to consumers while respecting the environment.

In 2006, already 60% of the tomato was produced according integrated production rules. At present in Emilia Romagna overall Utilised Agricultural Area of integrated production for vegetables is 64 thousand hectares (Figure 8 in Annex), of which 20% for tomato cultivated in Parma and Piacenza.

There is evidence that integrated production proved to have positive environmental results, even if not referred to tomato (whose integrated production is financed mainly through CMO Operational Programmes). The Regional Rural Development Plan 2000-2006 Mid-term and Final assessment data reported in the technical implementation fiche for Actions 1, 2, 5, 6 and 9 of Measure 214 “Agri-environmental payments“ of the Regional development Plan 2007-2013 show that in mid 2000s with integrated production, compared to the “Good Agricultural Practice“ usually adopted, there was an average reduction of pesticides of 20-30%, a lower impact on human health (of producers, first of all) and on the environment due to minor use of high and medium acute and chronic toxicity products, and an average reduction of fertilisers of 30-45% referred to the quantity of macro-elements (nitrogen N, phosphorous P, potassium K) thanks to new methods and different application period that determined minor releases in groundwater (-40% for nitrogen, -60% for phosphorous), making a positive contribution to the downward N-P-K trend registered at regional level (Figure 9 in Annex). And this is true also as far as technical standards for outdoor tomato under integrated production is concerned: in comparison to conventional farming the inputs admitted for an yield of 65-95 tons per hectare at present have been fixed at: 130 kg per hectare of nitrogen, 80-130-190 kg per hectare of phosphorus (plots with high-normal-low amount) and 120-200-250 kg per hectare of potassium (plots with high-normal-low amount).
Also concerning irrigation systems Producers Organisations held a key position in the adoption of water-saving practices. The development of optimal water management strategies is, in fact, one of the main concerns of the tomato supply chain. First of all, yield and quality of tomato (brix level) depends on water (and nutrients) inputs. Secondly, only appropriate irrigation management can preserve soil and water quality by avoiding nitrate leaching and groundwater pollution. Furthermore, water management is fundamental also for soil and water quantity, since groundwater extraction higher than natural reload is causing depressurization of the aquifer and a consequent serious and irreversible land subsidence problem (Figure 10 in Annex).

In this respect, the main turning point was the diffusion of microirrigation starting from the year 2000, when farmers started to adopt high efficiency irrigation systems better suited to new environmental conditions (+65% between 2000 and 2010 in Emilia Romagna, see Figure 11 in Annex). In the last years irrigation water needs grew by 20-30% due to higher temperature and heatwaves that extended irrigation season and increased evapotranspiration, whereas effective rainfalls and water level in rivers, lakes and reservoirs decreased, and consequently water saving has become fundamental (particularly for the Piacenza area, where average temperature rise and average rainfall decrease are worse and where tomato production is mainly concentrated; Figure 12 in Annex). Moreover, as for water quality and quantity, besides water sources and irrigation systems used, also tomato varieties chosen and its hydro-nutritional needs according to soil structure and temperatures have to be considered (Tables 22 and 23 in 9.4). But water saving is hard to manage at the farm level, because surface water and groundwater are influenced not only by the plant physiology but also by their geological characteristics, anthropic activities, atmospheric conditions.

Parma and Piacenza have always been characterised by the adoption of the most efficient agricultural practices available and focus was always both on the beneficial effect on the environment and on increasing profitability. However, from the point of view of the measurement of the reduction the negative impacts of an intensive crop as tomato, it is very hard to discriminate impacts from agriculture, processing and other human activities and to indicate, on a case-by-case basis, what is the final output of each technical and organizational innovations introduced for tomato growing and processing in the past 40 years.

The productive phase of the tomato supply chain is not fragmented. Tomato farms have quite a big size: 40% of the tomato area is cultivated by 15% of the farms. Average farm size is more than 20 hectares and 40% of farms exceed 20 hectares, while just 28% are of less than 10 hectares (Table 2). Value of tomato production per farm is relevant also for smaller farms, where the contribution to family income is adequate to employ one full time working unit and the value is more and more remarkable as farm dimension increases.
Once again, the biggest of pests and diseases, to improve soil mineralisation and to enhance yield quality and quantity. This composition reflects in part the specialisation of the two areas and in part the adoption of crop rotation plans, mandatory for cultivation produced according to the integrated production regional guidelines. And tomato is 94% integrated production and 6% biologic. In the two provinces, half or more of the arable land in the tomato farms follows a crop rotation plan. This reflects the great attention given to maintain the soil clean and fertile, to reduce the risk of pests and diseases, to improve soil mineralisation and to enhance yield quality and quantity. Once again, the bigger the farms are, the higher the percentage of arable land under rotation plan is (almost 60%).

Table 2: Tomato farms in the study area

<table>
<thead>
<tr>
<th>Farm size (hectares of tomato)</th>
<th>Nr. of farms</th>
<th>%</th>
<th>Utilised Agricultural Area (hectares)</th>
<th>%</th>
<th>Tomato cultivated area (hectares)</th>
<th>%</th>
<th>Value of tomato production €</th>
<th>Value of tomato production per farm €</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=10</td>
<td>171</td>
<td>28%</td>
<td>5,113</td>
<td>13%</td>
<td>1,041</td>
<td>7%</td>
<td>5,852,589</td>
<td>34,226</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>190</td>
<td>32%</td>
<td>9,625</td>
<td>25%</td>
<td>2,888</td>
<td>21%</td>
<td>16,228,716</td>
<td>85,414</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>150</td>
<td>25%</td>
<td>12,204</td>
<td>32%</td>
<td>4,390</td>
<td>31%</td>
<td>24,674,044</td>
<td>164,494</td>
</tr>
<tr>
<td>&gt;40</td>
<td>90</td>
<td>15%</td>
<td>11,694</td>
<td>30%</td>
<td>5,721</td>
<td>41%</td>
<td>32,154,057</td>
<td>357,267</td>
</tr>
<tr>
<td>Total</td>
<td>601</td>
<td>100%</td>
<td>38,636</td>
<td>100%</td>
<td>14,040</td>
<td>100%</td>
<td>78,909,407</td>
<td>131,297</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

More than half of the 600 tomato farms and are in Piacenza area, where we find 80% of the farms belonging to the class of 40 hectares or more. And, the bigger is the farm size, the less differentiated are the crops (Table 3). In farms with 10 or lesser hectares, instead, tomato is not very relevant and accounts just for 1/5 of their cultivated land: the smaller the farms are, the less significant is the amount of land under tomato compared to other arable crops, mainly compared to forage (31%). Piacenza is the leading tomato producer in Emilia Romagna and in the whole northern Italy, however if we consider all arable crops, tomato represents a small portion of them (15%); more common crops are wheat and forage (both 27%) and maize (16%). In Parma, instead, which is the third tomato producer in Emilia Romagna and the north, forage is the first arable crop (56% of total) and wheat the second (19%), whereas tomato accounts just for 8%.

Table 3: Arable crops in farms located in the study area (hectares, %)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Arable crops</th>
<th>Tomato</th>
<th>%</th>
<th>Wheat</th>
<th>%</th>
<th>Maize</th>
<th>%</th>
<th>Other cereals</th>
<th>%</th>
<th>Forage</th>
<th>%</th>
<th>Other</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>80,015</td>
<td>0</td>
<td>0%</td>
<td>17,797</td>
<td>22%</td>
<td>11,109</td>
<td>14%</td>
<td>3,631</td>
<td>5%</td>
<td>40,044</td>
<td>50%</td>
<td>7,433</td>
<td>9%</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>4,846</td>
<td>1,041</td>
<td>21%</td>
<td>1,226</td>
<td>25%</td>
<td>458</td>
<td>9%</td>
<td>132</td>
<td>3%</td>
<td>1,506</td>
<td>31%</td>
<td>483</td>
<td>10%</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>9,412</td>
<td>2,888</td>
<td>31%</td>
<td>2,524</td>
<td>27%</td>
<td>1,013</td>
<td>11%</td>
<td>155</td>
<td>2%</td>
<td>1,749</td>
<td>19%</td>
<td>1,084</td>
<td>12%</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>11,858</td>
<td>4,390</td>
<td>37%</td>
<td>3,287</td>
<td>28%</td>
<td>1,252</td>
<td>11%</td>
<td>218</td>
<td>2%</td>
<td>1,926</td>
<td>16%</td>
<td>785</td>
<td>7%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>11,544</td>
<td>5,721</td>
<td>50%</td>
<td>3,195</td>
<td>28%</td>
<td>739</td>
<td>6%</td>
<td>70</td>
<td>1%</td>
<td>1,121</td>
<td>10%</td>
<td>698</td>
<td>6%</td>
</tr>
<tr>
<td>Total</td>
<td>117,676</td>
<td>14,040</td>
<td>12%</td>
<td>28,030</td>
<td>24%</td>
<td>14,571</td>
<td>12%</td>
<td>4,205</td>
<td>4%</td>
<td>46,346</td>
<td>39%</td>
<td>10,483</td>
<td>9%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Table 4: Crop rotation (hectares, %)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Arable crops</th>
<th>Monocotulture</th>
<th>%</th>
<th>Free crop rotation</th>
<th>%</th>
<th>Crop rotation plan</th>
<th>%</th>
<th>No answer</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>80,015</td>
<td>1,298</td>
<td>2%</td>
<td>15,078</td>
<td>19%</td>
<td>21,700</td>
<td>27%</td>
<td>41,939</td>
<td>52%</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>4,846</td>
<td>1</td>
<td>0%</td>
<td>1,019</td>
<td>21%</td>
<td>2,186</td>
<td>45%</td>
<td>1,640</td>
<td>34%</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>9,412</td>
<td>107</td>
<td>1%</td>
<td>2,293</td>
<td>24%</td>
<td>4,950</td>
<td>53%</td>
<td>2,062</td>
<td>22%</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>11,858</td>
<td>188</td>
<td>2%</td>
<td>3,224</td>
<td>27%</td>
<td>6,234</td>
<td>53%</td>
<td>2,212</td>
<td>19%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>11,544</td>
<td>60</td>
<td>1%</td>
<td>3,439</td>
<td>30%</td>
<td>6,723</td>
<td>58%</td>
<td>1,323</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td>117,676</td>
<td>1,654</td>
<td>1%</td>
<td>25,053</td>
<td>21%</td>
<td>41,793</td>
<td>36%</td>
<td>49,176</td>
<td>42%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

As for soil management (table 5), arable land is mainly conventionally sowed: an average of 80% of tomato farms arable land, ranging from 74% in smaller farms to 86% in farms with more than 40 hectares. This reflects the widespread utilisation of Integrated Production schemes that require conventional sowing at 40-50 cm and then a second soil working (grubbing, vibration).

Table 5: Soil management (hectares, %)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Arable crops</th>
<th>Conventional sowing</th>
<th>Surface ploughing</th>
<th>No tillage</th>
<th>No answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>80,015</td>
<td>61%</td>
<td>2%</td>
<td>4%</td>
<td>33%</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>4,846</td>
<td>74%</td>
<td>2%</td>
<td>2%</td>
<td>21%</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>9,412</td>
<td>82%</td>
<td>3%</td>
<td>2%</td>
<td>14%</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>11,858</td>
<td>82%</td>
<td>4%</td>
<td>3%</td>
<td>10%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>11,544</td>
<td>86%</td>
<td>5%</td>
<td>1%</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>117,676</td>
<td>68%</td>
<td>2%</td>
<td>3%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

Most of the fertilisation of tomato farms is not organic (table 6). Standard procedures of Integrated production envisages specific requirements for organic fertilisers but it is mainly used controlled chemical fertilisation based on quantification of crop absorptions and additions to compensate losses and calculated with a specific free software and/or suggested from technical advisors of the Producers Organisations and of processing firms or from technical means suppliers.

Table 6: Organic manure (hectares, %)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Arable crops</th>
<th>Solid dung</th>
<th>Slurry</th>
<th>No organic manuring</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>80,015</td>
<td>24%</td>
<td>21%</td>
<td>55%</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>4,846</td>
<td>22%</td>
<td>25%</td>
<td>52%</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>9,412</td>
<td>14%</td>
<td>13%</td>
<td>73%</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>11,858</td>
<td>16%</td>
<td>12%</td>
<td>72%</td>
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<td>&gt;40</td>
<td>11,544</td>
<td>17%</td>
<td>13%</td>
<td>70%</td>
</tr>
<tr>
<td>Total</td>
<td>117,676</td>
<td>22%</td>
<td>19%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)
Tomato is a highly water demanding crop and correct irrigation is essential to grant yield and quality, since tomato suffers from water stress in every period of its growth. Most of the irrigation of tomato farms comes from groundwater and in much smaller part from water consortium (on turn or demand basis). Other sources, such as farm reservoirs and surface water, are of minor relevance.

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Groundwater</th>
<th>Farm reservoirs</th>
<th>Lakes, rivers, streams</th>
<th>Water consortium (collective use)</th>
<th>Other source</th>
<th>No answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>32.7</td>
<td>3.6</td>
<td>6.1</td>
<td>17.0</td>
<td>5.1</td>
<td>35.4</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>62.0</td>
<td>4.1</td>
<td>6.4</td>
<td>25.1</td>
<td>1.2</td>
<td>1.2</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>66.8</td>
<td>3.2</td>
<td>5.8</td>
<td>22.6</td>
<td>1.6</td>
<td>-</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>65.3</td>
<td>2.7</td>
<td>4.7</td>
<td>25.3</td>
<td>1.3</td>
<td>0.7</td>
<td>100.0</td>
</tr>
<tr>
<td>&gt;40</td>
<td>63.3</td>
<td>5.6</td>
<td>7.8</td>
<td>21.1</td>
<td>1.1</td>
<td>1.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>36.5</td>
<td>3.6</td>
<td>6.1</td>
<td>17.8</td>
<td>4.7</td>
<td>31.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

It is worth noticing that the percentage of farms irrigating with groundwater is equal in bigger and smaller size tomato farms, as equal but to a lesser extent is the use of collective water sources. However, not necessarily high use of groundwater means high water consumption, since this depends from irrigations systems adopted.

Irrigation water quantity is a critical point for tomato. The Po Valley has a great irrigation potential, but competition on the use of water, higher temperatures and reduction in effective rainfalls make it difficult to balance tomato cultivation water needs and respect of minimum levels of surface and groundwater. Moreover, as mentioned before, a very serious problem is land subsidence, which is due to high groundwater abstraction.

It takes therefore particular importance how water-efficient irrigation systems are. Tomato farms adopt almost exclusively sprinklers and microirrigation, with which they tailor irrigation to soil and seasonal weather conditions, control disease and reduce drastically the use of pesticides, ensure the right level of humidity of the root structure, and enhance yield and quality of tomato. The use of sprinklers is almost evenly widespread among all tomato farm size, but it is more used in smaller farms than in bigger farms; microirrigation is instead much less adopted by small farms and remains reserved to bigger size farms.

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Surface irrigation</th>
<th>Sprinklers</th>
<th>Micro-irrigation</th>
<th>Other systems</th>
<th>No answer</th>
<th>Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>0.5</td>
<td>4.1</td>
<td>1.3</td>
<td>0.1</td>
<td>94.0</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>5.3</td>
<td>65.5</td>
<td>19.3</td>
<td>1.2</td>
<td>8.8</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>4.7</td>
<td>58.4</td>
<td>31.1</td>
<td>1.1</td>
<td>4.7</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>4.0</td>
<td>54.0</td>
<td>36.7</td>
<td>1.3</td>
<td>4.0</td>
<td>100.0</td>
</tr>
<tr>
<td>&gt;40</td>
<td>4.4</td>
<td>43.3</td>
<td>48.9</td>
<td>2.2</td>
<td>1.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>10.4</td>
<td>4.9</td>
<td>0.2</td>
<td>83.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)
Therefore, evidence shows that intensification of tomato production favours the adoption of more sustainable agronomic practices and precision technology techniques which reduce the need for plant protection products and for irrigation and consequently reduce costs.

It has also to be noticed that bigger tomato farms pay more attention than smaller ones to conserve and/or restore the non-productive features of local rural landscapes, such as hedges and rows, which are also important for wild flora and fauna.

Table 9: Landscape (% of farms)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Farms with hedges</th>
<th>Farms with rows</th>
<th>Farms with dry stone walls</th>
<th>No elements of landscape</th>
<th>Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>12.6</td>
<td>14.0</td>
<td>1.2</td>
<td>72.3</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>16.4</td>
<td>15.2</td>
<td>4.1</td>
<td>64.3</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>16.8</td>
<td>22.6</td>
<td>0.5</td>
<td>60.0</td>
<td>100.0</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>20.0</td>
<td>28.0</td>
<td>1.3</td>
<td>50.7</td>
<td>100.0</td>
</tr>
<tr>
<td>&gt;40</td>
<td>30.0</td>
<td>32.2</td>
<td>2.2</td>
<td>35.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>13.4</td>
<td>15.1</td>
<td>1.3</td>
<td>70.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

Even in this case, it is the biggest firms that mostly improve biodiversity in agricultural land: they have twice the hedges and rows the smallest have and the number of tomato farms with no elements of landscape shows exactly the inverse proportion.

As a conclusion, it seems that intensification of tomato farms favours major sustainability of agricultural activities, since large farms invest more in environmental-friendly agronomical practices and in innovative water-saving technologies and methods (Figure 4). In percentage, it emerges that bigger farms:

- adopt crop rotation plans more (from 45% of the <= 10 hectares farms to 58% of the > 40 hectares farms),
- make lesser use of underground water (67% of the <= 20 hectares farms, 63% of the > 40 hectares farms) and of water from public consortia (25% of the <= 10 hectares farms, 21% of the > 40 hectares farms),
- use less irrigation with sprinklers (from 65% of the <= 10 hectares farms to 43% of the > 40 hectares farms),
- invest more in innovative irrigation systems (microirrigation ranges from 19% in <= 10 hectares farms to 49% in farms),
- show a higher percentage of hedges and hedgerows and stone walls (from a total of 36% of the <= 10 hectares farms to a total of 64% of the > 40 hectares farms).
Figure 4: Key indicators of ESBOs by tomato farm size (% of farms; crop rotation=% of hectares)

Source: our elaborations from Agricultural Census data (2010)

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

Investments in research and experimentation, introduction of innovative practices aimed at product quality, soil protection and water saving and respect of additional quality/quantity requirements set by producers and processing firms in tomato contracts resulted in higher costs and lower productivity compared to the other tomato producer countries. However, notwithstanding global competition and a structural downward trend of tomato price, cohesion of the stakeholders and coordination of the Inter-branch Organisation grant the conditions and the context for matching tomato supply and demand entirely within their own geographical area.

Table 10: Comparison on costs and productivity in main tomato world producer countries

<table>
<thead>
<tr>
<th>Raw material cost (€)</th>
<th>Productivity (t/ha)</th>
<th>Gross agricultural production per hectare (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Italy</td>
<td>95</td>
<td>72</td>
</tr>
<tr>
<td>Portugal</td>
<td>81</td>
<td>85</td>
</tr>
<tr>
<td>Spain</td>
<td>76</td>
<td>93</td>
</tr>
<tr>
<td>California</td>
<td>70</td>
<td>105</td>
</tr>
<tr>
<td>China</td>
<td>64</td>
<td>94</td>
</tr>
</tbody>
</table>

Source: Conforti G. - AllIPA, in Martelli G. (2015)

California and China are specialised in different products and address different markets. The direct competitors of Italian tomato are Spain and Portugal, whose productivity is favoured by more suitable soil and weather conditions and less restrictive agro-environmental conditions required (more active substances and soil sterilization admitted, etc.) despite acting under the same European framework.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Higher costs of northern Italian tomato depend on pedoclimatic and regulatory conditions and on deliberate quality choices. At present the challenge is to guarantee more profitability in a world context of volatility of prices. But the supply chain manages to withstand competition by keeping up with practice, product and process innovation, by putting emphasis on safety, quality and environmental and social commitment and by differentiating products, progressively shifting from the commodities segment (concentrate and pulp, more exposed to competition) to the retail one (where profit margins are higher).

The economic dynamic of the tomato supply chain is remarkable. It is composed by large and very large producing and processing companies with a substantial workforce and a high turnover.

Most of the tomato farms are highly capital, labour and technology intensive and the employment generated is of crucial importance. Average working days per year in the area are very high (329) and, except for the smallest tomato farm class (whose average, anyway, is more than one full-time working unit per year), annual working days in all other classes are well above average, ranging from 339 up to 432.

In general, family labour is prevalent in all farms, but it is indirectly related to size (more than 80% in smallest farms, 60% in the biggest) mainly due to higher capital intensity and to the use of other typologies of labour (seasonal) as sizes increase.

In overall terms, hired labour becomes more relevant as farm size is greater, however while in the smaller farms permanent hired labour prevails on seasonal hired, the opposite occurs in bigger ones. This implies a major necessity for large highly mechanized tomato farms to fulfil labour need just for short periods, in line with the programming of production phases.

Table 11: Farm labour working days in the study area and distribution among family and hired labour

<table>
<thead>
<tr>
<th>Farm size</th>
<th>Total agricultural working days</th>
<th>Annual working days per farm</th>
<th>Annual working days/UAA</th>
<th>% Family labour</th>
<th>% Permanent hired labour</th>
<th>% Seasonal hired labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>1,470,133</td>
<td>327</td>
<td>16.7</td>
<td>78.2</td>
<td>17.3</td>
<td>4.6</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>49,974</td>
<td>292</td>
<td>9.8</td>
<td>83.9</td>
<td>12.3</td>
<td>3.8</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>64,340</td>
<td>339</td>
<td>6.7</td>
<td>69.00</td>
<td>21.2</td>
<td>9.8</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>54,008</td>
<td>360</td>
<td>4.4</td>
<td>65.7</td>
<td>18.7</td>
<td>15.6</td>
</tr>
<tr>
<td>&gt;40</td>
<td>38,854</td>
<td>432</td>
<td>3.3</td>
<td>60.3</td>
<td>16.6</td>
<td>23.2</td>
</tr>
<tr>
<td>Total</td>
<td>1,677,309</td>
<td>329</td>
<td>13.2</td>
<td>77.2</td>
<td>17.3</td>
<td>5.5</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

But employment generated in the tomato production is even more relevant if also services to farms through contract labour and outsourcing are considered. Both of them are supplied partly by producers associations, partly by processing industries, partly by specialized firms.

The most part of contract labour inside/outside farms is hired by farms between 10 and 40 hectares, whereas large farms make wider use of seasonal contracts, as noticed also before. But most of the contract labour is seasonal and it increases as the size of the farms goes up, especially in comparison with contract labour inside the farm.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Table 12: Contract labour used by different farm sizes (annual working days)

<table>
<thead>
<tr>
<th>Farm size</th>
<th>Contract labour outside farm (A)</th>
<th>Contract labour inside farm (B)</th>
<th>Contract seasonal labour (C)</th>
<th>A/C</th>
<th>B/C</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>6.624</td>
<td>16.406</td>
<td>67.288</td>
<td>10%</td>
<td>24%</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>556</td>
<td>1.280</td>
<td>1.914</td>
<td>29%</td>
<td>67%</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>788</td>
<td>1.867</td>
<td>6.295</td>
<td>13%</td>
<td>30%</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>774</td>
<td>1.529</td>
<td>8.417</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>228</td>
<td>766</td>
<td>8.998</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>8.970</td>
<td>21.848</td>
<td>92.912</td>
<td>10%</td>
<td>24%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

Also outsourcing is frequently used, but especially from farms between 10 and 40 hectares. 30-40% of all tomato farms utilise outsourcing for mechanical harvesting and first processing of tomato, few utilise it instead for ploughing (except for the 10-40 hectares ones), and even less the sowing or fertilization.

Table 13: Outsourcing by farm size (% on arable land)

<table>
<thead>
<tr>
<th>Farm size (hectares)</th>
<th>Arable land</th>
<th>Complete outsourcing</th>
<th>Ploughing</th>
<th>Fertilisation</th>
<th>Sowing</th>
<th>Mechanical harvesting and first processing</th>
<th>Other operation on the land</th>
<th>Other operation not on the land</th>
<th>No outsourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td>no tomato</td>
<td>80,015</td>
<td>4.4</td>
<td>10.8</td>
<td>3.8</td>
<td>6.5</td>
<td>34.6</td>
<td>5.2</td>
<td>0.1</td>
<td>34.5</td>
</tr>
<tr>
<td>&lt;=10</td>
<td>4,846</td>
<td>4.8</td>
<td>8.1</td>
<td>1.7</td>
<td>4.9</td>
<td>34.0</td>
<td>4.0</td>
<td>0.1</td>
<td>42.4</td>
</tr>
<tr>
<td>&lt;=20</td>
<td>9,412</td>
<td>1.9</td>
<td>12.1</td>
<td>1.5</td>
<td>6.2</td>
<td>38.4</td>
<td>4.2</td>
<td>0.04</td>
<td>35.8</td>
</tr>
<tr>
<td>&lt;=40</td>
<td>11,858</td>
<td>1.4</td>
<td>13.2</td>
<td>2.7</td>
<td>4.1</td>
<td>28.7</td>
<td>6.0</td>
<td>0.02</td>
<td>44.0</td>
</tr>
<tr>
<td>&gt;40</td>
<td>11,544</td>
<td>1.0</td>
<td>7.1</td>
<td>0.6</td>
<td>3.2</td>
<td>27.4</td>
<td>5.1</td>
<td>0.02</td>
<td>55.7</td>
</tr>
<tr>
<td>Total</td>
<td>117,676</td>
<td>3.6</td>
<td>10.7</td>
<td>3.1</td>
<td>5.9</td>
<td>33.5</td>
<td>5.1</td>
<td>0.1</td>
<td>38.0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

The impact of tomato production on employment is therefore highly relevant, but while direct impact is mainly due to smaller farms, the increase in size of farms implies wider mechanization, major economies of scale and major use of seasonal labour (directly hired or under contract). Therefore, the increase in size of the farms less than 10 hectares could contribute to boost permanent (and seasonal) labour, and also contract labour. In fact, in bigger tomato farms only family labour plunges, whereas permanent hired labour and contract labour inside farm remain more or less constant and there is an increase in seasonal hired work (Figure 5).
Figure 5: Employment effects by UAA of tomato farms

Positive effects of the lively economic trends of the tomato supply chain are also found in exports. In fact, the promotion of Mediterranean diet and of made in Italy products together with the high quality and hygiene standards of northern Italian processed tomato (60% of which in the study area) boosted exports.

There is, in fact, a significant upward trend in Emilia Romagna processed tomato exports, whose value increased of 40% between 2009 and 2015 and which represent 18-20% of the whole regional made-in-Italy exports and 8-10% of national agri-food ones.

Particularly relevant was the rise in 2015, when Emilia Romagna processed tomato accounted for 25% of national exports (424 million Euros on 1.7 billion), for 16% of all regional processed products and for 10% of the regional exports; tomato exports registered an increase of 3% in value, of 2% in volume and of 1.3% in price compared to 2014 (Emilia Romagna Region-Unioncamere, 2016).

Exports are the new frontier. The challenge that producers and processors are taking at present is to strengthen the position in the existing markets and to enter new markets where processed tomato consumption is still low. And the supply chain is already well equipped with the standards required as to respect of quality and safety of products and national and international quality certifications, as we will deepen further on in the text.

3 Shifting societal norms, collective learning and voluntary actions

Decades of key stakeholders interconnections within the supply chain tomato supply chain led to a success story of economic growth and attention to a new balance between agro-industry and environment, for the benefit of producers/processors, consumers, and natural resources.
Profitability strategies inevitably imply intensification of farming in order to maximise profit levels per hectare. The keywords are: to produce less, to have better prices, and to use less agricultural land for tomato production in order to reduce unit price. However, in the tomato supply chain intensification does not necessarily conflict with regulatory and social requirements in support of sustainability.

The success of the tomato supply chain is based on investments in organizational and technical innovation geared to support long-term economic growth. But particular emphasis is put on environmental and social responsibility.

Profit margins are squeezed between pressing competition that pushes world prices down and compliance with public safety and environmental parameters that leads to ever-increasing adaptation costs. But, the supply chain found a collective motivation that could grant profitability and at the same time reward producers and processors for attention paid to safeguarding the environment: differentiation based on quality.

Reputation and attention to quality represent the cornerstone of the supply chain, as emerged in the interviews:

“The supply chain has a cascade of safeguards that in the long run pays back”;

“It is thanks to quality that northern Italian tomato has gained a good position on the market and is always a step up the other competitors”;

“Everyone’s attention to sustainability is a guarantee for everyone else since this makes the entire supply chain unassailable on a whole series of issues, including food scandals”.

Producers and processing firms of the supply chain collectively learnt that reliability and quality are highly appreciated by the market, and intend to further ensure so by moving, as we will see in detail in paragraph 5, from an approach founded on holding-based schemes to an ecological system approach.

Behind organisational and technical innovation there is not only competitiveness but also ethic, sense of identity, common aim: competitiveness based on reputation and high quality rather than on price erosion. The collective action that is behind the Inter-branch Organisation (IO) is rooted in the tradition of cooperation and conflicts mediation practices of Emilia-Romagna agro-industrial sector. This tradition has produced a sort of contractual economy where the different interests at stake try to find co-decision processes.

Main objective of farmers and agro-industrial entrepreneurs is conciliating intensification with cost-reduction and quality requisites of the processed tomato. A satisfactory trade-off between these objectives is not easy to find. IO represents the “neutral” institutional place where this trade off was possible over time. Farmers push towards more and more intensification, while industrial sector tries to strengthen quality features of the processed tomato.

The fundamental instrument for conciliating these conflicting parties is the quantitative and qualitative programming and control of production, in relation to the market demand. As we
will see in the next paragraph, this collective action based on dialogue and setting common general rules was under serious crisis. Global competition on the European and international market implied a reduction of the bargaining margins in the annual contracts. This can be considered a transition period where the IO action is becoming more and more hard to carry out.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

With a production of 5,4 million tons of tomatoes for processing in 2015 and a 13% share of the global market, Italy is the third world tomato producer after California (31%) and China (14%) and the first in Europe (50% of the market), far ahead Spain and Portugal (44% altogether).

As already mentioned above, half of the Italian tomato is produced and processed in northern Italy and mainly in Emilia Romagna, where industrial tomato is the major horticultural crop.

Parma and Piacenza (together with Ferrara) are the leading producing provinces in the north and account for almost 40% of the whole northern Italian tomato cultivations, and include most of the processing firms of the supply chain, representing more than 60% of processed tomato.

Tomato production and processing shows a steady upward path, even if following a cyclical pattern partly due to the strong influence of weather conditions on yield and partly due to fluctuations in the consumption levels and consequent agreed choice between producers and processing firms to reduce tomato cultivation, as happened during the last years in the 2012 and 2013 campaigns and as reportedly is going to happen for the upcoming one.

Table 14: Tomato production and processing in northern Italy (hectares, tons)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tomato cultivated area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(hectares), of which:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emilia Romagna</td>
<td>35,975</td>
<td>33,464</td>
<td>29,175</td>
<td>35,681</td>
<td>38,948</td>
<td>38,594</td>
</tr>
<tr>
<td>Parma and Piacenza</td>
<td>13,909</td>
<td>12,837</td>
<td>11,065</td>
<td>13,905</td>
<td>14,610</td>
<td>14,507</td>
</tr>
<tr>
<td>Tomato production (tons)</td>
<td>2,562,828</td>
<td>2,370,917</td>
<td>1,889,374</td>
<td>2,322,065</td>
<td>2,623,514</td>
<td>2,773,146</td>
</tr>
<tr>
<td>Yield per hectare (tons/hectares)</td>
<td>71.24</td>
<td>70.85</td>
<td>64.76</td>
<td>65.08</td>
<td>67.36</td>
<td>71.85</td>
</tr>
<tr>
<td>Tomato processed (tons), of which:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parma and Piacenza</td>
<td>1,548,455</td>
<td>1,469,329</td>
<td>1,185,700</td>
<td>1,429,671</td>
<td>1,610,889</td>
<td>1,740,656</td>
</tr>
</tbody>
</table>

Source: our elaborations on Inter-branch Organisation of processing tomato of northern Italy

The supply chain groups more than 2,000 producers, organised in Producers Organisations and cooperatives, and 24 processing companies and it is traditionally characterised by spatial concentration of tomato fields and processing premises, which are mainly located very near
(maximum 60 km) in order to contain costs and to guarantee the freshness of the product (tomato is usually processed within few hours after harvesting). Processing firms, anyway, obtain also small tomato supplies from outside Parma and Piacenza, so to avoid the risk of local adverse climatic events.

The study area accounts for almost 40% of the entire supply chain production and for more than 60% of the tomato processing of northern Italy. The most involved area in the tomato production is Piacenza (around 9 thousand hectares, that is 25% of the supply chain and 37% of the regional tomato) while in Parma (specialized also in the dairy sector) the hectares under tomato remain around 4.5 thousand, accounting for 12% of the chain and 18% of the region. However, in both areas production is constantly growing and reached the highest production peak ever in 2016.

Tomato processing, is instead concentrated in the area of Parma, where are located more than half of the private processing firms and half of the processing producers cooperatives.

Moreover, in the area there is also a relevant presence of all the upstream and downstream phases of the supply chain, such as an advanced mechanical engineering industry, specialized in agricultural machineries, food processing lines, and packaging lines, services (research and experimentation, but also transports and logistics) and international promotion events specialized in agri-food (the international food exhibition CIBUS, the international food processing and packaging technologies CIBUS TECH).

Although initially the development of the tomato supply chain depended on a favourable combination geographical, historical and economic reasons, recent attainments result from pioneering choices of producers and processors made in order to anticipate specific relevant issues unsafe for market stability and competitiveness, such as fragmentation, out-of-date structures, and unsuitable quality of production.

The cooperative culture characterizing the Emilia Romagna area, the expertise and long-sightedness of the supply chain stakeholders and the financial support of European and regional funds (CMO, RDP, other funds) consolidated collaboration, coordination and organizational and technical innovation. Step by step, producers and processors passed from direct agreements between them, to formalised written contracts concluded through Producers Organizations in advance containing basic elements of the tomato supply (required for accessing coupled aid envisaged in the 1996 CAP reform).

From the 80s, the pivotal role was played by Producers Organisations. Although European agricultural policies required the grouping of tomato supply to have access to CMO aid, in the tomato area the grouping in POs corresponded to real needs of the supply chain, since the POs strengthened the position of producers in the market and in negotiations with the processing industry, organized collective purchases of production inputs, offering tailored-made consultancy services and technical support. Further on, in order to tackle in advance the new CAP reform and the decoupling of aids from actual tomato production and world competition, the stakeholders agreed on the need to guarantee coordination of the entire tomato supply chain and in 2007 decided to set up the association “District of industrial tomato” between
Producers Organisation, processing firms and their representative associations, local institutions and local research centres.

Founder members of the association were the Provinces and the Chambers of Commerce of Parma, Piacenza and Cremona, the Union of processing firms of Parma (UPI), the provincial organizations of farmers (Coldiretti), local Producers Organisations and Association of Producers Organisations (AINPO, ASIPO, CIO), the local research centres (Experimental Farm Stuard, Experimental conserve production industry SSICA). But soon afterwards, the association enlarged its borders to include also other tomato areas in the nearby Regions (Lombardia, Piedmont, Veneto, Province of Bolzano) and finally, in view of new framework and market challenges to meet, in 2011 evolved into the present Inter-branch Organisation (IO) of processing tomato on northern Italy, soon afterwards recognized by the Region and the European Union.

The present set-up of the supply chain of northern Italy is very comprehensive and is characterized by a complex system of functional, technological and organizational relationships between the various players representing the production and processing stages and between them and institutions, research centres and provider of technical means and the intermediate/final market.

The Inter-branch Organisation is composed 50% by producers, all associated in PO and APO, and 50% by processing firms, partly private and partly cooperatives, all of them associated as well. It involves 62 members representing all the key actors of the tomato supply chain.

Advisory members (Provinces, Chamber of Commerce, professional agricultural organizations-Coldiretti, and representatives of processing firms - UPI, CONFAPI, and AIIPA) do not have the right to vote but have the right to issue opinions. Ordinary members are all the private processing industries (some of which with a centennial history, such as Mutti, Rodolfi, Greci, Manzella, etc.), the cooperatives of producers processing their own tomato (COPADOR, Conserve Italia, the recently merged ARP and Consorzio Casalasco, etc.), the Producers Organisations (ASIPO and AINPO), the association of Producers Organisations (the Interregional Fruit and Vegetables Consortium - CIO) and all the other processing firms and POs located outside our study area (AFE, CICO, APO CONERPO, APOFRTUIT, Ferrara Food, Conserve Italia, Tomato Farm, etc.).

Decisions are adopted by a majority of three-quarters of the ordinary members, but decision-taking power is allocated 50% to producers and 50% to processors and each single member’s vote has a weight proportional to its productive weight.

As illustrated in Figure 6 the local system where relevant trade relationships occur (in green) is much wider than the supply chain (in blue) and the Inter-branch Organisation (in pink), and is characterized by both vertical and horizontal relations and processes, including also second level processing firms.

In the Parma and Piacenza study area, tomato producers are members of local and/or inter-regional Producers Organisations (AINPO, ASIPO, CIO) or of cooperatives that produce and process tomato by themselves, through which they make collective purchase of means of production, receive agronomic and technical assistance, sell to processing industries.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
AINPO and ASIPO started as producers’ cooperatives in the middle 70s and were recognized as POs by the Region in 1997. AINPO associates more than 400 tomato producers (single producers and two cooperatives) located mainly in Parma and Piacenza, but also in Lombardia, Piemonte, Veneto, Marche and Abruzzo; its members cultivate 100% integrated production tomato on 6,200 hectares with a productive capacity of 400,000 tons per year of industrial tomato. Also ASIPO associates tomato producers are mainly located in Parma and Piacenza, and cultivate tomato on 5,600 hectares producing almost 400,000 tons of fresh products.

The CIO, instead, is a second-level Producers Organization formed in the 2000 on the initiative of by four tomato producers and processing organisations (AINPO, ARP-Agricoltori Riuniti Piacentini; Consorzio Casalasco del pomodoro, Cremona; COPADOR, Parma) and recently recognized as Association of Producer Organisations (APO); it gathers 650 producers cultivating on 12,000 hectares (that account for 30-35% of northern Italy cultivated land), producing 830,000 tons of fruit and vegetables (tomato, peas, beans, onion, garlic, melon, watermelon, pumpkins and spinach) with an average yield of 69 tons per hectare and transforming by themselves 480,000 tons of final products.

Figure 6: Governance structure of the processing tomato of northern Italy

Source: adapted from Daraio, 2014

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
As already mentioned in advance, in the study area is concentrated 60% the processing phase of the whole tomato supply chain. Processing is made partly in private firms and partly in producers cooperatives, some of them are specialised in semi-finished products, some others in processing fresh tomato and/or semi-finished tomato in finished products to be sold under own private label or for third parties, and some others just process semi-finished products.

Big producers cooperatives processing their own tomato (Consorzio Casalasco del Pomodoro, COPADOR, ARP) account for 40% of the processing of the supply chain. Consorzio Casalasco del Pomodoro in 2007 purchased the brands of Parmalat Group (Cirio, Pomi) and in 2015 merged by incorporation ARP (a cooperative operating in Piacenza since 1958 in cultivation, processing and distribution of tomato), thus becoming the first industrial tomato producer and processor in Italy and the third in Europe: it now associates 370 farms located mainly in the Provinces of Piacenza, Cremona, Parma and Mantova, cultivating tomato on 7,000 hectares and producing more than 550,000 tons of tomato, and it has more than 50 processing lines (formerly belonging to ARP) occupying nearly 1,300 workers (permanent and seasonal) and generating a turnover of 270 million euros. COPADOR, instead, is a processing producers’ cooperative set up in 1987; its members cultivate 4,000 hectares with tomato and process around 300 thousand tons of fresh tomato every year.

The biggest private processing firms (turnover of more than 50 billion Euros and more than 100 permanent employees) are located in Parma and Piacenza and most of them still belong to the founder families, even when publicly traded, such as Mutti, Rodolfi, Greci Alimentari, Emiliana Conserve. They represent nearly half of the entire processing of the supply chain. For example, Mutti Ltd, set up in 1899, is the Italian retail market leader: it processes almost 200 thousand tons of tomato provided by 400 tomato farms, it employs around 700 people (150 permanent), it has 30% of Italian market share, it has a turnover amounting to 234 million Euros in 2015 (+178% in comparison to 2003), 1/3 of which in export, and it is very proactive in product and process innovation and keen to pay higher prices for tomato produced under more stringent rules in order to achieve required quality. Rodolfi Ltd, instead, was set up in 1896 and in 2013 merged the processing firm E&O Von Felten. It processes almost 150 thousand tons of tomato and employs around 200 people. Its productions are addressed to the retail market and to second level producers and 1/4 of its turnover is on exports.

Relevant are also the medium and little processing firms, with less than 100 employees, among which we find well-structure old family business (Columbus, Sterilto, Carlo Manzella), small tomato processing businesses (Terre di San Giorgio), businesses that process mainly other fruit and vegetables than tomato (Suncan). Columbus was established in 1983 and belongs to the group Romano Freddi of Mantova owned by the same family, but processes tomato in a plant in activity under different owners from 1912. It employs more than 70 people; it processes up to 150 thousand tons of tomato (mostly for third parties) and exports 65% of its production. Sterilto was established in 1934 and still belongs to the Squeri family, which is also a tomato producer. It employs 25 people, processes around 150 thousand tons of tomato and its leader in pulp production for Horeca and industries, with a turnover of around 45 million Euros, 55% of which in export.

Although already mentioned in advance, the research system deserves a particular mention. In the northern Italian tomato context, a fundamental role for both producers and processors
has always been played by research and experimentation on varieties and cultivation techniques. Therefore, the Experimental Station for the Food Preserving Industry (SSICA) and the experimental farms Tadini and Stuard are vital members of the IO. They carry on targeted research projects and experimentation in individual farms and make a valuable contribution to competitiveness of food production and preserving and to supporting the implementation of regional guidelines for integrated production.

The Inter-branch Organisation does not intervene in trade within the supply chain, nevertheless it exert a key influence on competitiveness and market stabilization by managing vertical relationships between producers and processing firms, acting as a guarantor of the respect of the agreed rules set and endorsed by both producers and processors, monitoring the obligation to use only tomato produced in the area, supporting producers and processors to manage in a transparent way the general framework contract and the reference price agreed, facilitating the implementation and the respect of the single supply/delivery contracts as for price and terms of payment, exchanging of data on the tomato campaign, origin, quantity and quality of tomato.

The strength of the value chain is to be found in the collective action of producers and processor that ensures cohesion and programming and in the interprofessional agreements/contracts that ensure profitability by lowering transactions costs and conciling tomato supply from producers and tomato demand from processing industries and lay the basis for the stability to the tomato market. Through the coordination and supervision of the IO, different motivations and divergent interests of producers, processors and consumers find a fair balance to respond not only to the challenge of global competition but also to the food, energy and environmental challenges.

However, the collective action and the interprofessional agreements/contracts proved to be also its weakness. Lately, the stability of the supply chain, which is linked to timing and respect of contracts, began to waver.

During the campaign 2016, the two crucial elements of programming failed: time limit for contracts and time limit for payments have not been respected. Producers found themselves in weaker negotiating positions, since, due to unsold surplus of previous years, processing firms required to reduce tomato cultivations in order to avoid overproduction crisis and keep the price level high. Producers and processors couldn’t reach a timely agreement and contracts were signed only in June, when the tomato was almost ready for harvest. Therefore, since tomato production exceeded tomato under contract, a programming penalty of 2.25 Euros per tons was applied on the reference price agreed. Moreover, one of the biggest producing and processing cooperatives set in Parma (4,000 hectares under tomato) incurred in severe financial setbacks and paid to member farms only 35% of the sums due for the tomato of 2015 and hasn’t paid at all the tomato of 2016. And another processing firm based in Ferrara (1500 hectares under tomato, 20% of the Ferrara area) paid tomato producers just the deliveries made in June and not the more consistent ones of July and August (11 million Euros).

Under such circumstances, the starting 2017 campaign is getting off to an inauspicious start. All this can damage the stability and the reputation of the whole supply chain since it could
have a domino effect throughout the area. In first place, a big number of tomato producers cannot pay back investments made to produce high quality tomato required in contracts and cannot therefore plan the production for 2017. Secondly, if no recovery solution is found, there will be fewer processing companies where to deliver tomato and a decrease in producers negotiating power. And all of this could result also in loss of jobs, if the failing companies don’t find a way out.

At present, the 2017 contract hasn’t yet been signed and the persistence of uncertainty is endangering the programming of the new campaign for the entire supply chain.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

Governance arrangements of the tomato supply chain are the key element in the improvement of the provision of environmental and social beneficial outcomes in the area examined. And they are in turn the result of a 40-year-long process in which collective action (discussed in 4.1) and public policy changes (in 4.3) intertwined. Governance arrangements in the tomato sector ensued (following the approach of North, 1990) from the development of:

- new organisations associating, at an earlier stage, producers (Producers Organisations), and, later on, producers and processing firms (the association District of processing tomato and then the IO);
- new rules and contractual arrangements between producers and processors enforcing the new organisation and the market.

Institutional change and contractual agreements, as confirmed by all participants to the focus groups, have direct and indirect effects on ESBOs (Table 15).

<table>
<thead>
<tr>
<th>Governance arrangements</th>
<th>Indirect effects on ESBOs</th>
<th>Direct effects on ESBOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creation of Producers Organisation / supply chain association / Interprofessional Organisation</td>
<td>Positive effect on farm income via cooperation and better bargaining power of farmers</td>
<td>Soil: limitation of pressure on soil conditions due to reduction of pesticides and sustainable soil management (innovative farming practices)</td>
</tr>
<tr>
<td>Contractual arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply contracts between producers and processors</td>
<td>Positive effect on farm income via market programming and stabilisation of tomato prices</td>
<td>Water: limitation of pressure on water conditions due to innovative farming practices and reduction of irrigation water need due to the introduction of less water-demanding tomato varieties and innovative irrigation systems</td>
</tr>
</tbody>
</table>

Source: our elaborations

They both have comparable direct effects on soil and water, since direct effects ensue from the adoption of innovative and environmental friendly farming and water-saving practices. As explained in more details further on in the text, the introduction of technical innovation resulted in improved soil and water conditions.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Indirect effects, instead, converge (higher farm income) but ensue from different processes: inter-professional cooperation in the case of institutional arrangements and market/price stabilisation in the case of the agreed rules and contracts.

The supply chain was initially centred on Producers Organisations that provided support services to their associates, organised tomato offer and guaranteed relationships between producers with processors. But over the past years mutual cooperation agreements and networks among producers and between producers and processing firms evolved in nature and became the basis over which the present Interregional IO has been built.

The IO represents the supply chain by providing assistance, common identity and united voice, by defining and managing fair rules of conduct with regard to exchange of information and cooperation and common research questions and needs.

Transport costs have a limited impact on the value chain, since production and processing take place in contiguous areas, at an average distance of 60 km. Quality, intrinsic environmental characteristics and organisational structure are very positive factors as far as price is concerned. Production is entirely environmentally-friendly (94% integrated production, 6% organic production) and is organized in structured forms of cooperation (Producers Organisations, cooperatives) based both inside and outside Parma and Piacenza area. The processing phase is characterised by horizontal integration and by vertical integration. All farmers are organised in Producers Organisation and produce for the local processing industry and all Producers Organisations have formalised (and informal) interactions with the processing industry that started with access to CMO support measures but are still well working even after full decoupling.

Producers Organisation have been the driving force of the tomato system: they applied integrated production, organised tomato supply, provided technical services, channelled and guided CMO and RDP funding. They brought about relevant innovation from which benefited both competitiveness and the environment, thus favouring also processing industries and, consequently, real inter-branch logic.

Moreover, transformative practices were also explicitly promoted by fruitful collaboration with institutions. Emilia Romagna Region, in particular, provided technical support relevant for the ESBOs analysed by means of its plant protection service, meteorological service, prediction and early-warning service, monitoring networks etc. and made available RDP resources to foster the adoption of integrated production, to improve processing and commercialisation, to promote new products, processes and technologies and to increase agricultural production value added. Moreover, the Region financed with a specific regional law a great number of research projects on innovative tomato varieties, production methods and irrigation systems.

Together with organizational innovation, the tomato supply chain of northern Italy has followed a virtuous 40-year-long technical innovation path which has involved producers, processing firms, institutions, universities and research centres and specialized technicians, and
whose beneficial effects have radically changed relationships between production, environment and consumers.

Environmental concern has always been within the scope of the processing tomato supply chain of northern Italy and appropriate farming practices and technical means have constantly been adopted in order to preserve soil and water natural resources base and to optimise their use while aiming at raising productivity and production.

The engagement of the supply chain worked in conjunction with the commitment of Emilia-Romagna Region for crop protection methods respectful of the environment and of human health, that started with the adoption of Integrated Pest Management, that gradually evolved into Integrated Crop Management and then into the present Integrated Farming. This regional policy is described more in-depth in the next paragraph.

As far as water resources and irrigation are concerned, both producers and processing firms made substantial investments to increase the resource efficiency of water, not only introducing innovative irrigation technologies (microirrigation systems, probes measuring humidity of soil, drones to monitor growth stage and water needs of the crop, etc.) but also using decision support schemes to improve water management practices made available from the POs, the Region, the processing firms. In fact, uniform and timely water distribution does not necessarily mean water saving and reduction in water wastage. Microirrigation is nowadays among the most common irrigation system in use and it can potentially grant an almost complete efficient distribution of irrigation water (85-95%) but if it is not adequately designed, managed and handled, it doesn’t give the expected results in terms of water saving and most of all, in terms of tomato production (yield) and quality (brix level).

All this led to an even more stringent implementation of Integrated production within the tomato supply chain since, in pursuance of enhanced environmental, social and economic sustainability and of ethical principles, producers and processors of the IO agreed to define and respect additional rules intended to make the supply chain more efficient. And, from 2015, thanks to the Inter-branch Organisation, the different regional integrated production guidelines have been harmonized to grant the same operating conditions, quality of product and environmental consideration within the entire tomato area.

Tomato trading between the IO partners is totally transparent since it is defined according to agreed rules and contracts underpinning the cohesion of the supply chain. Commercial relationships within the IO are regulated by general rules contained in a Framework Contract and by specific contractual conditions set in detailed Supply/Delivery Contracts between producers and processors and between producers and self-processing cooperatives. All the trading takes place within the IO, except for the limit of 10% of the tomato under contract (in order not to hamper risk differentiation). Moreover, non-compliance with the agreed rules in force is penalized in different ways, ranging from fines to exclusion from the IO.

Framework Contract is signed before the tomato campaign starts (January-March) and sets rules and standards on product valorisation, programming (cultivated area and yield), production methods (certifications), quality, safety and wholesomeness of products, contractual conditions. It requires respect of product specifications, lays down criteria for products quality
assessments, establishes arrangements concerning terms of payment, transport and additional services, penalties and compensations.

Supply/Delivery Contracts, instead, transpose the provisions of the Framework Contract and specify the required quality and quantity of tomato, the scheduled cultivated area and yield, price per unit according to typology of tomato, duration of the contract, terms of payment, guarantees, compensations, programming of deliveries and transport, bonuses/penalties referred to production programming, services from the POs, penalties in case of failures of withdrawal and/or delivery. Moreover they require processing firms to complete delivery forms with data concerning quality, weight and final price of tomato.

The IO monitors the trading by gathering all the contracts signed and all the delivery certificates, by verifying production and quality, by checking the management of eventual contracts for processing, etc.

The biggest advantage of the overall governance arrangements voluntarily set within the processing tomato supplied chain is that they fostered maximum cohesion and accountability between stakeholders, notwithstanding the different interests at stake. And, as stated by local actors, it is cohesion which is unanimously perceived by all stakeholders as the only way to remunerate, defend and promote on the market the high quality of the tomato produced and processed in northern Italy and to protect it from global competition:

"There are times of the year when the interests of the different stakeholders of the supply chain are in conflict, but the IO tries to lead them to cohesion and pooling", "in comparison with Spain and Portugal and other districts and in a context of world price decrease, thanks to the IO and to the supply chain cohesion northern Italian tomato maintained a higher and more price and high standards of quality and reliability".

The definition and respect of contracts and of agreed rules bind together producers (linked between them by the principle of mutuality within the POs) and processors (linked to producers through contracts). The respect of quantities and quality agreed in contracts (no pesticide residues or chemical ingredients, brix level, consistency, flaws, etc.) guarantees prices and incomes and a premium/penalty on price is used as an incentive/deterrent against misconduct (Table 16). It is not admitted for single producers to contract directly with the processing industries outside the POs and processing firms interact with producers.
Table 16: Tomato produced, under contract and delivered within the OI producers and processing firms (tons)

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<tr>
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</thead>
<tbody>
<tr>
<td>Tomato production in northern Italy</td>
<td>2,562,828</td>
<td>2,370,917</td>
<td>1,889,374</td>
<td>2,322,065</td>
<td>2,623,514</td>
<td>2,773,146</td>
</tr>
<tr>
<td>Tomato under contract</td>
<td>2,693,390</td>
<td>2,488,245</td>
<td>2,402,081</td>
<td>2,758,800</td>
<td>2,951,800</td>
<td>2,955,890</td>
</tr>
<tr>
<td>Tomato delivered</td>
<td>2,562,828</td>
<td>2,370,917</td>
<td>1,889,374</td>
<td>2,322,065</td>
<td>2,623,514</td>
<td>2,773,146</td>
</tr>
</tbody>
</table>

% delivered/under contract |         |          |          |          |          |          |
Yield (t/ha)               | 71.24    | 70.85    | 64.76    | 65.08    | 67.36    | 71.85    |
Reference price*(€)        | 88.00    | 84.00    | 85.00    | 92.00    | 92.00    | 85.20    |
Weighted average payment rate | 96.36   | 90.52    | 96.95    | 89.95    | 94.68    | 92.96    |
Weighted average final price (€) | 84.80  | 76.04    | 82.41    | 82.75    | 87.11    | 79.20    |
Programming bonus/penalty* (€) |    -     | -        | -        | 1.00     | -        | -2.25    |
Total final price to producer | 84.80  | 76.04    | 82.41    | 83.75    | 87.11    | 76.95    |

* CREA survey
Source: our elaborations on data from Inter-branch Organisation and our survey

As a result of all this, the supply chain manages to preserve the structural balance of the market by trying to avoid overproduction crisis, to produce and process healthy and environmental friendly high quality products, to compensate the attention given to strengthening governance, transparency and environmental protection with a fair and remunerative price.

Organisational and technical innovation, together with attention to health, consumer safety and environmental protection are essential to maintain the leadership thanks to a globally recognised tradition of quality. And quality is essential to compensate tomato high cost/price and to enable the supply chain to compete.

A success story in this respect is the leader processing firm Mutti Ltd, first in Italy for sales in products processed from tomatoes, which greatly contributed to ESBO provision by choosing to bet on its private mark, on quality and on work in close contact with the supply chain. As stated during the focus group:

“It was necessary to make a choice: follow a price strategy (compete with high volume and low price) or find an alternative path. The approach chosen was to go against the world price trend [...] and to place emphasis on product quality and differentiation”.

During its century-old history, Mutti has always maintained a firm commitment to guarantee the best possible quality, functional to market valorisation of its production. But Mutti’s quality choice has been a collective quality choice, since it involved substantial investments (increasingly effective research and innovation) not only in tomato processing but also in tomato production. Mutti has introduced constant process and product innovation, has favoured producers innovation in tomato variety choice, and has provided its tomato suppliers with technical devices to measure soil moisture in order to tailor irrigation accordingly. Moreover, it has recently acquired a processing plant in southern Italy to widen the rage of its products with peeled tomatoes and cherries tomato for a better placement on national and international markets.
Innovation and quality are the core of Mutti’s strategy. Tomato is supplied always from the same farms and producers follow agreed farming practices according a premium price mechanism that promotes quality, and the best suppliers are awarded every year a prize in money (*Pomodorino d’oro* in the north, *Targa d’oro* in the south). In the processing plants of northern Italy, tomato comes from very near (maximum 130 km) and every truckload of tomato is strictly controlled according almost 20 parameters. Tomato delivery and processing happen within maximum 24 hours from harvesting and innovative successive lines enable to process the same tomatoes to get the best part of the fruit for every final product (pulp, puree, concentrate).

But quality of products goes together with sustainability and respect for the environment commitment. Mutti is the first firm to obtain in 1999 the regional certification of Integrated Production. In 2001 it obtains the GMO-free certification. In 2010 it starts to collaborate with the WWF and carries on two projects, one on carbon footprint (aimed at reducing CO2 emissions by rationalising energy use, adopting renewable sources and internal organisational procedures to monitor and manage energetic needs) and another on water footprint (reduction of water use during production and during processing obtained with the provision to its farmers of probes hygrometres and the reduction in the use of fertilisers) which resulted in a reduction along the whole supply chain of 27% of the carbon footprint in 5 years (-20,000 tons of CO2 emissions in the period 2010-2015 compared to 2009 baseline levels) and of 4.6% of the water footprint (-1,000,000,000 litres of water in the period 2012-2016 compared to 2010 baseline levels), exceeding by far the initial targets respectively of -19% and of -3%. In 2012 it engaged in a project on traceability of raw materials and, in order to reduce CO2 emissions, installed a solar plant and also a concentration plant. In 2014 it started with HORTA, a spin-off of the University of Piacenza, the project Pomodoro.net, a decision support system that simulates tomato plant growth taking into consideration climate, water needs, diseases, insects, which will be provided to all farms. And, in 2016, completed the certification process for the International standards ISO22005 for agri-food supply chains traceability, BRC and IFS that guarantee legality and food security, and UNI11233 the certification for Integrated production.

The path of quality and sustainability resulted in a collective growth that created turnover and jobs and granted fair working conditions to employees and ethic, trust, stability, continuity in business relationships. Relations with suppliers are based on trust and reciprocity and on support throughout the tomato production; relations with consumers are based on reputation and on immediately recognisable uniqueness and quality of products.

Nowadays Mutti is market leader in Italy and in Europe and is the first Italian tomato processing firm in terms of sales and value:

“*Mutti is constantly going through its whole stock, at the end of each tomato campaign most of the products are no more available because its growing production is not enough to meet market demand […] and this happens in a sector in crisis where also firms going well manage just to cover costs*”.

Notwithstanding the difficulties of the world tomato sector and the world crisis, its turnover increased by 290% between 2003 and 2015, 53% just in the last five years (Figure 7). And it is
present in more than 80 countries in the world and its exports doubled in volume and value in just six years.
This is a success story not only for Mutti, but also for the whole northern Italy supply chain since this success is distributed between the 400 families of farmers, nearly 150 permanent employees and 550 seasonally hired employees, the dealers of technical means, the researchers, etc.
Innovation leads to input reduction and to environmental benefits. Increased sustainability improves quality. And quality is the mainspring of the supply chain competitiveness.

Figure 7: Mutti: turnover 2003-2015; exports 2010-2015 in volume and in value

Source: Mutti

4.3 The role and impact of policy in ESBO provision

Farmers and processing firms use a broad spectrum of policy instruments to support organizational and technical innovation and to switch to more sustainable production and processing practices and means.

The discussion about the role of policies in ESBO provision is divided in two different parts, since there are two big types of polices which made a relevant contribution in fostering the progressive orientation of the tomato sector towards sustainability:

- The Common Market Organisation reform;
- The agricultural policy of Emilia-Romagna.

Aid granted through agro-environment-climatic measures, in fact, are mainly financed through the CMO (CAP 1st Pillar) and the Rural Development Plans (CAP 2nd Pillar), where environmental objectives are particularly relevant.
Even if it was not possible to single out all of the financial resources allocated to the tomato sector, from the analysis of some of the payments made to representative CMO and RDP beneficiaries (Producers Organisations, cooperatives and Associations of Producers Organisations) it results that the great majority of resources (97%) come from the CMO (Table 17).

Both policies, however, envisaged financial provisions for investments and for environmental practices, as well as technical assistance, training and advice. And also integrated production had broad-based support from both CMO and RDP, but with differences between the programming periods¹ and paying attention to avoid double financing for the same actions and cultivations.

**Table 17: Main resources for the processing tomato sector (payments 2002-2015, €)**

<table>
<thead>
<tr>
<th></th>
<th>Piacenza</th>
<th>Parma</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMO - Processed fruit and vegetables coupled subsidies</td>
<td>28,966,510</td>
<td>177,375,922</td>
<td>206,342,432</td>
</tr>
<tr>
<td>CMO- Fruit and Vegetables Operational Programmes</td>
<td>80,207,559</td>
<td>80,207,559</td>
<td></td>
</tr>
<tr>
<td><strong>Total CMO</strong></td>
<td><strong>28,966,510</strong></td>
<td><strong>257,583,481</strong></td>
<td><strong>286,549,991</strong></td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RDP 2000-2006 - M1g Improvement of processing and commercialisation of agricultural products</td>
<td>4,038,200</td>
<td>1,638,840</td>
<td>5,677,040</td>
</tr>
<tr>
<td>RDP 2007-2013 - M123 Increase in value added of agricultural production</td>
<td>4,170,906</td>
<td>2,503,106</td>
<td>6,674,012</td>
</tr>
<tr>
<td>RDP 2007-2013 - M133 Support to producers organisations for information and promotion activities concerning products belonging to quality systems</td>
<td>30,800</td>
<td></td>
<td>30,800</td>
</tr>
<tr>
<td>RDP 2007-2013 - M214 Promotion of cooperation for the development of new products, processes, technologies</td>
<td>66,500</td>
<td>547,090</td>
<td>613,590</td>
</tr>
<tr>
<td><strong>Total RDP</strong></td>
<td><strong>8,275,606</strong></td>
<td><strong>4,689,037</strong></td>
<td><strong>12,964,643</strong></td>
</tr>
<tr>
<td>Research Projects financed by Regional Law n, 28/1998</td>
<td>1,957,311</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>37,242,116</strong></td>
<td><strong>262,272,518</strong></td>
<td><strong>301,471,945</strong></td>
</tr>
</tbody>
</table>

Source: our elaboration on data of the regional payment Agency Agrea

Furthermore, even if it is a tiny amount in comparison with CMO and RDP (Table 17), it is important to mention the resources made indirectly available to the tomato supply chain form the regional law for promotion of development services to the agri-food system (Law 28/1998). It financed research projects strategically important for environment and economic sustainability of the supply chain and complementary to RDP measure for the development of new products, processes, technologies. Projects were carried out by local Experimental Farms Tadini and Stuard, Experimental Station for the Food Preserving Industry (S.S.I.C.A.), Crop Production Research Centre (C.R.P.V.) and the Second Level Water Consortium (C.E.R.) and concerned mainly technological and nutritional characteristics of processing tomato, varietal experimentation, sustainable system, tomato traceability management, reuse of processing firms waste.

¹ In the programming period 2007-2013 Integrated Production in the Fruit and Vegetable sector was admitted only through the CMO Operational Programmes.
The Common Market Organisation

Crucial impulse has not been given by the environmental regulatory framework, but by the reform of the Common Market Organisation of the Fruit and Vegetables sector (at the European level), which forced tomato farmers organizations and processing firms to cooperate in a more effective form: the Inter-branch Organisation (Giacomini and Mancini, 2015).

The CMO reform involved the transition from a top-down spending policy coordinated and managed from the EU to a bottom-up governance model where farmers make autonomous productive choices aimed at reinforcing the role of farmers plus a second-level coordination mechanism (the Inter-branch Organisation) voluntarily set up by all relevant stakeholders of the supply chain to contain market instability.

From 2000 onwards, more than three quarters of the CMO concern coupled subsidies to tomato producers (72%), and another relevant share (28%) is allocated to Operational programmes of Producers Organisations and their Associations for production programming and adaptation to the demand (quantity and quality, mainly through Integrated Production), supply and marketing concentration, cost optimisation and farm gate prices stabilisation (Table 17).

As for support to integrated production, aid concerns both production (agro-environmental measure) and processing, commercialisation and transport (phases outside tomato farms) and is linked to operations additional to standard environmental protection legislation and to the adoption of regional Integrated Production Guidelines.

As for coupled subsidies, instead, with the reform of 2007 aid was decoupled from tomato cultivation and linked to effective sales of tomato from recognised POs to processing firms. As the other European tomato producers, Italy adopted the transitory partially decoupled payments (50% of the national ceiling) for three years (2009-2010) and completely decoupled payments in the fourth (2011). Therefore, “historic” farmers who delivered tomato to processing firms and received CMO aid in the reference period (2004-2006) were entitled to be granted direct decoupled payments but their amount was reduced by 50%. In the transition period, aid was given directly to farmers submitting a single application and modalities and timing of the adjustment to single payment were defined by each member state. In Italy, the amount of coupled aid per hectare for processing tomato was fixed at 1,300 euros for the year 2008, at 1,100 euros for 2009 and at 1,000 for 2010. The effective aid was anyway higher (1,410.18 for the year 2008, 1,177.49 for 2009 and 1,182.15 for 2010). Moreover, transitory coupled aid had to be summed to 50% of the decoupled aid.

From 1 January 2014 the new CMO came into effect and from 2015 tomato could benefit again of coupled aid, but much lower in comparison with the previous one, since direct payments had to converge to a national unitary value. For the present CAP programming period, in particular, an important role was played by the Inter-branch Organisation. Since Italy is the third world producer and industrial tomato is considered to be a strategic sector, the IO presented a common position addressed to the Ministry of Agriculture asking to continue to grant support through integrated production, certification and promotion in the RDP and coupled sup-
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

In conclusion, during the first decade of 2000s CAP subsidies under the 1st Pilar were substantially reduced for the tomato sector, and they have not been compensated by any other form of CAP or regional support. This forced the tomato sector to adapt through a pro-active strategy, more oriented to cost-reduction, sustainability and quality, aggregation and cooperation of actors operating in the sector.

The agricultural policy of Emilia-Romagna

Also regional policy package and investment aid played an important role in supporting adoption, adaptation and promotion of integrated production by compensating consequent reduction in yield and increase in production costs, even if resources available were far below CMO ones. Again, the effect on ESBO provision is indirect, but contributed significantly to the widespread diffusion of environmental friendly attitude of farmers and processing firms.

Initially, in mid 70s, the focus was only on pest, disease, weed and nutrient management and it was the new-born Producers Organisation to assume a pro-active role, supported also by the Region that started to promote integrated pest management systems and low pesticide input in agriculture. After considerable long-term investments in research, sampling and experimentation on new low environmental impact farming practices and in technical assistance and training and the provision of a considerable amount of data gathered within a complex system of research and experimentation, the Region could take a step forward and foster the adoption of more modern methods of cultivation and preservation of products through financial support to farmers and processing firms.

From the early 90s onward, major emphasis was given in at first to crops and then to crops, soil conservation and irrigation and regional guidelines were introduced to secure the use of production methods and means allowing minimising the use of chemicals and rationalising fertilisation.

Actual integrated production guidelines set mandatory common rules on tomato varieties, crop rotation, fertilisation, irrigation, pest and disease control, ecological and toxicological principles and nevertheless take into account also the guarantee of economic aspects related to qualitative parameters (measured in Brix level, which is sugar content), consistency, and defects. They contain compulsory and voluntary standards aimed at reducing the use of pesticides, optimizing the use of fertilizers according to the soil, supporting crop rotation and water management. Moreover, regional and provincial technical advice and information bulletins, public data base and thematic maps for each soil type, weather forecasts, plant disease monitoring and warning service, research and experimentation, and water management and irrigation support were made available to all farmers.

Integrated production envisages general rules and advice concerning soil preparation for sowing, transplant, planting distances and density, agronomic practices for weed control, use of
ripening products just for harvesting by middle August (in order to facilitate harvesting planning). Strict mandatory rules are, instead, laid down for agronomic procedures and technical means and serve as a model in all environmental matters relevant for tomato cultivations (crop rotation, plant growth regulators, active substances and fertilizers, fertilization practices, irrigation). Emilia Romagna Region encouraged tomato producers to adopt the regional guidelines on integrated crop management by providing over time full compliance with environmental aid envisaged by the CMO Regulation, with specific measures of the Regional Development Plans, with Regional Act n. n.29/1998 financing research, experimentation, supervision and technical support and with Regional acts n.28/1999 introducing the promotion of agricultural and food products obtained with methods and practices respectful of the environment and of human health and by the establishment of the regional eco-label named Qualità Controllata – QC (Controlled Quality), which foresees also mandatory control operations carried out by accredited certification bodies in accordance with standard EN 45011.

The RDP was considered in two last programming periods a strong basis to support the new strategy emerging from the policy change and in both of them environmental-friendly farming practices were highly emphasized. In the programming period 2007-2013, for example, the RDP envisaged:

- agro-environmental aid for farms adopting on their entire area integrated crop management for at least five years and for every year was granted an amount spanning between 77 and 528 Euros per hectare according to crop and to first application or maintenance (Measure 214);
- 70% coverage of control and certification costs, for a maximum of 3,000 Euros per year for five years whether the farm accedes to the control system for at least 3 years after the first concession (Measure 123);
- aid within supply chain projects for promotion of integrated crop management products, since the aggregation of suppliers increases the market power of farmers and the aggregation of processing firms secures production planning, fair terms of payment and dissemination and imitation of best practices (Measure 133).

And a further emphasis on environment is given in the RDP 2014-2020, in line with the new CMO and the integrated production regional and national marks (QC and SQNPI), where particular attention is given to quality productions, to adhesion to certification systems and to the promotion of strict relationship between quality and environmental sustainability.

**The effect on ESBO provision**

Public resources do represent a key support to change in the tomato supply chain attitude towards sustainability. In general, policies played a very relevant role in promoting and supporting collective actions within producers and between producers and processing firms, in complementing private schemes and in supporting individual actions and fostered the adoption of more environmental friendly practices and innovations and influenced beneficial outcomes on soil and water resources both in a direct and indirect way.
Table 18: Role of policies and related interventions/measures/tools

<table>
<thead>
<tr>
<th>Role of policies</th>
<th>Policy interventions/measures/tools</th>
<th>ESBOs involved</th>
</tr>
</thead>
</table>
| Promoting and supporting collective action | - Creation of Producers Organisations  
- Creation of the Inter-branch Organisation                                                 | Soil/water     |
| Complementing private schemes          | - Integrated production schemes                                                                  | Soil/water     |
| Supporting individual actions          | - Cross-compliance guidelines  
- Regional measures supporting improvements in agricultural production  
- Investment in technological innovation                                               | Soil/water     |

Source: Our elaboration

This support was firstly regulatory through the agricultural policy of the region, secondly was of financial type through the different measures of RDP (direct and indirect focus on ESBO provision) and thirdly it was conveyed also with the provision of research and technical advice through specific research programmes and the technical advisory structures and services of the region.

The effect on ESBO provision in the CMO case is indirect, but it is as relevant as direct ones since aggregation of producers in Producers Organisations, initially, and aggregation of producers and processors in the IO, later on, together with framework and supply contracts, consolidated the adoption of Integrated production and fostered quality certifications of producers and processing firms. In the RDP case, instead, the effect on ESBO is both direct and indirect. Agro-environment-climatic measures spurred widespread use of integrated production and measures for investment in tomato food processing promoted the introduction of new products, processes and technologies (also water saving technologies).

All these policies were consistent and complementary with the strategies emerging from the collective action and the attitude change of the private sector towards safety, quality and reliability of production aimed at differentiating northern Italian tomato.
Table 19: Policy frame impacting on water and soil

<table>
<thead>
<tr>
<th>Level of governance</th>
<th>EU</th>
<th>State/Region</th>
<th>Local area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory framework</td>
<td>- Water Framework Directive*</td>
<td>- Regional Water Protection Plan*&lt;br&gt;- National guidelines for quantification of irrigation water volumes (and regional implementation guidelines)<em>&lt;br&gt;- National guidelines on water Environmental and Resource Costs (and regional implementation guidelines)</em></td>
<td>- Management Plan of the River Po Authority*&lt;br&gt;- Nitrate Vulnerable Zones (NVZs) in Provincial Territorial Planning Programmes (PTCP)</td>
</tr>
<tr>
<td>- Environmental Quality Standards Directive*</td>
<td></td>
<td>- Regional Environmental Action Plan</td>
<td></td>
</tr>
<tr>
<td>- Sustainable use of pesticides Directive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fruit and vegetable CMO</td>
<td></td>
<td>- Cross-compliance guidelines</td>
<td></td>
</tr>
<tr>
<td>- Rural Development Regulation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policies with direct focus</th>
<th>EU</th>
<th>State/Region</th>
<th>Local area</th>
</tr>
</thead>
<tbody>
<tr>
<td>- RDP: Agro-environment climatic measures (Integrated production); Investment in tomato food processing (water saving technologies)</td>
<td></td>
<td>- Technical advice (Region)&lt;br&gt;- Research and agronomic support (research centres)</td>
<td></td>
</tr>
<tr>
<td>- Regional law: Research, Experimentation, Supervision, Technical support in water saving technologies and tomato varieties</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regional Agronomic and Weather Technical services</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Policies with indirect focus</th>
<th>EU</th>
<th>State/Region</th>
<th>Local area</th>
</tr>
</thead>
<tbody>
<tr>
<td>- CMO: Operational Programmes and Direct payments to farmers</td>
<td></td>
<td>- Producers Organisations Operational Programmes&lt;br&gt;- Technical advice and governance support (Province)&lt;br&gt;- Inter-branch Organisation of processing tomato supply chain and system of mutually agreed rules</td>
<td></td>
</tr>
<tr>
<td>- National guidelines on precision agriculture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- RDP: Information and promotion activities concerning products quality systems and certifications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regional Law: quality control on products quality systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Regional Law regulating Interbranch Organisations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* only water resources
Source: our elaboration

4.4 The role of the private sector in ESBO provision and enabling factors

Governance agreements and direct and indirect public policies do not explain all of the relevance of the tomato supply chain as far as ESBOs provision is concerned. They were successful
in fostering the provision of beneficial outcomes on soil and water since they were consistent with market-driven strategic prospects of local entrepreneurs. Together with governance arrangements and policies, private schemes form and integral part of the competitive strategy of the supply chain. They all have a common aim: to work for quality products and strengthen the position on markets.

Promotion and implementation of private schemes has been handled by producers’ and processing organisations in order to enhance quality and foreign market penetration.

Integrated production and precision farming practices are widely adopted primarily due to economic reasons (lower need for agricultural inputs means lower input costs). But, at the same time, the compliance with specific regulatory constraints and with additional auto-imposed criteria (agreed contractual obligations) determined lower revenues due to reduction in yield and to increased costs involved in adapting to new rules (sprayers calibration, next-generation pesticides and herbicides and/or alternative cultural operations, plant disease monitoring, record keeping, samples collection and analysis, etc.).

The supply chain is strictly controlled from the seed to processed tomato. All producers and processing firms invest suitable human and financial resources to follow and check the entire tomato life cycle from soil management, sowing, transplant, harvest, delivery, processing, and packaging. Production follows the rules of regional Integrated production schemes and of supply/delivery contracts signed within the Inter-branch Organisation concerning pesticides, fertilization, irrigation, etc., whereas in the processing phase physico-chemical and microbiological controls go from the delivery of tomato to the firm exit gate.

The existence of solid regulatory systems introducing standards, bans, controls, certifications and specific procedures and production methods set up can be promoted and exploited by the local system for commercial purposes, guaranteeing quality and origin of products and meeting new consumption trends generated by uncertainties due to global food crises (Lamine, 2006).

Acknowledged reputation and quality are the distinctive feature of the processing tomato supply chain of northern Italy, since it meets certain requirements laid down by regulations to guarantee safety and quality (mandatory/voluntary) or previously agreed rules among partners (voluntary), and everyone involved in the production chain complies with these requirements and maintain high moral standards and business ethics.

Labelling and certifications are the means chosen to derive maximum benefit from attention to quality and to environmental issues. The tomato sector is highly certified to meet different needs: to comply with regulations/laws, to raise market profile, to differentiate from competitors, to grant certified quality, to reduce consumers’ uncertainty. However, respect of ethical standard of production and attention to consumer and environment protection does not mean necessarily higher competitiveness, since they result in higher costs and prices.

All producers/POs and processing firms of the tomato supply chain use certifications as a means of promoting the high value of their products on the national and international market. Product and management system certifications are clear and simple measures to encourage
willingness of consumers to pay more and to promote indirectly greener, more resource-efficient and more ethical production and processing. They are issued by an independent accredited certification body and have a value-creation potential and represent also a guarantee mechanism (mostly in case of food scandals).

Few certifications focus directly on the product and are referred to intrinsic qualities and to conformity to certain verifiable requirements (100% Italian, organic, OGM free).

Some other are referred to entire production processes. The respect of codified production schemes – such as ISO 11233, SQNPI and QC (respectively, international, national and regional certification for integrated production) and the organic farming certification – prove the use of environmentally friendly methods throughout the production phase. In particular, Emilia Romagna Region was the first Italian Region to adopt and promote integrated production schemes and introduced the related collective mark QC awarded to producers and Producers Organisation that throughout the production process attain to the quality standards required by integrated production, whereas only from 2011 there is a National Law setting up a national integrated production certification (SQNPI) for farming practices that entail the use of production inputs and pest management systems that minimize pesticides and rationalize fertilization. The implementation decree was adopted in 2014 and sets the procedure to lay down national guidelines to which all regional guidelines have to conform, thus granting that all the regional marks are equivalent.

Table 20: Main voluntary certifications and standards adopted in the tomato supply chain

<table>
<thead>
<tr>
<th>System Certifications</th>
<th>Level*</th>
<th>Product</th>
<th>Process</th>
<th>System</th>
<th>Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Eco-Management and Audit Scheme (EMAS)</td>
<td>EU</td>
<td>✔</td>
<td>✔</td>
<td>Performance, impact</td>
<td></td>
</tr>
<tr>
<td>UNI EN ISO 14001 - Environmental Management System (EMS)</td>
<td>EU</td>
<td>✔</td>
<td>✔</td>
<td>Performance, impact</td>
<td></td>
</tr>
</tbody>
</table>

Supply chain and product certifications

| Product certification100% Italian tomatoes | IT | ✔ | ✔ | Traceability |
| National Certification SQNPI (Integrated production) | IT | ✔ | ✔ | Method |
| Regional Certification QC (Integrated production) | ER | ✔ | ✔ | Method |
| Organic farming Certification | IT | ✔ | ✔ | Method |
| Supply chain with GMO-free seeds | IT | ✔ | ✔ | Method |

International standards and certifications

| GLOBAL G.A.P. (Good Agricultural Practices) | EU | ✔ | ✔ | Method |
| B.R.C. - British Retail Consortium [UK] | INT | ✔ | ✔ | Method |
| I.F.S. - International Food Standard [Germany and France] | INT | ✔ | ✔ | Method |
| FDA Registration – Certification from the Food And Drug Administration [USA] | INT | ✔ | ✔ | Method |

* EU: European, IT: national; ER: regional, INT: international

Source: our elaboration
System certifications are more numerous and focus on the entire supply chain and demonstrate enhancement in management, environmental, ethical, food security performance. For example, ISO 22005 gives evidence of the existence of traceability system that allows to trace back not only the product but also the interventions to which it was subjected and its single components and enables to determine the history or origin of the product and to identify all the responsible organizations in the feed and food chain. EMAS and EMS, instead, are European certifications that witness enhanced environmental performance and achievement of environmental objectives relating to energy, materials, water, waste, biodiversity, emissions (EMAS) or ensuing from an organisational framework that increase compliance to any applicable legal standards (EMS).

Also international standards and certifications are process certifications. Some of them are required to processing firms and retailers from large organised distribution networks for exports in certain countries (B.R.C and I.F.S., nowadays almost equivalent) (F.D.A. for the USA) and are mainly referred to hygiene and food safety requirements (HACCP methodology, Good Manufacturing Practice, Good Laboratory Practice, Good Hygiene Practice, etc.). The GLOBAL G.A.P. (Good Agricultural Practices, that is integrated production), instead, is a business-to-business certification and it is not directly perceived by the consumer; it is required to farms that produce crops for processing and consists of General Rules and Control Points and Compliance Criteria (CPCC) that cover all stages of production, from pre-harvest activities (soil management, plant protection product application) to post-harvest (produce handling, packing and storing) and grants food quality, food security, minimization of environmental impact of cultivations, responsible approach towards security and safety of workers.

While for product certifications the value added is directly associated to the output of major attention to environmental issues of producers, process certifications highlight how the environmental value added is created (good practice, internal controls, traceability, etc..) and pinpoint both the reputation of the producer/processor and the trust from citizens/consumers.

Safety, quality, reputation, trust are the essential attributes of this articulated framework of private drivers: official recognition of product/process/system quality guarantees trustworthiness of the tomato stakeholders reduces transaction costs, valorises the supply chain and acknowledges its differentiation in the market.

Therefore there is evidence that a virtuous course occurred. Private economic rationale and public policies together favoured the adoption of European, national and regional protection measures, the respect of legislative and quality standard requirements, the adoption of innovative resource-saving farming and irrigation practices, the setting of additional voluntary environmental friendly contractual rules, the accession to standards and certifications guaranteeing quality sustainability, as well as complete traceability. But, at the same time, great attention to quality, traceability, innovation, environmental factors determined strong product differentiation that provided added value for consumers and competitive advantage over other competitors, notwithstanding higher production and processing costs and prices. And, in turn, supply chain integration allowed reducing transaction costs, lowering the threshold for product and process innovation costs, facilitating access to expertise and technology.
Certifications increase transparency, improve access to information, enable improved protection for citizens and for the environment. And the ensured compliance with quality and safety standards enhances market penetration, including new export opportunities.

5 Potential pathways towards an enhanced provision of ESBOs

Sustainability and ESBO provision is a long-term process and requires a sustained and long-term commitment. Much has been done and a lot has been achieved with the adoption of specific quality-oriented and environmental friendly farming and technical innovations, but the provision of ESBO can be further enhanced.

As far as tomato production is concerned, the integrated production guidelines are annually adapted to agricultural and environmental conditions and, in perspective, its standards will be progressively raised. As for irrigation and plant protection products, instead, main attention has to be paid to the adoption of a crop growth cycle approach through precision agriculture and irrigation.

In northern Italy, the actual level of farming mechanisation is already very high, but is going to be improved in the near future. The tomato supply chain is willing to renovate further agricultural practices and is deeply involved in introducing the innovations of conservation agriculture (high-tech seeders, decompactors, etc.) and precision farming (variable rate fertilisation and irrigation spreaders, satellite systems, automatic piloting systems, software to collect data and rendering of production maps, monitoring with drones) that enable correct collimation of all working activity in the field and allow low environmental impact and cost saving. Experimentation in variable rate technologies, in particular, is at a very advanced stage and is of great interest since it enables to consider real needs of crops and to tailor all inputs exactly for biochemical and physical characteristics of soil. In addition, the sensors of variable rate machines allow also crop constant monitoring, permanent data acquisition and built up of data series, detection of irregularities and necessary corrections.

As for irrigation practices, instead, many decision support systems are and will soon be available, such as the system of irrigation seasonal forecast iColt, the irrigation water management decision support systems based on data organized in a GIS platform (project MOSES) and on integration of weather, soil and aquifer data and also key water parameters for single plots or district (ongoing project FIGARO).

Moreover, there is increasing attention to the assessment of the environmental performance of the whole tomato supply chain, in terms of Product Environmental Footprint within all the phases from the seeds to the end life (life+ project PREFER) and in terms of GHG emissions evaluated with a Life Cycle Assessment approach (life+ project Climate Chang-ER). Further improvement in ESBO provision could therefore come from widespread adoption of new technical innovation concerning:

- conservation agriculture;
- precision farming;
- irrigation decision support systems.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

Comments raised in the D.4.1 report on the processed tomato about SES are partly valid now. In this report we add some further reflections.

- The idea of S-E-S is already in the minds of our stakeholders, but this way of representing it is meaningless for them. In reality it was not relevant in interviews. Interviews work better when there is a simple scheme showing the main actors playing a role and suggesting possible interpretation of the conflicts and alliances between them.
- The objective of integrating of ecological and social aspects and thus providing a holistic viewpoint is very important, but at the same time is too ambitious and remain a wishful thinking since there is neither a theory nor a model helping to put together all the components of the SES in a coherent and convincing way. Nonetheless it is extremely helpful in forcing the researcher to find some global picture of the system.
- Single Interviews added many elements to our understanding of the system.
- The more useful elements of the SES in this case were motivations and objectives of the playing actors, their governance arrangements and the feed-back effects of the governance arrangements on the objectives and motivations. See the Figure 6 in this report to have a good idea of these elements. This can work very well also in the dialogue with stakeholders because these elements have to do with their feelings about themselves and their behaviour in a given situation.
- The SES framework needs to be further articulated when you have to consider the dynamics of the socio-ecological system.
- The collective and common pool of resource aspects is decisive in understanding the provision of ESBOs and it is clearly understood by some of the actors, in particular those more innovative in environmentally conservative practices.
- In this case action-oriented approach, despite the objective of this research, was unfeasible because of the time needed to develop it with main stakeholders and also because in the supply chain the representatives that were interviewed knew quite well the directions and potentials to be exploited. We simply elicited solutions and ideas that were already boiling in their minds.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

Over-exploitation and drought raised long since alarms for soil functionality and water quality and availability and upcoming public policies introduced solutions responding to the concerns of farmers and processing firms who were already committee to find ways to improve soil and water conditions for the sake of crops and the whole supply chain.

Acknowledging that chronic soil and water pollution by nitrates and pesticides from agricultural sources and water scarcity due to catchment area characteristics represented a pressing
matter and endangered sustainability of local agro-industrial economy, Emilia Romagna Region has been a precursor in taking adequate protection measures on all these issues. The Region adopted supervised pest control in the early ’70s (national guidelines were adopted only in 1987), formalises integrated production schedules and designed NVZs in 1997 (even before national transposition into national law of Nitrate Directive), financed from 1998 onwards research on water saving systems and varieties, cultivation techniques, product traceability, energy saving production and processing methods, and provided technical assistance, information, dissemination of results, adopted regional implementation acts on water, soil and mines in 1999, on land protection and management, environment and infrastructures in 2000, on Strategic Environmental Assessment in 2008 and made agreements with the Provinces relating sub-regional financial resources and management of local actions.

Within this framework, the tomato supply chain of northern Italy already showed evidence of consolidated positive interdependent relationships between human economic activities and biophysical environment. Strong commitment and efforts of all private and public actors enabled to step down from self-interests and to set in motion the virtuous cycle. The tomato economic system, in fact, was historically strictly entangled with the surrounding institutional, social, cultural and natural setting and even being an intensive production/processing has always been very concerned about environmental and social outcomes and sensitive to new perspectives and new calls for environmentally friendly production methods.

**Soil functionality** is essential for product quality and integrated production methods ensure food safety while allowing environment protection by means of reduced chemical inputs, as well as improved water quality. Producers, consumers and the environment benefit from farming and pest management systems that enable to limit the use of pesticides and reduce related risks of exposures, thus safeguarding also public health. Therefore, as pointed out during interviews,

“a major effect of integrated production has been the reduction of the impact on the environment more than on agricultural products”.

**Water consumption** is concentrated in the stages of tomato cultivation (irrigation) and of manufacturing process (not only for processing but also for cooling or cleaning) and poses relevant problems of competition over the allocation of water resources (agriculture, energy generation, industry and transport, households, natural ecosystems) also in an area rich in water as the Po Valley. But, the use of water within the tomato chain is nowadays reduced by means of measures aimed at reducing water demand, such as water-saving irrigation systems. In relation to water issues, quantity needed is affected not only by agricultural production but also by soil quality and climate. Therefore, in order to save water and maximise both yield and quality, microirrigation (included fertirrigation) is the practice for effective and sustainable water management used within the tomato supply chain. Microirrigation grants uniform distribution of water and allow relevant water saving since water can be precisely regulated and tailored to the soil and plants’ needs and to production and quality targets.
Strong emphasis on the quality and sustainability of cultivation and processing of tomato and adherence to this high quality profile result in lower yields and higher production costs and prices of northern Italian tomato than in the rest of world.

Producers and processing firms made every effort in order to improve their global position by concentrating on competitive advantages based on quality. The supply chain follows integrated production guidelines, acquires national and international quality standard, makes thorough controls in all phases, and, more recently, attains also ethical certification. Moreover, producers and processing firms conclude pre-campaign contracts containing not only quality and quantity terms of tomato produced/processed but also a binding code of conduct, whose endorsement and respect is rewarded by price (and income) stability within the supply chain and by increasing appreciation of consumers on national and international markets.

Therefore, since the supply chain ensures the highest quality standards and aim at raising the rating of their products by differentiating their products on quality and sustainability, although considered a commodity, northern Italian tomato cannot be considered as a “price-taker”.

7.2 Key findings on governance arrangements and institutional frameworks

The scenario where actors, institutions and rules interact and affect soil and water conditions, management and conservation is rather complex.

Competitiveness in the globalised economy was at stake and forward-thinking of producers and processors on one side, and of public institutions on the other side, managed to trigger a process of mutual trust that facilitated collective actions aimed at adapting organisational and entrepreneurial strategies to face the threats posed by world competition, paying special attention to increasing natural resources scarcity and/or pollution and recurrent adverse climatic events.

The response of the supply chain actors is twofold:

- The creation of new organisations associating, at an earlier stage, producers (producers’ Organisations), and, later on, producers and processing firms (the association District of processing tomato and then the Inter-branch Organisation);
- The adoption of new rules and contractual arrangements between producers and processors enforcing the new organization and the market (private schemes).

Organisational innovation provides the framework that facilitates a coherent functioning of the market and a rational supply/demand relationship; production rules and contractual arrangements underpin the cohesion and the accountability of the supply chain and are a guarantee for market stability, for remuneration, defence and promotion of the high quality of the tomato produced and processed in northern Italy and for protection from global competition.

The solutions adopted and the cooperative interactions between industry and agriculture are deeply grounded in the historical local context and convergence on agreed rules, transparency in production data and time limits for contracts and payments are the prerequisites for a fairest possible market balance. The positions of agriculture and industry by their very nature
diverge, but the awareness of the need for a coordinated and cooperative response to the world economic situation favoured a holistic supply chains vision.

7.3 Other enabling or limiting factors

We have seen that a relevant role in ESBO provision is played by public and private certifications and standards guaranteeing sustainable practices and quality of products.

However, during the interviews emerged that in the adoption of sustainable and innovative practices the most important thing is the territorial approach taken by the supply chain. Emphasis is not put on sustainability of crops but on sustainability of the whole territory, of the whole supply chain. And, since consumers make more and more conscious spending, the supply chain needs to have a high quality products according an integrated quality approach “from farm to fork” that can count on codified distinguished rules (contracts, certifications, standards, etc.).

A limiting factor, instead, is that innovation takes a long time to give its fruits; research, development and introduction of new tomato varieties and/or new products on the market take years.

Another limiting factor for worldwide competition is the lack of uniformity in some quality requirements, such as integrated production regulations. At supply chain level this problem has been overcome in the north since lately, thanks to the intermediation of the Inter-branch Organisation, the Regions of the supply chain solved the question with a legislative harmonisation of provision. However, at national and European level this is not true and causes distortions in market exchanges.

7.4 Contributions to EU strategic objectives

The tomato supply chain is based on a seasonal crop and processing, but production/processing volumes generate high employment and coordination within stakeholders lays the basis for long-term stability.

Tomato production requires highly intensive use of capital, labour and natural resources. In the study area tomato farms have relevant size (40% of the tomato area is cultivated by 15% of the farms) and employment generated is of crucial importance.

Average working days per year in the area are very high (329). Family labour is prevalent in all farms but other typologies of labour (permanent and seasonal) are very relevant. Family labour is indirectly proportional to the size, and hired labour increases as farm size is larger since the family cannot follow all the workload needed.

But employment generated in the tomato production implies also numerous services to farms through contract labour and outsourcing are considered, both of which are supplied partly by producers associations, partly by processing industries, partly by specialized firms.
The impact of tomato production on employment is therefore highly relevant, but while direct impact is mainly due to smaller farms, the increase in size of farms implies wider mechanization, major economies of scale and major use of seasonal labour (directly hired or under contract). Therefore, the increase in size of the farms less than 10 hectares could contribute to boost permanent (and seasonal) labour, and also contract labour.

Moreover, 60% the processing phase of the whole tomato supply chain is concentrated in Parma and Piacenza area and provide employment for thousands people (permanent and seasonal). And thousands more are employed in the upstream and downstream phases of the supply chain (mechanical engineering industry, packaging lines, research and experimentation, transports and logistics, agri-food international promotion events, etc.).

In the supply chain, economic growth is strictly intertwined with increased attention to research and innovation and to environmental issues. Competitiveness and environmental concern, in fact, are interlinked and reinforce each other, since appropriate farming practices and technical means have constantly been adopted in order to preserve soil and water natural resources base and to optimize their use while aiming at raising productivity and production.

And equally important for the whole supply chain is corporate social responsibility and social footprint certification is becoming an increasingly common practice.

### 7.5 How about the transferability of the approach/mechanism used?

The key driver of the socio-economic and environmental sustainability approach used by the processing tomato supply chain of northern Italy is organisational and technological innovation, which kept price and market stability, notwithstanding the dramatic change in policy support and in global competition.

Although not perfect, as demonstrated in the campaign 2016 (see 4.1), this framework caught the attention of the southern Italy processing tomato district and in June 2015, at the universal exposition Expo 2015, the two productive systems signed a memorandum of understanding aimed at promoting unitarily national traditional tomato production abroad (where 70% of the tomato goes) and at programming quantity and quality of tomato cultivation and processing in order to grant a fair remuneration of tomato at national level and to compete worldwide on quality and product differentiation under the same “made in Italy” brand.

However, the two tomato districts differ in almost everything and it is difficult to imagine whether there could be a transfer of knowledge, best practice and guidance. They have different pedoclimatic characteristics, different product (round tomatoes in the north; oblong and cherry tomatoes in the south) and processing (concentrate, pulp and puree in the north; whole oblong and cherry peeled in the south), and most of all a different structure.

The District of southern Italy was set up only in 2014 and it is very fragmented and uncoordinated: there are almost 50 firms processing more than 90% of the tomato in more than 80 plants located mainly in Campania, 21 Producers Organisations mainly based in Campania but representing 70% of the tomato produced in the south, 30 thousand hectares of arable land...
under tomato most of which in Puglia (Foggia) and Basilicata (Potenza) (Figure 13 in 9.4). Moreover, the south often hits the headlines for food scandals, illegal employment and exploitation.

The southern district is just at the beginning and it is therefore lagging behind in every aspect in comparison to the north, most of all as far as transparency and respect of agreed rules is concerned. Already in 2015 there was extreme tension between processors (that didn’t respect the framework agreement) and Producers Organisations (which threatened to resign from the District). In 2016, due to stocks and low prices and trade, industries required the reduction of tomato cultivations and price.

For sure, traceability of agri-food products and food security could help to sustain the market of southern tomato, but value of contracts and agreed rules depend on willingness of everyone involved to respect them.

As emerged during our interviews, “the tomato district of southern Italy lags behind as far as market logic is concerned since there is no transparency, and this self-destructive pattern is rooted in people’s attitude; it would be unrealistic to imagine changing the southern market by exporting the system adopted in the north”. In the southern Italian tomato district “there is no real correlation between producers and processing firms”; and, most of all, it is not possible to secure tomato traceability: “it is not possible to know where the tomato comes from, since also product traceability is not so much an issue of certifications, but of relationships”.

Therefore, transferability of the mechanisms adopted in northern Italy should be accompanied by the creation of a climate of trust between the parties involved.
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Regione Emilia-Romagna, Disciplinari di produzione integrata, Various Years


9 ANNEX: Supporting data and statistics

Figure 8: Percentage of regional area under integrated production commitment on Utilised Agricultural Area (UAA)

Figure 9: Kg of N, P2O5, K2O per hectare of Utilised Agricultural Area (UAA)
Source: Emilia Romagna Region

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Figure 10: Subsidence rate (cm/year)

Figure 11: Evolution of irrigation methods between 2000 and 2010 in Emilia Romagna Region
Source: Mannini P., 2016
Figure 12: Temperature and rainfalls variation between 1961-1990 and 1991-2008 in the 37 municipalities of the study area (°C, mm)
Municipalities: 1-12 belong to Parma; 13-37 belong to Piacenza.
Source: our elaborations on data from Arpa-Simc (2010)
**Table 21: Daily water supply admitted for processing tomato (mm/day)**

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<tr>
<th>Wet period</th>
<th>1. Semi/Trapianto</th>
<th>2. Primi frutti</th>
<th>3. 2° Frutti</th>
<th>4. 10% Bacche rosse</th>
<th>5. 25% Bacche rosse</th>
<th>6. Raccolta</th>
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<td>Non ammessa salvo indicazione del bollettino</td>
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Source: Emilia Romagna Integrated production scheme 2016 – Cultivation technical standards

**Table 22: Maximum irrigation volumes admitted according to soil structure (mm)**

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Source: Emilia Romagna Integrated production scheme 2016 – Cultivation technical standards
Table 23: Quality of surface water and groundwater in the study area

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<th>Municipality</th>
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PC-Piacenza; PR-Parma

*LC: Level of Confidence; **EQS: Environmental Quality Standard.
Source: our elaborations on data from regional environmental agency ARPAE
Figure 13: Areas growing tomatoes for processing in Centre and South Italy (in red)
CASE STUDY

"BERGAMOT, CONVENTIONAL AND ORGANIC PRODUCT" (ITALY)

D4.3 | Final Version | February 2017

Francesco Mantino

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1 Introduction: What is the case study about?

Bergamot is a high-specific species of citrus cultivation, diffused mainly in the Reggio Calabria Province, in the most coastal part of the area. Uniqueness of this production derives from the following characteristics:

- More than 90% of the world production is coming from the Reggio Calabria province in southern Italy, that is from the study area;
- It is used almost exclusively as a fragrance ingredient. Bergamot is a significant ingredient for the perfume industry where it is used in more than 65% of women’s perfumes and almost half of men’s fragrances. However, a small portion of the production is used as a flavouring and in the pharmaceutical and cosmetics industries;
- The essential oil produced in this area is characterised by 354 diverse fragrance components which makes the oil of high quality for the perfume industry, such components are unavailable in other production areas;
- The cultivation of bergamot and the high quality of the essential oil is due to the specific climatic conditions of the area (temperate climate even in wintertime, mitigating action of the sea, low difference in temperature between day and night, etc.). There is a stretch of land approximately 120 km length that is one of the only places in the world where Bergamot trees grow this kind of high quality fruit, rich with desirable essential oil;
- The cultivation was introduced in this area for the first time in 1740 and since then it was rooted in the cultural identity of population living in the area.

Figure 1: Map of the Grecanica Area
The socio-economic characteristics of bergamot farming system has been studied in depth in recent years (Nesci et al, 2005; Ciani et al, 2014). There are more than 600 farms specialized in the bergamot, few of them have a big size, most of farms are of small and very small size (see . More than 90% of production is sold on the market. From our interviews, 5 ha is the minimum size to get a sufficient family income. Given the prevalence of small farms, part-time farming is largely widespread. This area is characterised by the lack of employment opportunities, which caused the continuous process of outmigration to North of Italy and other countries. This process has still continued in the last decade.

The ecological context is extremely fragile, devastated by the disordered urbanization and hydro-geological erosion of land, both in the more internal areas and in the coastal area. In this context the bergamot cultivation is a way to maintain landscape (bergamot is part of the image and identity of the area), biodiversity and rural vitality. Since bergamot is a water-demanding cultivation, the water systems adopted in this area have strong impact on the quantity of water at territorial level. Over time there has been a certain decline in biodiversity in the area, linked to mass tourism development in ‘70s-’80s and high demand of land for urbanisation purposes: abusive and second houses by natives and main city’s inhabitants. Biodiversity is strongly linked to the permanence of the bergamot cultivation and, on turn, to its economic viability. The typical landscape is also strongly dependent by the permanence of bergamot cultivation in the area, which is strongly appreciated by local tourism and notably by external naturalistic tourism which has developed in the area since the second half of ‘90s. This implies that bergamot chain, including also the processing of the primary products, has important second-order socio-economic impacts on the local economy. A lot of typical products (local sweats, bergamot beverages, perfumes, etc.) use as primary ingredient bergamot fruits and provide local economy a further source of income linked to this specific product.

Governance of such ecosystem services is highly complicated by the structure and distribution of powers within the bergamot food chain. It is impossible to understand the provisions of ESBOs without taking into account of the complexity of this chain. Key actors are as follow:

- Bergamot farms;
- Three different Consortia of primary producers: two of them producing conventional essence, one producing organic essence;
- A series of small industries processing bergamot fruit to produce essential oil, concentrated juice and other minor by-products for animal feeding (the so-called “pastazzo”);
- A series of local small artisanal firms producing typical food and non-food product using bergamot oil and juice as main ingredient (local sweets, bergamot beverages, perfumes, etc.);
- Very few (only four) wholesalers dominating the essential oil trade and exports to European, USA, Cina, India, Japan and South Corea markets.

As we will see in the next chapters, there is a strong link between the bergamot market, the governance of the food chain and the maintenance of the cultivation in the area with positive ESBOs effects.
Table 1: Key features of the bergamot case study

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Area Grecanica (Greek area), province of Reggio Calabria, Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Fruits (citrus) and vegetables, arable lands.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; Case Study)</td>
<td>There are 623 farms and 4931 hectares of total agricultural land, whose bergamot area is 885.5 hectares</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Landscape, biodiversity, rural vitality and water quantity.</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>623 farmers, with a total bergamot production of 7.8 million € and an average production of 12,568 € per farm.</td>
</tr>
</tbody>
</table>
| Other key stakeholders involved | • Three different Consortia of primary producers: two of them producing conventional essence, one producing organic essence;  
• A series of small industries processing bergamot fruit to produce essential oil, concentrated juice and other minor by-products for animal feeding (the so-called “pastazzø”);  
• A series of local small artisanal firms producing typical food and non-food product using bergamot oil and juice as main ingredient (local sweets, bergamot beverages, perfumes, etc.);  
• Very few (only four) wholesalers dominating the essential oil trade and exports to European, USA, Cina, India, Japan and South Corea markets. |
| Source(s) of funding | Regional agricultural policy (from the regional budget); Rural development policy (mainly agri-environmental policy and Leader programme) and Cohesion policy over the programming periods 2000-2006 and 2007-2013. |
| Start date of initiative | Main initiatives considered here are two consortia Bioassoberg (1995) and Unionberg (2003), both promoting several activities to enhance marketing and sustainability of the production |
| End date of initiative | Several activities are still under implementation by two consortia |
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

**RESOURCE SYSTEM**
Stretch of land approximately 120 kilometres in length that is one of the only places in the world where Bergamot trees grow heartily and bear the sweet tangy fruit, rich with desirable essential oil. Strong tradition and family heritage, bergamot as source of identity.

**RESOURCE UNITS**
Land cultivated, image of territory in the product, landscape, biodiversity and water are constantly under threat. High expertise of farmers growing bergamot. Scarce social capital under the form of trust and social relations.

**ACTION SITUATIONS**
2 Consortia trying to maintain the bergamot economic viability through market integration and cooperation in the food chain. In reality over the time two different approaches to the defence of economic viability: conservative (conventional cultivation) vs/ progressive (organic and cooperative) strategy.

**GOVERNANCE SYSTEM**
Prevalence of private mechanisms. Certification under PDO not really working, organic certification unique form of regulating the quality. Scarce role of national/regional policies and CAP in this context. Limited (but with potentials) role of RDP at regional level.

**ACTORS**
Direct: farmers, two Consortia of bergamot producers, small and medium processing industry, few exporters creating an oligopolistic demand. Indirect: Wider interest of local communities and businesses because of linkages between bergamot production and tourism in the area.

Extreme weather events, Market prices of bergamot oil; new market outlets for fresh market.

Figure 2:
Summary of the SES framework for case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)
2.2 Description of the SES

The first phase (1930-1990s)
The market prices of bergamot essential oil are structurally considered as a source of instability for farmers’ income, due to:

- Strong variation of the bergamot fruit and essential oil production from year to year;
- The oligopolistic structure of the demand (the final demand by the perfume industry) and the fragmented structure of the supply (given by too many small and very small producers);
- The presence of diffused phenomena of adulteration of the essential oil (mixtures of pure essential oil with other fragrances imitating the bergamot characteristics, produced artificially by chemical industries).

In order to reduce the influence of these factors on market prices and consequently on farmers’ income, a public consortium was set up by the State in the beginning of 1930s with the aim of stabilising market supply, control the quality of the pure essence and avoid frauds by private operators (notably the processing industry). This consortium was under the control of the Ministry of Agriculture. The public intervention was strongly supported politically by bergamot producers and their official organisations, under the assumption that this new institution would have maintained the economic viability of this peculiar production.

Main policy tools under the consortium management were: the compulsory storage of the bergamot oil production and a collective selling strategy under the control of the same consortium in the interest of primary producers. This policy was day by day managed by the consortium, but at the same time it was under the influential control of the State (Ministry of Agriculture) that definitely determined the governance structure of the consortium (president and management board). Despite this reinforced state intervention on the governance of the productive chain, the quality of the essential oil did not improve, and surpluses of essential oil were stocked in consortium storehouses and finally huge debts were accumulated.

The crisis of the bergamot production was particularly severe since the beginning of 1970s, when the lack of an effective governance by the consortium was accompanied by new socio-economic and political drivers: the diffusion of mass tourism in the coastal area, the lack of spatial planning and the widespread illegal process of urbanisation, which led to the most pervasive consumption of fertile soil in the history of this area. On the other hand, the crisis of the consortium intervention on market pushed single producers to return to previous atomistic regime of relations with the oligopolistic demand by processing industries and private wholesalers and exporters. These drivers (market and governance) led to the decline of the resource system.
Table 2: Evolution of the local SES

<table>
<thead>
<tr>
<th>SES Component</th>
<th>Decline of the bergamot production (1930-1990s)</th>
<th>New governance in the bergamot chain (1990s onwards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance system</td>
<td>State-managed consortium. Scarce collective action initiatives.</td>
<td>Birth of two new consortia: UNIONBERG (Producers organisation) and BIOASSOBERG (Organic farmers association)</td>
</tr>
<tr>
<td>Actors</td>
<td>Oligopolistic structure of the productive chain, dominated by few wholesalers. Non cooperative behaviour of primary producers</td>
<td>Producers are better organised under two consortia. Growing awareness of bergamot farmers of their force and positive effects on ESBOs.</td>
</tr>
</tbody>
</table>

Source: Our elaboration

In the first phase (1930-1990s) the action arena is dominated by the presence of many small producers and few large exporters with very unbalanced bargaining power. The public intervention tries to mediate conflicts through the creation of a state-led agency (the consortium), but in a community characterised by patronage and clientelism, scarce entrepreneurial spirit and non-cooperative behaviour, the consortium is unable to find the right legitimation to stabilise price volatility and improve the bargaining power of bergamot producers. Dominant interests becomes then those driven by rent-seeking orientation: few large landowners and those seeking for urban development in a period of increasing mass tourism, lack of spatial planning and no control of soil use. In conclusions, dominant interests of main actors and the failure of positive mediating role of the State are both the reasons why landscape degradation and loss of biodiversity prevail in the socio-ecological system of the bergamot area. The only institution that should have aimed to keep alive the bergamot chain was dominated by large landowners and was strongly conditioned by local political forces willing to preserve the status quo (local municipalities, regional administrations, etc.). They had major interests in urbanisation and touristic development of the area. A synthetic representation of this action arena and main drivers is in figure 2.
The second phase (from 1990s onwards)

In this phase, there is a relevant change in the local governance system of the bergamot chain which is complemented by new market drivers. We could state that the new governance system created by local actors cooperating makes possible the exploitation of the new market trends.

In 1995 a new consortium of organic producers (Bioassoberg) is set up by innovative bergamot growers and some years later (1998-99) new direct relations with the perfume industry (the English Body Shop) are established to sell small quantities (compared with the whole production) of essential oil. This allows the creation of alternative chain and better prices for producers. This alternative chain makes evident that diverse organisations of the market are possible and prices can be negotiated and agreed outside an oligopolistic structure.

In 2003 the second consortium (Unionberg) is created, under the initiative of a bigger group of producers and under the form of Producers Organisation, but these producers, differently from the previous ones, prefer to follow a more conventional method of production. However, they benefit from the price set by Bioassoberg and are able to negotiate this new price with wholesalers and exporters thanks to the bargaining power of their relevant memberships. Within the bergamot chain new power relations are now established and this allows redistributing the value chain more in favour of primary producers.

So in this period two different organisation modes operate in the bergamot chain, one (Bioassoberg) based on organic production and direct market relations with perfume industries, exploiting directly the increasing international market demand for organic essential oils; the
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

second one (Unionberg) producing more conventional essential oil, but supported by the majority of producers (about 500 farmers) and able to negotiate better prices thanks to the size of memberships. This membership also supports the creation of the PDO “bergamot of Reggio Calabria”, that on turn strengthen the bargaining power of producers with respect to the oligopolistic demand.

In the most recent years the demand of bergamot has shown a new impulse: the natural essence is more appreciated and consumed and new applications of bergamot products are found in the food industry and pharmaceutical fields. Naturalistic/green tourism in the area has grown and the knowledge of bergamot properties are more and more widespread, together with the appreciation of the places where bergamot is grown. Recently, bergamot juice has been successfully introduced in gastronomy, confectionery, liqueurs, and other component of the food industry. The essential oil finds novel applications in pharmaceutical preparations, exploiting a segment of demand for high specialised sectors because of its properties.

In conclusion, in the second period (from 1990s onwards) new equilibria were introduced by some participants entering into the action arena with innovative orientations, trying to set up direct relations with bergamot oil industries. These innovations were decisive in generating change because they showed that something different from the past rent-seeking behaviour could be done. And this relatively small change (few producers contributed to that) paved the way to an institutional change at the local level: the creation of two producers’ consortia (Bioassoberg in a first step and Unionberg in a next moment). These institutional changes caused relevant improvements in small farms’ incomes and increasing profits for large landowners. Moreover, consumers began to appreciate increasingly biodiversity and landscape linked to bergamot presence in the area, due to the preference towards more sustainable modes of touristic recreation. In other words, high-quality demand for tourism, organic production and new applications of the bergamot oil and juice in pharmaceutical preparations and food products were all economic and social external factors that contributed to change previous equilibria in the action arena (figure 4).
Institutional changes which have been promoted through the creation of two consortia generated outcomes that reinforced disposition to change of main actors. As Ostrom says (2005): “When outcomes are perceived by those involved (or others) is less valued than other outcomes that might be obtained, some will raise questions about trying to change the structure of the situation by moving to a different level and changing the exogenous variables themselves” (p. 14). It is what happened when two consortia, especially Biossoberg, discovered over time that they were able to gain increasing margins of the value chain. Always following Ostrom, these actors have tried “to contemplate how to change any of the constraints on an operational situation (or, on a collective-choice situation) that are potentially under the control of the participants in that situation” (2005, p. 62). In these cases Ostrom says that actors are trying to shift from a level of action to another one.

2.3 Levels of ESBO provision, trends and determinants

The levels of the ESBO provision have changed relevantly moving from the first period (1930-1990s) to the second one (1990s onwards).

In the first period there are evident signals of the declining provision, that can be summarised as follows:

- the bergamot surface has been reduced as the effect of different socio-economic and political drivers;
- the bergamot production and the same cultivation survival was severely jeopardised by viruses, attacking bergamot trees as the effect of bad agronomic techniques, as it pointed out by a publication of the Istituto Sperimentale per l’agrumicultura di Acireale-Catania (Caruso et al, 1996);
• the bergamot cultivation was characterised by intensive use of fertilizers in about 20% of total farms, both for nitrogen and for phosphorous, and in excess with regard to optimal plants’ needs (the use of nitrogen was about 300 Kg/hectare when optimal needs were quantified in 150-180 kg/hectare). Consequently, this caused ground-water pollution, hampered the nutritional balance of plants and affected negatively the production. Instead, the level of adoption of organic fertilizers was quite scarce;

• irrigation in bergamot farms was possible thanks to ground-water sources (80-90% on the average) and water was delivered mostly through traditional methods at the farm level (over 69% of land was irrigated through surface irrigation and 30% through sprinkler irrigation) (Caruso et al, 1996).

In conclusion, in the first period the bergamot production is based on inefficient agricultural practices, determining low economic returns at the farm level and depletion of natural resources, notably soil, water and landscape (this latter is depleted simply because bergamot cultivation is abandoned by farmers using land for urbanisation purposes).

As we have already pointed out, the bergamot cultivation is diffused mainly in the coasta area in the province of Reggio Calabria. This is confirmed also in our study area (the area Grecanica) which is part of the province. According to recent data provided by JRC-ISPRRA, the intensity of mineral nitrogen input (Kg/ha) does not seem linked to the bergamot cultivation (figure 6) and overall is characterised by medium values in the study area.
Farm structures are mostly characterised by small sizes: 2/3 of bergamot farms are below 1 hectares and 89% below 3 hectares, occupying about 72% of the entire bergamot area (table 3). Below 1 hectare the contribution to the family income is rather marginal, and between 1 and 3 hectares can be considered as more relevant. Above 3 hectares the bergamot production allows the employment of at least one full-time working unit.

Table 3: Characteristics of bergamot farms in the study area

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>No. of farms</th>
<th>Agricultural utilized land (AUL)</th>
<th>Bergamot cultivated land - Hectares</th>
<th>Value of bergamot production (farmer prices, €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=1</td>
<td>397</td>
<td>63,7</td>
<td>2.030,7</td>
<td>1.510.476</td>
</tr>
<tr>
<td>1.01-3</td>
<td>158</td>
<td>25,4</td>
<td>30,9</td>
<td>2.567.508</td>
</tr>
<tr>
<td>3.01-5</td>
<td>35</td>
<td>5,6</td>
<td>7,3</td>
<td>1.188.697</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>33</td>
<td>5,3</td>
<td>20,6</td>
<td>2.563.175</td>
</tr>
<tr>
<td>Totale complessivo</td>
<td>623</td>
<td>100,0</td>
<td>7.829.857</td>
<td>12.568</td>
</tr>
</tbody>
</table>

The role of the bergamot cultivation on the creation of the landscape is not only through the presence of a typical tree ever green over seasons (quite similar to other citrus trees like oranges, lemons and tangerines), giving the image of a lush countryside, but also through the presence of other structural landscape components linked to farming practices: hedges, rows and dry stone walls. These components identify territorial capital needed to maintain a sustainable land management and the quality of landscape. Bergamot farms in the study area adopt and maintain hedges, rows and dry stone walls more than non-bergamot farms (table 4) and these components increase as the bergamot size increases: the highest share of farms adopting conservative practices is above 5 hectares of bergamot surface (table 4).

Table 4: Components of landscape (hedges, rows and dry stone walls) by farm size in the study area (% of total farms of each size group)

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>Farms with hedges</th>
<th>Farms with rows</th>
<th>Farms with dry stone walls</th>
<th>Total farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>no bergamot land</td>
<td>5,5</td>
<td>8,0</td>
<td>14,8</td>
<td>100,0</td>
</tr>
<tr>
<td>&lt;=1</td>
<td>6,5</td>
<td>12,3</td>
<td>16,9</td>
<td>100,0</td>
</tr>
<tr>
<td>1.01-3</td>
<td>8,2</td>
<td>11,4</td>
<td>19,0</td>
<td>100,0</td>
</tr>
<tr>
<td>3.01-5</td>
<td>5,7</td>
<td>11,4</td>
<td>20,0</td>
<td>100,0</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>18,2</td>
<td>21,2</td>
<td>24,2</td>
<td>100,0</td>
</tr>
<tr>
<td>Total</td>
<td>5,8</td>
<td>8,7</td>
<td>15,2</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Bergamot farms have also a strong impact on the water resources consumption because, as every other citrus cultivation, bergamot is a highly water demanding type of farming. The need to fulfill increasing demand of water as the surface of bergamot increases can explain why the biggest farms tend to use more ground-water resources than the small ones (table 5). Looking at the other water sources, the water provide by the water consortium decreases as the bergamot surface increases: this means that the cost of water from consortium sources is higher than from private pumps drawing from underground layers.

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Table 5: Sources of water for irrigation by farm size in the study area (% of total farms of each size group)

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>Underground water</th>
<th>Farm basins</th>
<th>Lakes, rivers and other superficial water sources</th>
<th>Water consortium (collective sources)</th>
<th>Other water sources</th>
<th>No answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>no bergamot land</td>
<td>4,4</td>
<td>2,8</td>
<td>1,9</td>
<td>2,7</td>
<td>6,4</td>
<td>81,8</td>
<td>100,0</td>
</tr>
<tr>
<td>&lt;=1</td>
<td>33,5</td>
<td>3,5</td>
<td>4,3</td>
<td>20,7</td>
<td>12,1</td>
<td>25,9</td>
<td>100,0</td>
</tr>
<tr>
<td>1.01-3</td>
<td>46,2</td>
<td>4,4</td>
<td>1,9</td>
<td>27,2</td>
<td>7,6</td>
<td>12,7</td>
<td>100,0</td>
</tr>
<tr>
<td>3.01-5</td>
<td>54,3</td>
<td>2,9</td>
<td>5,7</td>
<td>14,3</td>
<td>5,7</td>
<td>17,1</td>
<td>100,0</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>69,7</td>
<td>6,1</td>
<td>3,0</td>
<td>9,1</td>
<td>9,1</td>
<td>3,0</td>
<td>100,0</td>
</tr>
<tr>
<td>Total</td>
<td>9,7</td>
<td>2,9</td>
<td>2,2</td>
<td>5,5</td>
<td>7,0</td>
<td>72,7</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

Methods of irrigation in the study area are still mostly traditional in the smaller farms (table 6). The other methods allowing saving water techniques (micro-irrigation) are used when the farm size increases. These findings imply that sustainable use of water by the bergamot farmers is partly linked to the farm size. Intensification of the bergamot production does not necessarily mean more water consumption, but on the contrary more care to reduce water costs.

Table 6: Methods of irrigation by farm size in the study area (% of total farms of each size group)

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>Surface irrigation</th>
<th>Flood irrigation</th>
<th>Sprinkler irrigation</th>
<th>Micro-irrigation</th>
<th>Other methods</th>
<th>No answer</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>no bergamot land</td>
<td>1,6</td>
<td>0,1</td>
<td>0,7</td>
<td>0,4</td>
<td>0,3</td>
<td>97,0</td>
<td>100,0</td>
</tr>
<tr>
<td>&lt;=1</td>
<td>24,2</td>
<td>1,3</td>
<td>24,7</td>
<td>9,1</td>
<td>10,1</td>
<td>30,7</td>
<td>100,0</td>
</tr>
<tr>
<td>1.01-3</td>
<td>27,2</td>
<td>1,3</td>
<td>35,4</td>
<td>13,3</td>
<td>6,3</td>
<td>16,5</td>
<td>100,0</td>
</tr>
<tr>
<td>3.01-5</td>
<td>20,0</td>
<td>0,0</td>
<td>22,9</td>
<td>22,9</td>
<td>14,3</td>
<td>20,0</td>
<td>100,0</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>12,1</td>
<td>3,0</td>
<td>27,3</td>
<td>33,3</td>
<td>21,2</td>
<td>3,0</td>
<td>100,0</td>
</tr>
<tr>
<td>Total</td>
<td>5,0</td>
<td>0,2</td>
<td>4,7</td>
<td>2,2</td>
<td>1,7</td>
<td>86,2</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

Sustainable methods are also embodied into the organic production, but organic production is scarcely adopted by bergamot farms (table 7). However, the share of surface under organic production grows as the bergamot surface increases in the farm.

Table 7: Surface under organic production by farm size in the study area

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>Surface under organic bergamot (hectares)</th>
<th>% of the total organic surface</th>
<th>% of bergamot surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>no bergamot land</td>
<td>2,38</td>
<td>0,0</td>
<td>-</td>
</tr>
<tr>
<td>&lt;=1</td>
<td>9,06</td>
<td>0,0</td>
<td>5,3</td>
</tr>
<tr>
<td>1.01-3</td>
<td>108,88</td>
<td>0,2</td>
<td>37,5</td>
</tr>
<tr>
<td>3.01-5</td>
<td>71,17</td>
<td>0,4</td>
<td>52,9</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>186,65</td>
<td>0,4</td>
<td>64,4</td>
</tr>
<tr>
<td>Total</td>
<td>378,14</td>
<td>0,1</td>
<td>42,7</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)
In conclusion, bergamot intensification within farms does not normally translate into less sustainability of the production techniques. Vice versa, intensification is generally linked to more attention to the landscape, more water-saving methods of irrigation and finally higher shares of organic production (see figure 7).

![Figure 7: Key variables of landscape, water use and organic practices (*)](image)

*Figure 7: Key variables of landscape, water use and organic practices (*). Comparisons among no bergamot and different classes of bergamot sizes
Source: our elaboration from agricultural Census data (2010).
(*) Excepting organic area, all other variables are expressed in terms of % of number of farms

### 2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

The bergamot production is highly intensive in terms of capital and labour resources. The direct employment, at the farm level, is relevant when compared to other types of farming. The table 8 illustrates how many differences are between bergamot farms and other farms in terms of agricultural employment. First, agriculture in the study area does not affect so much the labour force: an average of only 120 working days per year (table 8). In general, family labour is underemployed when work opportunities are limited to farm. Farms need to reach a size between 1 and 3 hectares of bergamot in order to employ at least one full-time working unit per year (282 working days). These conditions of labour intensity can be ensured only by the bergamot cultivation: this gives an idea of the importance of this type of farming in the area.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Table 8: Farm labour working days in the study area and distribution among family and hired labour

<table>
<thead>
<tr>
<th>Farm size (hectares of bergamot)</th>
<th>Total agricultural working days</th>
<th>Annual working days per farm</th>
<th>Annual working days/UAA</th>
<th>% Family labour</th>
<th>% Permanent hired labour</th>
<th>% Seasonal hired labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>no bergamot land</td>
<td>398.195</td>
<td>112</td>
<td>26.3</td>
<td>69%</td>
<td>16%</td>
<td>14%</td>
</tr>
<tr>
<td>&lt;=1</td>
<td>40.112</td>
<td>101</td>
<td>19.8</td>
<td>68%</td>
<td>14%</td>
<td>19%</td>
</tr>
<tr>
<td>1.01-3</td>
<td>26.452</td>
<td>167</td>
<td>17.4</td>
<td>66%</td>
<td>14%</td>
<td>20%</td>
</tr>
<tr>
<td>3.01-5</td>
<td>9.859</td>
<td>282</td>
<td>27.3</td>
<td>41%</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>&gt; 5</td>
<td>22.179</td>
<td>672</td>
<td>21.8</td>
<td>23%</td>
<td>59%</td>
<td>17%</td>
</tr>
<tr>
<td>Total</td>
<td>496.797</td>
<td>119</td>
<td>24.8</td>
<td>66%</td>
<td>18%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Source: our elaborations from Agricultural Census data (2010)

The family labour is a key component of the labour force until the size of 3 hectares of bergamot, then hired labour (permanent or seasonal) prevails since the family cannot fulfil alone working needs at farm level. Consequently, bergamot generates an additional demand of hired labour when farm size is above 3 hectares and this involves notably permanent hired labour (figure 8). This component is very relevant, about 60% of total labour requirements, above 5 hectares of bergamot. This implies that a further diffusion of bergamot cultivation and, in particular, the increase of bergamot at the farm level could have very positive impacts on the labour market in the study area.

Figure 8: Annual working days per UAA by classes of farm size in the bergamot cultivation

Source: our elaborations from Agricultural Census data (2010)

Other indirect effects of the bergamot type of farming can be described as follows.

A Employment effects on the sector of services to farms

Bergamot farms need a series of technical services, partly supplied by processing industries (technical assistance), partly by other firms, notably contract firms specialised in agricultural operations (contract labour). Usually bergamot farms demand contract labour for farm operations (table 9), and relatively more than other farms. The smallest bergamot farms use contract labour quite often and this can represents event the 10% of the seasonal hired labour in farms below 1 hectare.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
innovator. This new consortium was opened to all farmers available to follow the rules and certification procedures for the organic production.

Motivations behind these changes were not only the certainty of better prices and the selling of all bergamot production, but also the desire to escape from oligopolistic structure of the value chain (few big exporters making the market price, representing the main constraints to the agricultural change in the area). Moreover, among main motivations there are also the strong sense of identity linked to the bergamot production, the sense of the family heritage and the identification of bergamot with one of the main cultural patrimony in the area.

“Our bergamot is a unique production in the world. It is part of our culture. When I travel I bring with me bergamot as part of my identity. This uniqueness is part of us. I don’t sell simply a commodity, I am selling part of my identity, when tourists come here. Everyone here has a family history linked to the bergamot. Our grandfathers and fathers were very wealthy producers of bergamot” (interview with the president of Assobioberg).

All these motivations are shared among the members of the Assobioberg consortium. This is a small consortium (only 14 members) but the main strength of this organisation is the common basis of shared values (trust, high-quality of the production and the adoption of sustainable methods).

What does it mean “shared values”?

“Assobioberg aims to valorise the product quality. The big consortium (Unionberg) instead aims to get only better prices, and the satisfaction of farmers for the price. We believe that quality is essential in the relation with our clients (buyers). Other farmers in Unionberg don’t care about who is buying your product, the main concern being price. They sell all product to exporters and do not have any contact with their clients, they never know who are the clients buying the product. Clients of our consortium instead contact us directly because they know who we are and that we are able to provide high-quality product” (interview with Assobioberg president).

If we had to conceptualise the mechanism of social innovation in this area and reasons to join the Assobioberg consortium (figure 9), we could say that beyond the profitability conditions given by market prices (guaranteed by international buyers against the provision of high quality product), an important role has been played by shared values of this small consortium of farmers and by the desire to abandon the oligopolistic structure of the supply chain: sense of identity linked to the bergamot culture, family heritage, desire to maintain/improve landscape and soil through sustainable practice as fathers gave them.
These values fostered the search for innovative solutions against the oligopolistic dominance of few local actors. One farmer, the present president of the consortium, searching for a way out from this economic and social barrier decided to use some opportunities to establish direct contact with the market. When perspectives of market outlets became interesting then a small group of farmers were asked to cooperate and set up a new consortium. This impacted on the farmers income and also on the social distinctiveness and the reputation of this small group in the local context. This in turn consolidated the image of the consortium and confirmed to all members they were right in searching for solutions other than the traditional consortium.

The small size of the consortium was a crucial variable explaining its success: “The small size helped to maintain the quality of production. The size is a factor of strength, not more than twenty members. Big size doesn’t usually work because over time members tend not to sell to consortium, but to private exporters” (interview with the Assobioberg president).

In this story there was also a process of collective learning because direct contacts with international buyers meant continuous exchanges with markets, so that farmers learned how markets work in practice. They also learned that markets give value to credibility and reliability over time. They meet at least two-three times a year to discuss about contracts and initiatives of the consortium. Collective learning was not only about markets and prices, but also about co-decision and self-government methods. This was a radical change of the traditional individualistic culture in a context where experiences of cooperation and self-government have always been really scarce.
4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

In this case study organisational capacities, leaderships, networking and communication should be analysed within the specific value chain. Main networks, in fact, are among the operators of the value chain (figure 10). In the frame of this research, WP3 report defined four types of action: a) individual action; b) collective action – public policy driven; c) collective action – private actors driven; d) collective action – public/private partnership driven. In this case we would define the initiatives undertaken within the bergamot value chain as mainly collective action – private actors driven, although along the history of the bergamot value chain there are periods where public policies have been relevant drivers.

As we have already said in the previous description of the SES, during the time two different consortia among bergamot producers have been set up: Bioassoberg in 1999 and Unionberg in 2003. These two consortia can be seen as result of two different collective actions driven by private actors. Unionberg gradually took the place of the previous State-driven consortium and contributed to consolidate the conventional value chain. Within the conventional value chain 90% of the entire bergamot oil production is processed. The processing plant was created by the previous State-driven consortium whose president is also ruling the Unionberg Producers’ Organisation. The processing plant has been rented to one private entrepreneur who is one of the most important exporter of the area. Bergamot essence is exported in international markets through four private wholesalers having direct relations with cosmetic perfumery industry and food industry abroad.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

The conventional value chain do not use usually organic production methods. In 2001 a DPO named “The bergamot essence of Reggio Calabria” was created. This is essentially aimed to protect and fulfil rigorous rules of production so as to supply in the market a genuine and high-quality essential oil. In reality, DPO is scarcely used to defend the purity of the bergamot oil: there are huge quantities of essence obtained artificially through chemical or physical processes and also through other mixed citrus oils, with physical/chemical manipulation of the natural bergamot cold-pressed oil.

Despite of the presence of a Producers’ Organisation (Unionberg), the market is characterised by a oligopolistic structure, where few local private exporters buy the essence (and partly also process the primary production to obtain the essence) and sell it to big cosmetic perfumery industry and food industry abroad. Annual price of the bergamot essence is practically set by exporters on the basis of international demand and the annual supply of bergamot fruit in the area. There is some margins of negotiation between Unionberg and exporters, which is exploited by Unionberg to ensure not only price stability for farmers, but also a continuous increase year by year.

The alternative value chain is represented by a small consortium of producers under Assobioberg. Motivations to join this consortium have already been discussed in the paragraph 3. This consortium gather a small part of the production (about 5%), but the high-quality is certified as organic and pure essence, without any sort of manipulation. This production, in fact,
is processed by a small local industry and it is sold directly to international buyers (multinational cosmetic and perfumery industry), without any sort of brokering by some commercial operators. Assobioberg undertakes direct commercial relations with international buyers. This allows all farmers who are members of Assobioberg benefitting from two price additional pluses: a) the additional price for organic production; b) the commercial margin that is usually appropriated by exporters.

Fresh market involves the commercialisation of fresh fruits. A demand from domestic and European consumers was growing in the last 2-4 years. The production of the bergamot juice is also developing in this period, stimulated by anti-cholesterol and other medical properties of the natural components of the juice and the fruit.

These two value chains (conventional and alternative) in reality can be identified with two different territorial networks. The focal point of each network is just the producers’ consortium (Unionberg and Assobioberg). In the conventional network the leadership has been taken by the president of Unionberg, who took at the same time the role of president of the old State-driven consortium of bergamot. He gained a consolidated legitimation in the study area, both among farmers joining Unionberg and among regional and provincial institutions. He negotiates directly the public support from the Calabria region, on one side, and annual prices with main exporters. As president of the consortium, he has also promoted the multipurpose use of the bergamot and communication campaigns of medical properties of the fruit on the domestic market. Under his presidency, a series of research project have been funded (to University centres) by the consortium budget on the potentialities of bergamot for human health. Another relevant subject of this network is the Capua processing industry, through which a relevant share of the essence production is processed and marketed on international markets. This is the biggest industrial firm in the bergamot sector, that is able to influence the market price and relations with international buyers.

In the alternative network, based on the presence of Assobioberg consortium, the leadership is of the consortium president, a farmer combining agriculture with tourism hospitality in the farm. Assobioberg has been pioneering organic production since the end of ‘90s and succeed in establishing its own network with international buyers of the bergamot essence. The organic essential oil is paid slightly more than the conventional oil (5-6 €/kg), but what is relevant for Assobioberg is the strength of commercial relations supporting the international network. In practice, this is a niche network, smaller than the conventional one, but with a very strong potential of innovation and also high reputation for all bergamot producers.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

Improvements in the provision of ESBOs in this study area strongly depend on governance arrangements in the sector of the bergamot production. Governance arrangements depend, in turn, by the mix of collective action initiatives and policy changes. We have already examined collective action initiatives and their drivers in 4.1 and we are going to examine policy changes in 4.3.
In this paragraph we describe governance arrangements in the sector of bergamot production. As North (1990) says, governance can be identified with the creation of new organisations among producers, on one side, and on the other side with the definition of new rules enforcing the new acting organisations. In this case study the main governance arrangements can be summarised as follows:

a) **New organisations among producers:**
   - the creation of the Unionberg Producers’ Organisation, which takes the place of the old State-driven bergamot consortium;
   - the creation of Assobioberg consortium;

b) **Rules enforcing the new acting organisations and the market:**
   - the contractual arrangements that Unionberg and Assobioberg agree every year with the main buyers (local exporters for Unionberg, international buyers for Assobioberg). They represent actually the concrete definition of rules in the private sector of bergamot that influence indirectly (through price mechanism) and directly (through the definition of specific agricultural practices) the provision of ESBOs.

Table 10 summarises the main effects on ESBOs of new organisations among producers. The table focuses on the creation of main institutional changes in the private sector in the study area. For both organisations there are positive indirect effects, notably on incomes of bergamot farms via a better cooperation and the strengthening of the farmers’ bargaining power. This was acknowledged by all stakeholders participating to focus groups.

**Table 10: Effects of governance arrangements on ESBOs in the study area: institutional changes in the private sector**

<table>
<thead>
<tr>
<th>Governance arrangements</th>
<th>Indirect effects on ESBOs</th>
<th>Direct effects on ESBOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creation of the Producers Organisation (Unionberg)</td>
<td>Positive on farm income. Via cooperation and better bargaining power of farmers</td>
<td>Landscape: maintenance of bergamot cultivation; valorisation of bergamot oil and juice properties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>healthy sols and water: no effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Rural vitality: better image of the area at the national and international level</td>
</tr>
<tr>
<td>Creation of the organic consortium (Assobioberg)</td>
<td>Positive on farm income. Via cooperation and better bargaining power of farmers</td>
<td>Landscape: maintenance of bergamot cultivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>healthy sols and water: reducing pesticides via organic methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Rural vitality: increased diversified activities in the farm</td>
</tr>
</tbody>
</table>

Source: our elaborations based on focus groups in the study area

Direct effects of new organisations on ESBOs are more complex to be evaluated. Main effects are on landscape and rural vitality, no effect can be found for healthy soil and water. The effects on the landscape are linked to the maintenance of bergamot in the area and those on rural vitality are linked to the ways bergamot induces changes in the whole economy of the area.
area. In fact, both organisations have contributed to the maintenance of a favourable economic context for the bergamot cultivation: Unionberg contributed to explore and valorise peculiar medical properties of bergamot oil and juice and enhanced the public immage of the area at the national and international level through a series of promotional activities on media (tv, radio, newspaper, etc.). These activities had positive benefits for bergamot economy and for the rural economy as a whole. Assobioberg worked much more to reduce pesticides via organic methods, in this way impacting positively on the soil/water quality. Assobioberg also promoted integration of farming with diversified activities like naturalistic tourism.

Contracts are the specific governance arrangements enforcing the role of two organisations. Contracts require specific activities of design, control and monitoring of main stakeholders at stake. There are diverse typologies of contracts in conventional and alternative value chain. In the conventional one the most relevant contracts are between Unionberg and exporters; in the alternative one relevant contracts are between Assobioberg and international buyers.

Both types of contracts have positive indirect effects on farm incomes, via the stabilisation of annual market prices of the bergamot essence. In this sense Assobioberg was pioneer when in 1999 contributed to set the price for the organic essence. This price was agreed with the English cosmetic industry Body Shop and was higher that the market price, considering the size of the demand by buyers and the production costs at the farm level. This price level soon became the «reference price» for the whole bergamot market, including those producers belonging to the conventional value chain. Since then Assobioberg negotiates every year contracts with international buyers on the basis of prices slightly higher than the conventional market prices and increasing by 1-2% maximum per year, and never decreasing. In practice, international buyers acknowledge a differential (premium) prices for organic product; this price also embodies a plus value for the purity of the essence, which is certified by external organisms. In the conventional market, Unionberg benefitted from this contractual model that was also applied in the commercial relations with exporters of non-organic essence. Even Unionberg agrees every year a market price that cannot be below the price of the previous year. Exporters are committed to buy the entire production at that agreed price. This contract model ensure not only stable and even increasing price to farmers, but also allows commercialising the entire production in the international market without excessive volatility over time.

These contractual arrangements have ensured not only stabilising the market price of bergamot, but since 2006-7 they fostered increasing prices at a slow rate (figure 11).
These contractual arrangements had positive direct effects on ESBOs: in both cases they contributed to the reprise of the bergamot cultivation and consequently to the conservation of the landscape; they had positive impacts on rural vitality as well, notably through the increase of employment in the local processing industry of essential oil and in the tourism sector (table 11).

Table 11: Effects of governance arrangements on ESBOs in the study area: contractual arrangements in the private sector

<table>
<thead>
<tr>
<th>Governance arrangements</th>
<th>Indirect effects on ESBOs</th>
<th>Direct effects on ESBOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contracts between Unionberg and exporters</td>
<td>Positive on farm income. Via stabilisation of annual market prices of conventional bergamot essence</td>
<td>-Landscape: maintenance/increase of bergamot cultivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-healthy sols and water: no effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Rural vitality: Employment effects in the local processing industry of essential oil</td>
</tr>
<tr>
<td>Contracts between Assobioberg and international buyers</td>
<td>Positive on farm income. Via stabilisation of annual market prices of organic bergamot essence</td>
<td>-Landscape: maintenance/increase of bergamot cultivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-healthy sols and water: reducing pesticides via organic methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Rural vitality: Employment effects in the local processing industry of essential oil</td>
</tr>
</tbody>
</table>

Source: our elaborations based on focus groups in the study area

4.3 The role and impact of policy in ESBO provision

The study area has always been interested by diverse types of policies. In the EU definition this area is within a less developed region (formerly Objective 1) for all Structural Funds, including the rural development funds. According to the definition of rural areas officially used in Italy for rural development policies this area also belongs to the “D” type (Areas with development problems).
Unfortunately, there are only few available information on funds spent for bergamot types of farming by the two CAP pillars. A first analysis can be done on the amount and composition of funds delivered by the CAP to all farms of the study area (table 12), including bergamot farms. This is relevant to understand:

a) How much the study area is practically considered as a territorial target by the most recent policies;

b) Which policies can have an indirect effect on some ESBO and for which kind of measures they are spending money in the study area.

In this area 2/3 of total expenditures are represented by direct payments from CAP – I pillar, addressed mainly to non-bergamot farms. All investment for bergamot sector in the period 2007-13 have been delivered mostly outside the regional RDP, under a specific regional law providing structural public support to renovate old bergamot plants, enlarge the bergamot area and renovate the processing machinery of the bergamot industry. Six million € have been committed and paid (about 14% of the total amount of funds delivered to the area). It is a relevant amount of money when we consider that 8,4 million € have been spent by all RDP measures in the same period and that no other sector could benefit from specific funds by the Calabria region in this period. This public effort undertaken by the region contributed to increase of the bergamot surface in the last five or six years, alongside with the stabilization of the bergamot oil market price.

Table 12: Expenditures on the study area by the CAP and regional policy in 2007-13

<table>
<thead>
<tr>
<th>Types of policy measures</th>
<th>Value (€)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupled payments</td>
<td>16.788,76</td>
<td>0,04</td>
</tr>
<tr>
<td>Direct payments</td>
<td>27.938.610,42</td>
<td>65,91</td>
</tr>
<tr>
<td>Tot Pillar 1</td>
<td>27.955.399,18</td>
<td>65,95</td>
</tr>
<tr>
<td>Agro-environmental payments</td>
<td>3.815.734,12</td>
<td>9,00</td>
</tr>
<tr>
<td>Less favoured area payments</td>
<td>1.238.418,38</td>
<td>2,92</td>
</tr>
<tr>
<td>Investments in farm and processing industry</td>
<td>1.570.957,85</td>
<td>3,71</td>
</tr>
<tr>
<td>Investments in diversification and Leader</td>
<td>1.809.842,29</td>
<td>4,27</td>
</tr>
<tr>
<td>Tot Pillar 2</td>
<td>8.434.952,64</td>
<td>19,90</td>
</tr>
<tr>
<td>Investments in bergamot farming and processing industry</td>
<td>6.000.000,00</td>
<td>14,15</td>
</tr>
<tr>
<td>Tot CAP + regional policies</td>
<td>42.390.351,82</td>
<td>100,00</td>
</tr>
</tbody>
</table>

Source: our elaborations on data from AGEA (Italian Payment Agency) and from Calabria region

Bergamot farms get also support from RDP through agri-environmental measures addressed to organic practices: in the case of bergamot a subsidy of 300 €/hectare has been provided conditioned to the commitment of organic fertilization and no use of pesticides. In the present RDP the support to organic methods for bergamot has been substantially increased (740 €/hectare).
Regional Department of Agriculture has given an annual contribution to the bergamot consortium to cover overheads expenditures and promotional activities (about 150,000 €), contribution decreasing over time.

In conclusion, public support from regional policies to bergamot production was relevant in the last decade and contributed to accompany the reprise of this type of farming, that was possible thanks to more effective collective actions in the two value chains (conventional and alternative).

When we look more carefully to policies by types of ESBO, we can distinguish between soil/water and landscape on one side and rural vitality on the other side. Policies directly impacting on the soil/water are represented by measures for organic production within the RDP and PDO rules on the certification of bergamot oil of Reggio Calabria. Landscape is influenced by policies directly supporting the renovation of old trees or the plantation of new bergamot area. Indirectly, the creation of the consortium of bergamot by the regional law contributed to create a new institutional setting more favourable to good agricultural practices for soil/water resources.

<table>
<thead>
<tr>
<th>Policy frame impacting on healthy soil/water/landscape</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory framework</td>
<td>EU</td>
</tr>
<tr>
<td>- general rules on cross-compliance</td>
<td>- Cross-compliance guidelines</td>
</tr>
<tr>
<td>- general rules on PDO</td>
<td>- PDO rules on &quot;the bergamot essence oil of Reggio Calabria&quot;</td>
</tr>
<tr>
<td>Policies with direct focus</td>
<td>State/Region</td>
</tr>
<tr>
<td>- Organic measures within Agro-environmental measures (regional RDP)</td>
<td>- Support of the Consortium of bergamot (regional law)</td>
</tr>
<tr>
<td>- Regional measures supporting investments in renovating bergamot trees and new bergamot area</td>
<td></td>
</tr>
<tr>
<td>Policies with indirect focus</td>
<td>Local area</td>
</tr>
<tr>
<td>- Rules on spatial planning at the municipal level</td>
<td></td>
</tr>
</tbody>
</table>

Source: our elaboration from focus groups in the study area
The objective of rural vitality has been addressed directly by diverse policy instruments (table 14). This area has been intensively interested by Cohesion policies over years. These policy instruments and funds have addressed rural infrastructures and socio-cultural endowments of the area much more than RDP measures, which was directed essentially to agriculture investments. In this area Leader programme has always played a crucial role in stimulating rural vitality in a wide sense. The Local Action Group has been very proactive in defining interventions for renovating rural villages, strengthening the sense of cultural identity of local population (via the old Greek cultural heritage) and enhancing facilities for naturalistic tourism. These policy interventions are perceived as really effective and innovative by local population, although there is a general sense of frustration due to the lack of working opportunities in place for most of young population. These interventions are considered as positive examples of innovative policies, because they contributed to renovate ancient villages and increased the knowledge of the area at national and international level. The ERDF, LIFE, Leader, etc. promoted also collaboration among municipalities and private organisms, due to the partnership approach that was required to implement these policy instruments. In conclusion, all policy instruments that were used for local development in this area can be considered a necessary complement to sectoral policies (RDP, and regional agricultural policies). There were strong synergies among these policies, notably because the Local Action Group and a series of municipalities were able to coordinate them over years and finalise them to a shared strategy. They made possible to improve the rural context and non-agricultural activities connected with the economy of bergamot.

Table 14: Policies and multi-level institutional governance in the study area for rural vitality

<table>
<thead>
<tr>
<th>Policy frame impacting on rural vitality</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EU</td>
</tr>
<tr>
<td>Regulatory framework</td>
<td></td>
</tr>
<tr>
<td>Policies with direct focus</td>
<td></td>
</tr>
<tr>
<td>- investment in technological innovation in the bergamot processing industry</td>
<td></td>
</tr>
<tr>
<td>- investment in rural diversification (Leader)</td>
<td></td>
</tr>
<tr>
<td>- valorisation of Greek cultural heritage</td>
<td></td>
</tr>
<tr>
<td>- facilities and services for naturalistic tourism (leader, ERDF)</td>
<td></td>
</tr>
<tr>
<td>- support to urban renovation of small villages (ERDF)</td>
<td></td>
</tr>
<tr>
<td>Policies with indirect focus</td>
<td></td>
</tr>
</tbody>
</table>

Source: our elaboration from focus groups in the study area

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Policies that have been examined in this area can be less or more effective depending from how they interact with:

- governance arrangements;
- private schemes designed to valorize ESBOs, including those based on market price mechanisms.

In the table 15 we have summarized three possible role of policies in providing ESBOs, in general, and which measures have been used to perform these roles.

In the bergamot area policies have influenced local governance arrangements via the promotion/support to collective action, in two ways:

a) State and Region administrations promoted the creation of the bergamot consortium (through a regional law), in other words they stimulated bergamot farmers to cooperate in order to improve their bargaining power within the value chain. It was not properly a form of collective action, because principal initiative was undertaken by bureaucratic bodies. When the consortium was created it was mainly driven by the State. In a second phase, however, a Producers’ Association took the lead of the consortium and this became something more similar to a form of collective action. This was relevant to promote initiatives aiming to the maintenance of the bergamot cultivation;

b) ERDF, Leader programme and some other EU programmes (LIFE) have promoted partnership approaches and activated in this ways collective actions as well, with important effects on rural vitality.

**Table 15: Role of policies in providing ESBOs**

<table>
<thead>
<tr>
<th>Role of policies</th>
<th>Policy interventions/measures/tools</th>
<th>ESBOs involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting and supporting</td>
<td>- Creation of the bergamot Consortium</td>
<td>All</td>
</tr>
<tr>
<td>collective action</td>
<td>- support to urban renovation of small villages (ERDF)</td>
<td>Rural vitality</td>
</tr>
<tr>
<td></td>
<td>- all measures managed through the Local Action Group</td>
<td>Rural vitality</td>
</tr>
<tr>
<td>Complementing private schemes</td>
<td>- PDO rules on &quot;the bergamot essence oil of Reggio Calabria&quot;</td>
<td>Soil/water</td>
</tr>
<tr>
<td>Supporting individual actions</td>
<td>- Cross-compliance guidelines</td>
<td>Soil/water</td>
</tr>
<tr>
<td></td>
<td>- Organic measures within Agro-environment measures (regional RDP)</td>
<td>Soil/water</td>
</tr>
<tr>
<td></td>
<td>- Regional measures supporting investments in renovating bergamot trees and new bergamot area</td>
<td>Landscape</td>
</tr>
<tr>
<td></td>
<td>- investment in technological innovation in the bergamot processing industry</td>
<td>Rural vitality</td>
</tr>
</tbody>
</table>

Source: our elaboration from focus groups in the study area

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Looking at the second possible role of policies in the area, interactions of policies with private schemes to valorize ESBOs were really scarce. PDO rules had this potentials, but in reality PDO certification was not implemented because the demand and prices of the conventional essence were high over time. The premium price given to organic production was not so high as to incentivize the diffusion of organic practices and related certification. Some industrial entrepreneurs and experts said that the low interest for organic certification shown by farmers on a wide scale in this area is justified by chemical manipulations of the essence in the industrial phase, which is capable of eliminate pesticides during the processing of the fruit. In reality organic certification matters and it is required by international buyers as proof of purity and quality of the essence in the non-conventional value chain. But in this value chain there is no interaction with public policies. The international buyer looks for a product that embodies features of environmental sustainability. In this case collective action (cooperation under the name of Assobioberg) was not promoted by public policies, it was a spontaneous and innovative reaction to escape from the oligopolistic domination of few exporters and gain a greater share of the value added.

In conclusion, the role of policies in the bergamot value chain was mainly supporting individual action with a long series of policy instruments and only partly promoting and supporting collective action. The role of complementing private schemes was quite limited in case they were not sufficient to valorize ESBOs.

4.4 The role of the private sector in ESBO provision and enabling factors

In this case the role of private sector is crucial in the provision of ESBOs. All ESBOs examined here are provided only whether bergamot farmers survive and their organisations (Assobioberg and Unionberg) work well.

Main motivations of private sectors initiative are described quite extensively in the paragraph 3 and main actors operating in the supply chain of bergamot in the paragraph 4.1. The interplay between public policy and market mechanisms, public policies and links between private sector initiatives and CAP are discussed in the paragraph 4.3.

The future of the private sector initiative is discussed in the paragraph 5. Potential gaps in the provision of ESBOs and the potentials to be filled by EU policies are discussed in the paragraph 5 as well.

Benefits related to the provision of ESBOs through private sector schemes was discussed in the paragraph 2.4.

5 Potential pathways towards an enhanced provision of ESBOs

The provision of ESBOs can be further enhanced through:

a) A more widespread diffusion of organic production in the area, through the collective action organised by Assobioberg consortium;
b) More targeted promotion of the characteristics and properties of the bergamot fruit, carried out by the producers’ association Unionberg;

c) A diversification of the bergamot production, now focused on the essential oil, but with strong potentials in the fresh market that is developing more and more in the biggest cities (Rome, Milan, etc.) in the last years.

The provision of ESBOs is linked to further diffusion of the bergamot cultivation, on one side, and on the use of sustainable production methods (in terms of soil, landscape and water conservation), on the other side. Given the present and the likely future trends in the demand from the market (supply is relatively rigid in the short-medium term) we could envisage that the bergamot surface will increase in the next ten years of about 500-600 hectares. The diffusion of more sustainable production methods is linked to:

a) The participation of farmers to organic schemes promoted by Assobioberg;

b) The effectiveness of bergamot-targeted agro-environmental measures introduced by the 2014-20 Rural Development Plan of Calabria Region, which deliver a subsidy of 740 € per hectare to farmers which commit themselves to use natural and non-chemical or mechanical control of the spontaneous vegetation in the bergamot area for a period of 7 years.

While this second policy measure will have likely wide adoption by local farmers, the same success cannot be envisaged for further participation to organic schemes promoted by Assobioberg. This does not exclude some limited increase of members of Assobioberg.

Main limiting factors are both internal and external to the consortium. Assobioberg members stated very clearly that they wish to avoid to grow too fast, since their size is considered as optimal for the decision-making process and the control of sustainable practices among participants. Another very limiting factor is the oligopolistic nature of the supply chain, dominated by very few exporters. There is no effective counter power in the area: the producers association Unionberg does not want to generate new conflicts with exporters because these latter control the market and relations with cosmetic and food industry abroad.

Future changes in this situation can be driven by:

- Small and medium processing industry at local level in search for new market outlets (for example, the fresh market can generate new development in the future and promote the access of new subjects in the supply chain, more prone to social innovation);
- The desire of the Unionberg members to change strategy, and move towards more sustainable production practices.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

Comments raised in the D.4.1 report on the bergamot about SES are partly valid now. In this report we add some further reflections.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
The idea of S-E-S is already in the minds of our stakeholders, but this way of representing it is meaningless for them. In reality it was not relevant in interviews. Interviews work better when there is a simple scheme showing the main actors playing a role and suggesting possible interpretation of the conflicts and alliances between them.

The objective of integrating of ecological and social aspects and thus providing a holistic viewpoint is very important, but at the same time is too ambitious and remain a wishful thinking since there is neither a theory nor a model helping to put together all the components of the SES in a coherent and convincing way. Nonetheless it is extremely helpful in forcing the researcher to find some global picture of the system.

Single Interviews added many elements to our understanding of the system.

The more useful elements of the SES in this case were motivations and objectives of the playing actors, their governance arrangements and the feed-back effects of the governance arrangements on the objectives and motivations. See the figure 5 in this report to have a good ideas of these elements. This can work very well also in the dialogue with stakeholders because these elements have to do with their feelings about themselves and their behaviour in a given situation.

A certain surprises on the discussion on ESBOs, because interviews highlighted as farmers prioritised cultural identity as form of ESBO (as part of rural vitality).

The SES framework needs to be further articulated when you have to consider the dynamics of the socio-ecological system.

The collective and common pool of resource aspects is decisive in understanding the provision of ESBOs and it is clearly understood by some of the actors, in particular those more innovative in environmentally conservative practices.

In this case action-oriented approach, despite the objective of this research, was unfeasible because of the time needed to develop it with main stakeholders and also because in both supply chains (conventional and organic) the representatives that were interviewed knew quite well the directions and potentials to be exploited. We simply elicited solutions and ideas that were already boiling in their minds.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

The role of the bergamot cultivation on the creation of the landscape is not only through the presence of a typical tree ever green over seasons (quite similar to other citrus trees like oranges, lemons and tangerines), giving the image of a lush countryside, but also through the presence of other structural landscape components linked to farming practices: hedges, rows and dry stone walls.

- Bergamot farms have also a strong impact on the water resources consumption because, as every other citrus cultivation, bergamot is a highly water demanding type of farming.
- Sustainable methods are also embodied into the organic production, but organic production is scarcely adopted by bergamot farms. However, the share of surface under organic production grows as the bergamot surface increases in the farm.
7.2 Key findings on governance arrangements and institutional frameworks

In this case study the main governance arrangements can be summarised as follows:

a) New organisations among producers:
   - the creation of the Unionberg Producers’ Organisation, which takes the place of the old State-driven bergamot consortium;
   - the creation of Assobioberg consortium;

b) Rules enforcing the new acting organisations and the market:
   - the contractual arrangements that Unionberg and Assobioberg agree every year with the main buyers (local exporters for Unionberg, international buyers for Assobioberg). They represent actually the concrete definition of rules in the private sector of bergamot that influence indirectly (through price mechanism) and directly (through the definition of specific agricultural practices) the provision of ESBOs.

Policies that have been examined in this area can be less or more effective depending from how they interact with:

- governance arrangements;
- private schemes designed to valorize ESBOs, including those based on market price mechanisms.

7.3 Other enabling or limiting factors

- If we had to conceptualise the mechanism of social innovation in this area, we could say that beyond the profitability conditions given by market prices (guaranteed by international buyers against the provision of high quality product), an important role has been played by shared values of this small consortium of farmers and by the desire to abandon the oligopolistic structure of the supply chain: sense of identity linked to the bergamot culture, family heritage, desire to maintain/improve landscape and soil through sustainable practice as fathers gave them.
- Main limiting factors are both internal and external to the consortium. Assobioberg members stated very clearly that they wish to avoid to grow too fast, since their size is considered as optimal for the decision-making process and the control of sustainable practices among participants.
- Another very limiting factor is the oligopolistic nature of the supply chain, dom-inated by very few exporters. There is no effective counter power in the area: the producers association Unionberg does not want to generate new conflicts with exporters because these latter control the market and relations with cosmetic and food industry abroad.

7.4 Contributions to EU strategic objectives

- The bergamot production is highly intensive in terms of capital and labour resources. The direct employment, at the farm level, is relevant when compared to other types of farming.
The family labour is a key component of the labour force until the size of 3 hectares of bergamot, then hired labour (permanent or seasonal) prevails since the family cannot fulfil alone working needs at farm level.

Bergamot farms need a series of technical services, partly supplied by processing industries (technical assistance), partly by other firms, notably contract firms specialised in agricultural operations (contract labour).

There are also other types of activities directly linked to the use of bergamot oil and juice: small and medium food industries in the confectionery sector, notably typical products linked to the cultural traditions of the Greek Calabria; commercial firms specialised in the export sector.

Employment and income effects are increasing in the tourism firms supplying services for excursions, trekking, biking, etc. This new demand for naturalistic tourism is concentrated in spring and summer.

7.5 How about the transferability of the approach/mechanism used?

The approach used to provide ESBOs can be applied in other areas with peculiar/niche supply chains, especially for initiatives taken by the Assobioberg consortium. This approach seems really appropriate to overcome oligopolistic barriers created by few wholesalers and many small and medium producers.

This approach can be further enhanced through:

a) A more widespread diffusion of organic production in the area, through the collective action organised by Assobioberg consortium;

b) More targeted promotion of the characteristics and properties of the bergamot fruit, carried out by the producers’ association Unionberg;

c) A diversification of the bergamot production, now focused on the essential oil, but with strong potentials in the fresh market that is developing more and more in the biggest cities (Rome, Milan, etc.) in the last years.
8 References (including projects docs, evidence reports etc.)

Crispo, F. (2010). Bergamot in the Calabrian Economy and the role of Consorzio del Bergamotto


CASE STUDY

GRAZING PAYMENTS IN DAIRY FARMING (THE NETHERLANDS)

D4.3 | Final Version | March 2017

Floor Brouwer, Nico Polman, Martijn van der Heide

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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1 Introduction: What is the case study about?

1.1 Dairy production in the Netherlands

Global demand for dairy products is increasing, especially in emerging economies in Asia. It appears that milk consumption per capita in urban areas is higher than in rural areas, showing that as more people move into urban areas, overall dairy consumption will rise. This is supported by increase urbanization and changing diets across the globe.

According to the 2015 Rabobank vision on dairy farming in the Netherlands (‘Milking in balance’) the Dutch dairy sector has a strong position on the global market, both with respect to quality and sustainability. Global milk prices have been highly volatile in the past decade and the abolition of the CAP milk quota regime in 2015 has given incentives in the Netherlands to increase milk production. Wholesale milk deliveries to dairy processors in the Netherlands during June 2016 was some 50 million liters above that of June 2015. This is equivalent to an increase of almost 5% (Eurostat, 2016). This was far beyond increases in other EU Member States, since total milk production in EU-28 during this period dropped by 200 million liters. The Rabobank in her 2010 study ‘Anders Melken’ ("Other Milking") projected milk production in the Netherlands by 2020 will increase by about 20% compared to 2010.

Grazing is a main feature of dairy farming in the Netherlands and an important public service of the dairy sector (RLI, 2011). This feature is widely appreciated in the Netherlands and consumers elsewhere. At national level, some 70% of the dairy cows are part of grazing systems (Figure 1).

![Grazing cattle (in % of total)](image)

Figure 1: Grazing of dairy cattle during the period 2001-2015 in the Netherlands and meadow region in the western part of the Netherlands.
Source: CBS (2015), Sustainable Dairy Chain (Duurzame Zuivelketen).

The highest shares of grazing dairy cattle are found in the peaty areas of the provinces Utrecht, North Holland and South Holland. Grazing is widely used for marketing purposes by the milk...
processing industry. So-called meadow farm milk – milk that originates from cattle with grazing - is processed into meadow dairy products, like fresh milk and cheese, and distinguishes itself from in-house production systems. And although the dairy industry does not want to lose the credits from society that are also attached to meadow farm milk, there is a declining trend in grazing, which has been stabilized in the recent past (Figure 1).

1.2 The case study: actors and the grazing premium

This particular case study focuses on dairy production in part of the Province of North-Holland (Figure 2). 'CONO Kaasmakers' (the most important key actor in this case study) is a farmer's cooperative operational for over 100 years in this region, mainly producing cheese. The company has some 460 members (dairy farmers, who can also be regarded as key actors), with a gradual increase in supply of milk. The aggregated milk production is 350 million kg per annum, which is approximately 3% of total production of milk from dairy cows in the Netherlands. Annual cheese production in the Beemster polder is approximately 28 million kg of cheese. In addition, ‘CONO Kaasmakers’ has a joint programme with Ben & Jerry on their Caring Dairy programme, enabling to produce ice and cheese milk is delivered from sustainably produced milk.
The company initiated a premium for pasture grazing in 2002. The premium by CONO to dairy farmers for the delivery of meadow farm milk can be regarded, or interpreted, as a particular type of governance arrangement aimed to stimulate animal welfare (‘happy cows’), to create an attractive landscape, and to make the most delicious cheese from the best milk. Of course there are other governance arrangements could have been considered to achieve these environmental and socially beneficial outcomes, such as (public or private) command-and-control regulations (e.g. specific guidelines prescribed by the government to the dairy sector, that prohibit the full-time housing of cattle). Recently (February 2017), the Dutch parliament has decided to make pasture grazing mandatory for dairy cattle in the Netherlands. The Secretary of State of Agriculture did respond by launching a research project on ways to stimulate voluntary grazing and the advantages and disadvantages of a legal mandatory system for grazing and alternatives. In addition to this, (local) government is another key actor in this case study, for instance through its Environment & Planning Act (‘Omgevingswet’).

Figure 3a: CONO production plant
Source: CONO Kaasmakers

Figure 3b: Product quality control
Source: CONO Kaasmakers
Each member of the co-operative delivering milk according to the requirements of the Sustainable Dairy Chain (*Duurzame Zuivelketen*) is eligible for the premium paid by CONO. The requirements are an effective monitoring by dairy producers who process raw farm milk. They are responsible for the task of checking on and taking primary responsibility for compliance with the obligation that meadow milk cows are out for grazing during at least 120 days a year and a minimum of 6 hours a day. Pasture grazing is considered essential to reach high quality standards of cheese.
Table 1: Overview of case study

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Waterland and Zuid-Oost Beemster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Dairy</td>
</tr>
<tr>
<td>Area (UAA) of initiative (Case Study)</td>
<td>23</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Landscape character and cultural heritage. Farm animal welfare. Soil functionality. Species and habitats.</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>460</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>CONO Kaasmakers, consumers of cheese, collective and agri-environmental association Water, Land en Dijken; Province Noord-Holland. 460 dairy farmers. UNESCO cultural heritage, visitors in region, municipality.</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>CONO kaasmakers</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>2002</td>
</tr>
<tr>
<td>End date of initiative</td>
<td>n/a</td>
</tr>
</tbody>
</table>

The premium payment was introduced by ‘CONO Kaasmakers’ in 2002 at a level of €0.50 per 100 kg of milk, and is on top of the regular milk price. In 2016, this premium was doubled to €1 per 100 kg of milk, and is doubled again on 1 January 2017, to reach €2.00 per 100 kg of milk (CONO, 2016). This premium might have supported in the recent past of stabilizing the declining trend in pasture grazing. Some farmers argued that an early introduction of a premium helped to maintain the grazing culture in this area. This feature does distinguish them from other parts of the country where the share of grazing dropped. As said in the press release (CONO, 2016), the premium is argued (i) to secure a fair price to farmers for grazing, (ii) to acknowledge pasture grazing adds to the taste of cheese and (iii) to increase animal welfare. In general, it can be said that with its increase in scale and the cattle being housed, dairy farming is starting to resemble intensive cattle farming, which is mainly related to the industrialization of dairy farming. CONO and its farmers understand that having cows graze pasture is good for dairy farming’s image. The premium for grazing is embedded in a marketing strategy for meadow dairy products; products that are not only sold on the national market, but also on the international market (e.g. Germany). It helps CONO to differentiate itself in the market. As such, consumers of CONO-products are another group of key actors. Farmers recognize the importance of consumers towards grazing. Farmers also indicated during the interviews they remain to be able to maintain grazing in the near future. They argue that they have a personal satisfaction of grazing cows on their farms.

Farmers appreciate private payment schemes. It acknowledges product quality and provision of ESBOs.
Some 92% of the dairy farmers who are member of the CONO co-operative adopt pasture grazing, which exceeds national average. Branded cheese ‘Beemsterkaas’ is produced from branded grazing systems. Grass is considered essential for the quality of the product. The size of the parcel near the farm is critical for the pasture grazing. With an average of 50 ha per farm with grazing, the size of the parcel near the farm is some 33 ha. Pasture grazing requires additional labour for milking, but reduces costs for feed and disposal of manure. With an average of 55 kg per day, fodder represents more than 90% of the food of dairy cows. This is complemented with an average of 5 kg of compound feed, and composed of maize, soya and other products. Moreover, a cow on average drinks approximately 100 litre of water, and is fed with 100 grams of vitamins and minerals (NZO, 2016).

Creating high-quality agricultural land was one of the main reasons at the time for draining the Beemster Polder (in 1612). Originally the drained land was used for grain production, but as time went by this land gradually turned into pasture land for cattle. The reasons for this were the fact that the groundwater level and the soil composition produced a less favourable result for agriculture than the investors in agriculture had anticipated. As a result, dairy farming and cheese production quickly developed after the polder had been drained and have since been an integral part of the Beemster Polder.

Since 1999, the Beemster Polder is a UNESCO World Heritage Site in a region which was reclaimed from water during the 17th century (also other polders were constructed, such as the Purmer, the Wormer and the Schermer). Land reclamation is accompanied by seepage and a general shrinking of the soil, which manifests itself in settling. As a result, the region is currently some 3-4 meters below sea level. It is put on this list ‘as a masterpiece created by humans’ with a strict pattern of squares and quadrants.

1.3 Object of the study and four ESBOs are distinguished

The report explores the importance of grazing premium relative to other payment schemes for the provision of environmentally and socially beneficial outcomes (ESBOs) from grazing in dairy farming. The study did focus on:

a. Relevance of grazing in the provision of ESBO. We distinguish farmers, inhabitants of the region, tourists.
b. Main trends in grazing and the challenges for grazing in the years to come.
c. Business-economic of the different strategies for farmers, distinguishing between volatile milk prices, grazing premium, CAP payments (both Pillar I and Pillar II).

A key question remains whether challenges remain that might potentially be addressed in the CAP.

The report draws from literature review and interviews, complemented with data from the national census and the Farm Accountancy Data Network. See Annex 1 for names of persons interviewed.
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

The social-ecological system framework (SES framework) was largely designed with a view to develop a comprehensive picture of the key interactions among the resource system in place, their drivers, key actors and outcomes (Figure 4). The SES framework is based on and grounded in a couple of expert interviews (including farmers, provincial authority and agribusiness) complemented with a literature review. After compiling a first version of this framework, it has guided a couple of interviews in Stage 1 and Stage 2 (with regional dairy farmers), mainly to test how the comprehensive view of this framework is perceived by the interviewees.

We focus on the following objectives to be achieved (and related environmentally and social beneficial outcomes - ESBOs) that a system of pasture grazing delivers are:

1. Protecting landscape character and cultural heritage, with focus on ESBO14: landscape character and cultural heritage, maintaining or restoring a high level of landscape character and cultural heritage. This ESBO is a characteristic of the Resource System.

2. High levels of farm animal welfare, targeted at ESBO18: achieving or maintaining the implementation of high animal welfare practices on farms. This ESBO is connected to the type of Resource Units. It differentiates grazing cows from non-grazing cows.

3. Healthy, functioning soils, with focus on ESBO9: soil functionality, achieving or maintaining good biological and geochemical conditions of soils. This ESBO is part of the Resource Units.

4. High levels of biodiversity, with focus on ESBO11: achieving or maintaining diverse and sufficiently plentiful species and habitats). This ESBO is part of the Resource Unit.

In discussions with stakeholders it has been questioned whether healthy dairy products would be an additional ESBO from grazing. There were different opinions on the importance of soil functionality as ESBO. It is difficult to show the relation between soil functionality and grazing. The consumers express their appreciation for the package of ESBOs through buying dairy products. We did not find evidence that consumers prefer a specific ESBO above others. Cows in the meadow result in so-called cattle-enhanced landscapes; i.e. the dairy cows maintain and improve landscape beauty. It appears that a rural landscape with cows is more highly appreciated (by tourists and residents) than an ‘empty’ landscape whereby the dairy cattle is kept indoors. In other words, a cow grazing is part of the traditional Dutch landscape and highly appreciated by the people (this is reflected by the fact that a rural scenery with (a herd of) cows are characteristic of Dutch landscape paintings). So, the visibility of cows graze pasture has a positive effect on the appreciation of the Dutch countryside.

Moreover, having cows graze pasture might be beneficial for animal health. Improvement of animal health and animal welfare will lengthen the lives of the animals. Healthy cows live longer, needless medication and have a more efficient milk production.

Given the ever more stringent nutrient management regulations – such as for phosphate – healthy soils are crucial for dairy production in order to produce feed for the animals. Soil
degradation occurs when soil loses its nutrients or its organic matter when the soil structure breaks down (including as a result of erosion), or if the soil becomes toxic from pollution. Grazing animals can be an important factor in maintaining balanced and diverse mineral resources in the soil. Manure, for instance, has an influence on soil life.

Although complex and dependent on farm management practices, having cows graze pasture might also be beneficial for nature. For instance, the degree to which grasslands are suitable habitat for meadow birds strongly depends on the type of manure applied, but generally, it appears that ‘meadow manure’ is beneficial to specific birds such as the black-tailed godwit (see De Snoo et al., 2016). Cow dung attracts larger insects on which the chicks depend for their survival.

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1 The black-tailed godwit is elected as the national bird of the Netherlands, the country in which the vast majority of the West European godwit race breed.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
CASE STUDY: Outdoor grazing in the Netherlands

Key ESBOs considered:
1. Landscape character and cultural heritage
2. Farm animal welfare
3. Soil functionality
4. Species and habitats

RESOURCE SYSTEM
Polder area, with peat (60%) and clay soils (34%); water-rich part of the Netherlands. Farm size: 48 ha (only fodder). Outdoor-grazing is in 2015 188 days (above average). 95% of the farms adopt 120 days outdoor-grazing, at least 6 hours a day.

RESOURCE UNITS
Grassland and cows are key factors for outdoor-grazing. Size and location of the parcels are key to the ability of farmers for outdoor-grazing. The high quality of grass is promoted by CONO.

ACTION SITUATIONS
Product quality is key for the marketing of Beemster cheese (100% milk from outdoor grazing). There is an additional payment for milk from outdoor grazing (€2 per 100 kg). Manure legislation does limit an increase in milk production.

GOVERNANCE SYSTEM
Valorisation of milk through the value chain cheese and ice. Product quality is a key feature for marketing of cheese with secured outdoor-grazing. CAP payments (Pillar 2) are provided for nature management. Additional payment for outdoor-grazing. Collective Water, Land en Dijken is the official contracting party for nature and water management.

ACTORS
CONO Kaasmakers, consumers of cheese, collective and agri-environmental association Water, Land en Dijken; Province Noord-Holland. 460 dairy farmers. UNESCO cultural heritage, visitors in region, municipality.

MACRO-ISSUES
Outdoor-grazing is at risk with increasing scale of production. Phosphorus legislation limits increase in milk production.

Summary of the SES framework for [NL-1] case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)

2.2 Description of the SES
The grazing premium to dairy farmers is important to acknowledge towards consumers the final products (e.g. cheese) are based on farming systems with grazing for at least 120 days (6 hours a day). The Sustainable Dairy Chain (Duurzame Zuivelketen) aims to maintain the share...
of the number of farms with grazing (either 120 days per annum and at least six hours a day, or other types of grazing) at the level of 2012 (which was some 81% in total). It reflects the appreciation by consumers and is part of a business strategy towards the national and international market (e.g. Germany). The grazing premium creates synergies with open landscape features.

Landscape features and product quality through grazing are used in the marketing of Beemster cheese. Landscape features have a public good character. Farming practices that include grazing might also be beneficial for animal health. Ammonia emissions in outdoor-grazing are below those with in-house production systems. Although complex and dependent on farm management practices, it might also be beneficial for nature. Grazing is an important management practice in dairy farming. It might also be a way to communicate the broader context of farming in a region (Figure 4).

Grazing and the maintenance of open landscapes are highly perceived by consumers. The future trends of outdoor grazing depend on:

- Number of dairy farms is likely to decline in the years to come, and dairy farms with grazing and without successor might have a large share of those who quit production.
- Market conditions of the quality cheese. The premium for outdoor-grazing increases over time (starting 2017, to be €2.00 per 100 kg of milk) is noticed by consumers of cheese and used in the marketing in the Netherlands and abroad (e.g. Germany).
- Trends in environmental legislation (e.g. to apply fertilizers and organic manure, and eventually dispose excess of manure). The costs of transport of excess amounts of manure could be €12 per m3. Disposal of manure at short distance might cost around €5 per m3, and to amount several thousands of euro.
- Number of dairy cattle per farm. Monitoring and enforcement of grazing systems would require additional ICT technology (e.g. GPS systems) when milk production per farm increases.

Grazing is part of the branding of the products and grass-fed production is considered essential for product quality. Beemster cheese, for example, is secured from grazing systems. There is a trade-off between manure legislation and outdoor-grazing: increasing the scale of production tends to be more efficient with in-house production systems. Compared to outdoor-grazing, dairy producers with in-house production systems tend to be better able to improve the efficiency of feed consumption. This is especially relevant for producers who target to optimise milk production at constant levels (Van der Schans and Van der Weijden, 2016). Environmental legislation is nowadays largely felt to be the new system to limit milk production and replacing the former milk quota regime. Synergies with outdoor-grazing and dairy farming could be achieved when the field parcel is sufficiently large to provide food and fibre. Both the size of the field parcel near the stable and the number of dairy cows are critical for outdoor grazing. Landscape features are an important public good related to outdoor-grazing. Such farming practice might also be beneficial for animal health. Ammonia emissions in pasture grazing are below those with in-house production systems. Although complex and dependent on farm management practices, it might also be beneficial for nature. Pasture grazing is an important
management practice in dairy farming. It might be a way to communicate the broader context of farming in a region.

The trend in grazing is stabilizing. Pasture grazing requires grassland and it largely takes place at field parcels that are near the farm house that also need to be sufficiently large for grazing. The home plot needs to be sufficiently large to enable for synergies of grazing and dairy farming could be achieved when the home plot is sufficiently large to provide food and fibre. This is a key factor enabling farmers to maintain pasture grazing for their dairy cattle. CONO offers training to farmers to maintain and improve grazing. Training includes the implementation of grazing in combination with automatic milking systems (AMS).

There is a trade-off between manure legislation and outdoor-grazing: increasing the scale of production tends to be more efficient with in-house production systems. Environmental legislation is nowadays largely felt to be the new system to limit milk production and replacing the former milk quota regime.

Image is important for the provision of ESBOs. Management of landscapes through pasture grazing systems are important for the image of a region. Pasture grazing is appreciated by the local population, as expressed by media attention. Some farmers also invite school classes to visit their farm and explain the contribution of the farm to the region and beyond.

Labour requirements of outdoor-grazing could create tensions with maintaining open landscape features. Outdoor-grazing requires additional labour for transfer of dairy herds, but reduces some of the labour needs for mowing of grass. Compared to in-house production-systems, outdoor-grazing is more unpredictable and requiring more labour.

Monitoring of outdoor-grazing remains a challenge. Monitoring of outdoor-grazing is currently implemented by CONO Kaasmakers, and the dairy farms keeps track of outdoor-grazing through a calendar. The co-operative visits the farm to inspect outdoor-grazing. In addition, Qlip (quality assurance in agrofood) does perform a selection of farm visits to monitor outdoor-grazing. More advanced ICT technology (e.g. GPS system) could create synergies with the maintenance of open landscapes.

2.3 Levels of ESBO provision, trends and determinants

The ESBOs related to grazing are assessed in indirect way, based on the adoption of grazing systems on dairy farms. Such indirect assessment is needed since no observations are available on the ESBOs distinguished in the case study. In addition, ‘landscape character’ and ‘cultural heritage’ are only relevant at respectively the landscape level and society. This is the case because the number of dairy cows grazing should exceed a minimum level in order to be visible for people in the landscape and the number of people viewing graze part of their culture. In needs to be kept in mind that CONO is not the only dairy processor in the case study area. Other processors are important to achieve a critical mass with respect to visible dairy cows in the area. We will start with discussing the 4 ESBOs in more detail (see also Table 1).
The four ESBOs are:

1. Landscape character and cultural heritage. Compared to other regions, grazing in the case study area is more common than in other areas and farmers are aware of this culture. From the literature it follows that an open landscape with grazing cattle is appreciated by the general public (Van den Pol-van Dasselaar et al., 2015a). Grazing is also seen as an icon of the Netherlands (Van den Pol-van Dasselaar et al., 2015c). Farmers perceive the preferences from society in a comparable way, although, it has been argued among farmers that grazing is old fashioned (Van den Pol-van Dasselaar et al., 2015b). The contribution to the landscape character and cultural heritage was recognized by the stakeholders.

2. Farm animal welfare. Grazing allows a cow to show her natural behaviour and offers more stimuli to a cow compared to non-grazing. However, in the winter period cows need to stay indoors because of climatic reasons (too cold and no grass available). Nowadays, most farms use cubicule sheds in combination with parlour milking for the winter period. This has many advantages compared to older systems: lower labour input, easier to mechanise and manage and improved animal health and welfare (Horne and Prins, 2002). With the introduction of automatic milking systems (AMS) only pasture sites of the home plot are suitable for grazing since the cows need to be able to go to the milking robot all throughout the day (Van den Pol-van Dasselaar et al., 2015d). It is expected that in the future more farmers will adopt AMS (30% of dairy farmers in 2020).

3. Soil functionality. In the Netherlands, large differences in soil quality exist. In some parts of the case study areas the soil type prevents extended grazing (e.g. peat soils). Nitrogen (N) and phosphorus (P) cycle through the farming system by transfer between different components of the farm, i.e. from crops/feed to herd, from herd to manure, from manure to soil and from soil to crops/feed (Van den Pol-van Dasselaar, 2015c). To maintain soil fertility and grass yield, N and P need to be managed in a sustainable way.

4. Species and habitats. Due to grazing, biodiversity increases (Van den Pol-van Dasselaar, 2015a). Grazing plays an important role in supplying feed for meadow birds (Eekeren, 2013). Further, fine-tuning grazing and moving is beneficial for the reproduction of meadow birds (Melman et al., 2013). In needs to be kept in mind that grazing is not the only factor, other factors are groundwater level, intensity for farming and grassland composition.

The uptake of grass during grazing depends on the availability of grass, additional feeding, the number of hours in the field per day, the number of cows per plot and the number of days outside (Remmelink et al., 2015). In practice different grazing systems (e.g. unlimited grazing (day and night, 16-20 hours), limited grazing (usually daytime only, 6-10 hours), very limited grazing (only several hours per day, see Van den Pol-van Dasselaar et al., 2013) are applied depending on the number of hours per day cows can graze. Both, the number non-grazing cows has increased and if grazing is practised, the average number of grazing hours per cow per day has reduced (Van den Pol-van Dasselaar, 2011). Table 1 shows that on average cows graze much more days a year than the minimum requirement of 120 days. If the cows graze, it is also a longer time than the minimum level of 6 hours a day.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Table 1 also indicates that larger farms on average adopt the smallest number of grazing days and the average number of hours cows graze is below that of smaller farms. In addition, there is a seasonal effect regarding the number of hours cows on average graze throughout a day. Grazing is highest during the summer months (July – August). This implies that ESBOs from grazing are also seasonal.

### Table 1

**Key indicators on grazing in the Netherlands and the case study area, farms with dairy cows grazing 120 hours a year, at least 6 hours a day, 2015**

<table>
<thead>
<tr>
<th>Number of cows</th>
<th>Number of cows</th>
<th>Farm size (ha)</th>
<th>Home plot (ha)</th>
<th>Grazing days</th>
<th>May-June (%)</th>
<th>July-August (%)</th>
<th>September-October (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 50</td>
<td>34</td>
<td>26</td>
<td>11</td>
<td>206</td>
<td>56</td>
<td>66</td>
<td>55</td>
</tr>
<tr>
<td>50-100</td>
<td>73</td>
<td>44</td>
<td>18</td>
<td>180</td>
<td>39</td>
<td>48</td>
<td>38</td>
</tr>
<tr>
<td>100-150</td>
<td>122</td>
<td>64</td>
<td>27</td>
<td>174</td>
<td>34</td>
<td>40</td>
<td>28</td>
</tr>
<tr>
<td>150-200</td>
<td>169</td>
<td>87</td>
<td>35</td>
<td>168</td>
<td>32</td>
<td>43</td>
<td>30</td>
</tr>
<tr>
<td>&gt; 200</td>
<td>271</td>
<td>128</td>
<td>54</td>
<td>158</td>
<td>31</td>
<td>40</td>
<td>29</td>
</tr>
<tr>
<td>Total</td>
<td>86</td>
<td>49</td>
<td>20</td>
<td>183</td>
<td>41</td>
<td>50</td>
<td>39</td>
</tr>
<tr>
<td>West Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-100</td>
<td>69</td>
<td>44</td>
<td>21</td>
<td>192</td>
<td>55</td>
<td>71</td>
<td>50</td>
</tr>
<tr>
<td>100-150</td>
<td>114</td>
<td>60</td>
<td>40</td>
<td>176</td>
<td>39</td>
<td>48</td>
<td>27</td>
</tr>
</tbody>
</table>

Source: Farm Accountancy Data Network (FADN), the Netherlands

Intensification of the dairy sector has the largest negative effect on pasture grazing, partly because of the need for more control over business operations on and partly through reduced availability of grazing area around the farm. On the other hand, low costs and social acceptance of the sector serve to stimulate pasture grazing. Furthermore, the dairy sector and the government are aware that keeping cows in pastures stimulates natural bovine behavior (Reijs et al., 2013).

Van den Pol-van Dasselaar et al. (2015d) identify facts as well as softer arguments in favour of grazing. The facts distinguish between economic conditions (e.g. cost savings), climatic conditions (high levels of grass growth), topography (some regions are unsuitable to grow arable crops or maize), soil type (sand, peat, clay), infrastructure at the farm (e.g. tracks and fencing), and farm support through the CAP. The softer arguments facts are linked to the inner motivation of the farmer (e.g. farmers use AMS also for a better lifestyle), social pressures, image/perception of grazing (it has been seen as old-fashioned), skills of farmers and their level of education. Larger farms in the Netherlands, measured in number of cows, throughout the year graze a smaller number of days a year and also graze a shorter part of the day (Table 1).

Grazing cows are appreciated by the general public through tourism and by consumers. Tourists mostly appreciate the contribution to the landscape of grazing cows, whereas the wider...
society seems mainly interested in animal welfare. Farmers recognize the importance of grazing for visitors of the area, both for tourism and recreation from surrounding urban areas. Dairy processors in the Netherlands are in favour of grazing systems. They argue that cows are part of the Dutch landscape and the general public attaches a high value at grazing cows (The Dutch Dairy Association (NZO), www.nzo.nl). In order to be able to work towards a future-proof and responsible dairy sector, the Sustainable Dairy Chain initiative (dairy processors and dairy farmers) has formulated a goal on retention of pasture grazing. CONO Kaasmakers is part of this initiative. They argue that “as grazing cows make the dairy farm industry visible and define the image that society has of the Dutch dairy sector and its products.” (see Reijs et al., 2015).

When consumers are asked for their types of appreciation towards dairy products – compared to other types – they express a strong appreciation towards grazing cows (Haaster-de Winter and Hoogendam, 2011). More than 80% of the Dutch population indicate that pasture grazing is important or very important. About 70% of the Dutch population is willing to pay more for milk from grazing cows, although it needs to be mentioned that the question asked is not very precise and a stated preference (Table 2).

Table 2: Response to question “Are you willing to pay a higher price for 1 litre milk if this implies that cows can graze more days per year?”

<table>
<thead>
<tr>
<th>Response</th>
<th>Absolute number</th>
<th>Share of total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, 1-5 cent more</td>
<td>342</td>
<td>35</td>
</tr>
<tr>
<td>Yes, 6-10 cent more</td>
<td>225</td>
<td>23</td>
</tr>
<tr>
<td>Yes, 11-15 cent more</td>
<td>62</td>
<td>6</td>
</tr>
<tr>
<td>Yes, more than 15 cent more</td>
<td>69</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>I do not buy milk</td>
<td>82</td>
<td>8</td>
</tr>
<tr>
<td>I do not know</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>Total number</td>
<td>971</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Milieudefensie/TNS-NIPO, 2015

In a somewhat older report (Van den Pol-Van Dasselaar et al., 2002), and based on the outcomes of a questionnaire survey where 258 Dutch were asked about their opinion on the importance of grazing, it is said that animal health and welfare is the most important reason for cows in pastures. That is, people think that a cow in a field is better off; these cows usually have better opportunities to perform natural behaviour compared to indoor-housing. However, people not only think that pasturing benefits animal welfare, they believe it benefits nature and landscape too. Grazing as a key factor for the quality and flavour of the milk was considered less important.

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

Are there any obvious additional economic or social benefits provided on the back of ESBOs? Rural amenities, for example, can increase the tourism potential leading to new jobs and income sources. Please identify ancillary economic and social benefits in conjunction with the
analysis and description of the SES, and pay particular attention to the EU objectives of inclusive, smart and sustainable growth: creating employment, enhancing sustainability, strengthening innovative capacity.

3 Shifting societal norms, collective learning and voluntary actions

At least 85 percent of dairy cattle in the northwest part of the Netherlands (the pasture areas in the west part of the provinces of Utrecht and North and South Holland) has access to pasture. In the vast pasture areas in the east and north of the country and in the south-western province of Zeeland, 65 to 75 percent of dairy cows are pastured. In areas of intensive dairy farming, like the southern province of North Brabant, the number of grazing dairy cattle is significantly lower.

Private and public measures can be devised to maintain or enhance grazing on dairy farms. These policies should counteract the full-time housing of cattle, and improve the image of dairy farming as becoming increasingly industrial. Grazing makes dairy farming visible in the landscape and is therefore nowadays seen as a crucial element for dairy farming to keep up a positive image within society (e.g. Outdoor Grazing Covenant, Convenant Weidegang, 2012). Covenants are a voluntary negotiated agreement between the government and sectors of industry (see Bressers et al., 2011). Because generally society favours grazing, and is willing to pay for it by buying meadow dairy of Stichting Weidegang (Dutch Grazing Foundation), having cows graze pasture is in most situations economically attractive.

In the Netherlands, the public debate on cows in pastures is quite strong and many parties are involved. Several dairy companies, not only CONO but also major players as FrieslandCampina, have launched large commercials to boost the image of dairy products with grazing as one of the trump cards. Stichting Weidegang actively promotes ‘preservation of the current level of grazing’. The largest share of the dairy industry has joined in by signing up the Outdoor Grazing Covenant. The debate amongst dairy farmers about this Covenant is very strong.

The Grazing Foundation provides member dairy farmers with advice on outdoor grazing. Several parties who signed the covenant initiate learning oriented projects. The covenant has also been signed by universities (of applied sciences) and research institutes. CONO also aims to give advice to farmers as part of her activities within the covenant. Within its sustainability program Caring Dairy, thematic farmer groups organise 3 times a year a farm walk to optimize grazing on their farms. Caring Dairy was developed in the Netherlands by CONO Cheesemakers and Ben & Jerry’s and aims to make the entire dairy chain (from milk to cream to ice cream) more sustainable. Another example to enhance sustainability in dairy farming is the project Amazing Grazing 2.0 in which the Dutch Dairy Organisation (NZO) and the Farmers Union (LTO) initiate research for finding solutions for implementing grazing and the translation of these solutions to, for instance, management tools and grazing systems. Amazing Grazing aims to

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3 At least in the Netherlands, the government prefers voluntary agreements with those producers or consumers who are directly involved in the attainment of sustainability and environmental goals.
stimulate the application and development of grazing in the Netherlands as part of future proof farming.

As will be explained later on in Section 4, instruments and initiatives to stimulate grazing can be divided into the following categories (see also Reijs et al, 2013): (i) milk price incentives (‘grazing premiums’); (ii) regulation on grazing (for instance, in Sweden and Norway grazing is mandatory for all dairy farms); (iii) other regulations (for instance, legislation on ammonia emission and subsidies for new housing are more favourable for dairy farms that apply grazing compared to non-grazers; (iv) knowledge development (has, for instance, the new generation of farmers been educated with the tradition of grazing?); and (v) CAP reform.

As mentioned earlier, since a couple of years there is big pressure from the public to promote dairy cattle being kept on pasture. As a result, initiatives have been introduced to make this compulsory by law. More specifically, the Lower House is making fuss about pasture grazing and some political parties want to make it mandatory for dairy cattle in the Netherlands, against the wishes of Minister for Agriculture Van Dam. In February 2017, the Dutch parliament decided that it is better to encourage voluntary pasture grazing than to prohibit the full-time housing of cattle. If by 2020 more than 20 percent of the Dutch cows are confined indoors all year round, then there is still a chance that regulation on grazing is put in place. However, nothing is sure in life, because a few days later a motion passed in parliament calling on the government to find any way possible to still secure pasture grazing. It is not clear yet how this motion should be interpreted, what its implications are and whether this means that grazing becomes mandatory for dairy cattle in the Netherlands. But what is certain is that the public debate on cows in the meadow is not over yet.

The idea behind this decision is that the choice between putting cows in the meadow or keeping the cattle indoors (and whether pasture grazing should be voluntary or mandatory) should be made integral, by individual farms. Unilaterally imposed regulation is not farm specific, but usually based on some ‘single components’ that should fit the entire sector. A voluntary choice, tailored to a farmer’s own agricultural entrepreneurship will make a greater contribution to actual grazing – and thus to the provision of ESBOs – since the entrepreneur is expected then to be more motivated. As such, voluntary grazing is a well-understood, anticipating and proactive strategy, not only to guarantee a farm’s long term continuity, but also to create a new competitive edge with meadow dairy products of the Grazing Foundation anticipating a further ‘greening’ of consumer preferences.

So, an advantage of milk price incentives is that, at least in principle, it combines the properties of effectiveness in ESBOs terms and efficiency in economic terms. Through the pricing mechanism, ESBOs will be supplied by those who can achieve them at the least cost (or by those for whom pasture grazing is financially most attractive). Such a dynamic efficiency property is generally not ascribed to regulation on grazing: inflexibilities in rules and legislation leads to static inefficiencies, ignoring cost differences between firms. Moreover, it can be expected

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4 In the Netherlands a grazing premium has been applied by CONO since 2002. Friesland Campina (75% of the milk) introduced the grazing premium in 2009.
that regulation results in a relatively heavy burden on the government budget, since the administration and enforcement costs often prove to be relatively high.

In general, and from the theoretical viewpoint of environmental economics, it can be said that regulation on grazing better meets the objectives of the government than using grazing premiums, although it is at the expense of consumers’ wealth and the effectiveness and efficiency of ESBO-provision.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

4.1.1 Collectives

Nature management programs in the province of Noord-Holland are targeted to core areas for meadow birds (Kuiper, 2015). The collectives conclude contracts with farmers and secure the transfer of agri-environmental payments to 8,000 farmers (national total; 80,000 ha). The total amount transferred to farmers in the Netherlands (€60 million) is from EU and provincial funding. These payments cover the nature management practices adopted by farmers. The collectives are regionally targeted, responsible to monitor nature management and conclude management contracts for

(i) field border management,
(ii) protection of meadow bird and
(iii) maintenance of landscape elements.

Collective approaches were implemented in the Netherlands and targeted at agri-environment-climate measures. The scheme started in 2016, with a short-term (until 2020) focus to enhance the efficiency of nature management and a longer-term (beyond 2020) towards sustainable rural areas, including viability of agriculture. Ministry of Economic Affairs (2016) offers the four main argument why a collective approach was adopted in the Netherlands:

a. A cross-farm approach is considered essential to reverse the declining trend in farmland biodiversity (mainly farmland birds and ecological corridors).

b. Flexibility regarding conservation measures, location and level of compensation would potentially increase the effectivity of programs.

c. Implementation costs are reduced, administrative processes would be simplified and compliance to schemes improved by working with cooperatives.

d. The Netherlands has a long tradition of agri-environment co-operatives, operating as cooperatives securing the provision of public goods and a partner for farmers and the government.

The perceived benefits of such cooperatives would be (a) increased environmental outcome; (b) increased flexibility regarding the design and location of conservation measures. By 2016, there are 40 collectives in the Netherlands. The operate as applicant. The province of Noord-
Holland has four collectives: (i) De Lieuw, (ii) Hollands Noorden; (iii) Water, Land en Dijken; and (iv) Noord-Holland Zuid.

4.1.2 Outdoor grazing covenant

Pasture grazing is promoted through the outdoor grazing covenant (Convenant Weidegang) (Reijs et al., 2016):

a. Providing financial incentives for pasture grazing.

b. Offering support for new pasture grazing farms and the development of new knowledge. The Dutch Grazing Foundation (Stichting Weidegang)

c. Develop new knowledge and grazing concepts.

The outdoor grazing covenant was agreed in 2012 as part of the Sustainable Dairy Chain. This covenant was agreed among a large number of parties linked to the dairy chain, including dairy farmers, dairy companies, retail, cheese traders, nature organisations, government, as well as education and knowledge. Dairy companies target to commercially market products that are produced from dairy cows with pasture grazing. Pasture grazing is certified with a minimum of 120 days a year, and 6 hours per day at least.

Figure 5 presents a picture of outdoor-grazing in the Netherlands. It shows that fields still could look empty. Outdoor-grazing takes place through rotational grazing systems, mainly at the field parcel near the farm house.

Quote: ‘More than 90% of the dairy cows graze in this region. Rotational grazing systems are applied. This implies that most of the fields could look empty. However, the grass from the whole farm is used to feed dairy cattle.’ (Farmer, during interview)

Figure 5: Outdoor grazing in the western part of the Netherlands (photo: Floor Brouwer)
4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

4.2.1 Concept of incentive mechanisms in markets and measures

Innovation and motivation are key factors for the successful adoption of market-driven approaches to support the provision of ESBOs (Figure 6). The figure does distinguish between markets and different incentive mechanisms. The features of private-sector approaches are compared to more public-sector driven approaches to stimulate ESBOs. Some schemes aim to create new markets and innovation seems to be the key mechanism. Motivation of farmers is the key focus when a scheme operates with a market mechanism.

![Figure 6: Incentive mechanisms for the provision of ESBOs by farmers (source: adapted with the permission of Franck Kuiper, Province Noord-Holland)](image)

Farmers build their grazing strategies on all four incentive mechanisms, although preferences for strategies differ per farmer depending on their farming styles. Incentive mechanisms towards farmers operate through the markets (existing markets or entering new markets) or, alternatively, through payments (private schemes through the food-chain, or public schemes through the CAP). In the context of the CAP Pillar II payments, farmers are compensated for not adapting their practices. Such payments could compete against market payments (including milk prices that becomes increasingly volatile in a liberalised market). Such Pillar II payments (e.g. nature management) in the CAP are incentives targeted to solve market failure to deliver ESBOs. Contrary to such compensatory payments in the CAP, there are market-driven payments. Motivation is a key feature of such incentives (e.g. grazing premium for the delivery of milk) that stimulate farmers to operate within the market. In addition, there are incentive mechanisms that target towards existing markets (e.g. selling cheese) or creating new markets (e.g. supply of ice through grazing milk) (see e.g. [http://www.benjerry.co.uk/]). The motto “Ben & Jerry’s Caring Dairy™ programme, with over 300 participating farms in America and Europe, is helping farmers to make a difference from soil to sunshine and everything in between.” ([http://www.benjerry.co.uk/values/how-we-do-business/caring-dairy](http://www.benjerry.co.uk/values/how-we-do-business/caring-dairy)). For this purpose it is needed to innovate within the supply chain. In existing markets it is needed to continue to
meet the requirements of these markets. These markets can evolve in time resulting in a need to adopt to consumer preferences for cheese. Soil quality would be an ESBO that could be supported from such mechanisms to enter new markets. In addition, incentive mechanisms might also target to remain compliant with changing requirements in existing markets.

4.2.2 Environmental policy

In anticipation of the abolishment of the milk quota regime, milk production has increased by most farmers in the past couple of years. The excess amounts of phosphorus increased rapidly, mainly with dairy farming. A proposal is send to Parliament (September 2016) to introduce right to the amount of phosphates produced in dairy farms. Farmers will only be eligible to grow dairy cattle in coming years if they have adequate amounts of phosphate rights. Such rights will be admitted by early 2017 and the reference level relates to the number of cows by 2 July 2015, when the system was introduced. A three percent reduction in the number of dairy cows is considered needed to comply with European legislation regarding emissions of phosphate. Sanctions might be introduced to dairy farming in the Netherlands if such reduction would not be achieved in time.

Phosphorus rights are going to be equivalent to the maximum allowable amount of phosphorus from livestock manure during a calendar year. It remains to be clarified how extensive production systems are affected. The production rights are transferable, but as part of each transaction, they are reduced by 10% of the amounts transferred. Such reduction of production rights is not applicable within a family from one generation to the next. The system will be applicable to all dairy farmers, but the generic reduction will become less severe for farmers with a large size of agricultural land related to the number of cows.

The dairy sector has introduced measures to reduce milk production and subsequently phosphorus emissions. FrieslandCampina, for example, has launched a program in September 2016, to compensate dairy producers for their reduction in delivery of milk. This voluntary program was in anticipation of upcoming measures to introduce phosphorus rights. Members of this co-operative who would reduce the delivery of milk would be compensated at an amount of €0.10 per kg of milk that is reduced. This amount comes on top of a European premium of €0.24 per kg of milk that is reduced. Farmers who reduce milk production during a period of six months by at least 2,000 kg and at most 40,000 kg would therefore be compensated by in total €0.34 per kg.

In February 2017, the Ministry of Economic Affairs introduced a program to farmers who their business and remove all animals (either by slaughter or export to other countries). This program allowed for a compensation of €1,200 per dairy cow or €276 per calf. The first tranche (20 February 2017) included 10,000 cows, and was closed very soon. The program in total has a budget of million €50. Half of the budget is from the Ministry of Economic Affairs, and the other half originates from the dairy sector. The compensation is foreseen to be reduced in upcoming rounds, since farmers could still continue delivery of milk in the coming months.

4.2.3 Agricultural policy

The size of the home plot (ha) and the number of dairy cows are essential farm management features to enable outdoor grazing (see Figure 7).
Figure 7: Key indicators on grazing in the Netherlands and the case study area, farms with dairy cows grazing 120 hours a year, at least 6 hours a day, 2015 (Source: Farm Accountancy Data Network (FADN), the Netherlands)

More than 90% of the dairy farms who are member of the CONO Kaasmakers have adopted outdoor grazing (120 days, at least 6 hours a day). The home plot on average is 29 ha in the western part of the country, which is approximately sixty percent of total farm size. It contributes to reaching outdoor grazing for close to 190 days per annum (Table 3).
Table 3: Features of dairy farmers with outdoor grazing in ‘Westelijk weide’ and other parts of the Netherlands, relative to average of dairy farming in the country (situation in 2015)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Farms with outdoor-grazing (120 days, 6 hours a day)</th>
<th>Average of all dairy farms in the country</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Westelijk weide</td>
<td>Other parts of the country</td>
</tr>
<tr>
<td>Farm size (ha)</td>
<td>48</td>
<td>50</td>
</tr>
<tr>
<td>Size of home plot (ha)</td>
<td>28.8</td>
<td>21.9</td>
</tr>
<tr>
<td>Number of dairy cows</td>
<td>77</td>
<td>88</td>
</tr>
<tr>
<td>Milk production (1,000 kg milk)</td>
<td>596</td>
<td>703</td>
</tr>
<tr>
<td>Milk per cow (kg)</td>
<td>7,722</td>
<td>7,984</td>
</tr>
<tr>
<td>Number of days with outdoor grazing</td>
<td>188</td>
<td>183</td>
</tr>
<tr>
<td>Share of farms with outdoor grazing (120 days, 6 hours a day) (%)</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Share of peatland in total land area (%)</td>
<td>55</td>
<td>6</td>
</tr>
<tr>
<td>Share of sandy soil in total land area (%)</td>
<td>10</td>
<td>65</td>
</tr>
<tr>
<td>Milk price (€ per 100 kg)</td>
<td>33.5</td>
<td>35.0</td>
</tr>
<tr>
<td>Income from farm operation (1,000 €)</td>
<td>51.8</td>
<td>36.8</td>
</tr>
<tr>
<td>CAP - Pillar one payments (€ 1,000)</td>
<td>12.0</td>
<td>14.3</td>
</tr>
<tr>
<td>CAP - Pillar two payments (€ 1,000)</td>
<td>4.0</td>
<td>10.1</td>
</tr>
<tr>
<td>Outdoor-grazing premium (€ 1,000)</td>
<td>4.8</td>
<td>7.4</td>
</tr>
<tr>
<td>Total revenues per cow (€)</td>
<td>2,792</td>
<td>3,050</td>
</tr>
<tr>
<td>Revenues from milk (€ per cow)</td>
<td>2,540</td>
<td>2,751</td>
</tr>
<tr>
<td>Revenues from dairy products (€ per cow)</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: LEI-Informatienet.

Pillar I payments at dairy farms with pasture grazing in the western (polder) part of the country on average is some €12,000 per farm. This is smaller than the average of all dairy farms in the Netherlands (€15,800 per farm). While total milk production at the first group does reach 596,000 kg milk per holding, it is 797,000 kg milk per holding at the average of all dairy farms. CAP Pillar II payments at dairy farms with outdoor-grazing in the western part of the country on average is some €4,000 per farm, which is considerably below that of the average of all dairy farms in the Netherlands (€7,500 per farm).

**Market prices and premium for outdoor-grazing**

Market prices in 2014 were around €41 per 100 kg of milk. Since then, market prices rapidly declined (€34 in 2015) and reached around €27 per 100 kg of milk (summer of 2016). Some farmers interviewed targeted at maintaining revenues by increasing milk production, and reduced costs because the fairly low costs of feed, energy and capital.

The premium for pasture grazing was still fairly small in 2015. By then, the premium for outdoor-grazing on average was some €4,800 per holding in the western polder region of the Netherlands. By 2016, the payment is some €1.00 per 100 kg of milk, and CONO has announced to double the payment in 2017, to reach €2.00 per 100 kg of milk. The outdoor-grazing premium would be some €15,000 per farm for a dairy farm with 750,000 kg of milk.
Revenues
Total revenues per cow are around €2,792 per cow, and includes milk (€2,540 at dairy farms in the western polder region of the Netherlands who also adopt outdoor-grazing), complemented with €3 from on-farm sales of processed dairy products (e.g. yoghurt, cheese). The revenues differ by farm size (Table 4). The grazing payment includes a sustainability payment, which however is a small part of this payment.

Table 4: Dairy farmers with outdoor grazing in ‘Westelijk weide’ and other parts of the Netherlands, relative to average of dairy farming in the country (situation in 2015)

<table>
<thead>
<tr>
<th>Number of cows</th>
<th>Production value of milk (€, excluding VAT)</th>
<th>Pillar 1 payment in CAP</th>
<th>Pillar 2 payment in CAP</th>
<th>Grazing payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>80,232</td>
<td>5,830</td>
<td>2,019</td>
<td>2,328</td>
</tr>
<tr>
<td>50-100</td>
<td>200,385</td>
<td>11,914</td>
<td>1,579</td>
<td>6,153</td>
</tr>
<tr>
<td>100-150</td>
<td>339,492</td>
<td>19,547</td>
<td>5,960</td>
<td>10,862</td>
</tr>
<tr>
<td>150-200</td>
<td>465,284</td>
<td>27,488</td>
<td>4,070</td>
<td>14,254</td>
</tr>
<tr>
<td>&gt;200</td>
<td>740,216</td>
<td>38,773</td>
<td>4,212</td>
<td>22,823</td>
</tr>
<tr>
<td>Total</td>
<td>234,442</td>
<td>13,878</td>
<td>3,019</td>
<td>7,308</td>
</tr>
<tr>
<td>West Netherlands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-100</td>
<td>173,031</td>
<td>10,783</td>
<td>3,152</td>
<td>5,309</td>
</tr>
<tr>
<td>100-150</td>
<td>310,314</td>
<td>17,284</td>
<td>5,203</td>
<td>10,999</td>
</tr>
</tbody>
</table>

Source: LEI-Informatienet.

For the Netherlands, the average milk price per farm was about 34.6 eurocent (std. dev. 3.75). Pillar 1 and pillar 2 average payments amount respectively about 2.2 cent (std. dev. 0.7) and about 0.6 cents (std. dev. 1.9). For CONO, the grazing payment in 2015 was 1 cent per kg and 2 cent per kg in 2017.

4.3 The role and impact of policy in ESBO provision

About 10 years ago there was still grazing at a large scale and there was hardly concern about possible declining trends. However, the share of the number of grazing cows in total number of cows decreased since then. Societal preferences gained visibility, through animal welfare groups and the Dutch Party for Animals. In 2013, the Government mentioned in a letter to the House of Representatives that she support the dairy sector initiative (Covenant Stichting Weidegang) in their objective to maintain the level of grazing at the existing level.

After a long period of hearings and debates, the Dutch house of representatives has voted in favour for a motion asking the government to introduce regulation to guarantee grazing of dairy cattle. The motion itself does not give insight in the way it should be arranged. Motions that were precise (e.g. more SMART with respect to number of days, number of hours per

---

5 Letter of Secretary of State of Economic Affairs to Dutch Parliament of 13 December 2013.
6 Dutch Parliament, House of Representatives, Motion 21501-32-982, Party for Animals 23 February 2017
days and the year in which more than 80% of the dairy cows should be grazing) were not accepted. Earlier, the House of Representatives had already accepted a motion which states that cows need to be grazing. This motion was a follow-up of a motion from 2014 which stated that cows should be grazing, asking the government either for regulation or an agreement with the dairy sector on grazing cattle.

In the period in between, the House of Representatives and government discussed during several occasions grazing of dairy cattle (2016-2017). For instance in June 2016, many organisations (science, society and dairy sector) were asked to express their views on grazing. The dairy sector itself is not in favour of a legally binding grazing standard. On the one hand, the dairy sector argues that an existing business model for farmers with voluntary grazing will be lost when a legally binding standard is introduced. On the other hand, animal welfare organisations and political parties like the Party for Animals and left wing parties pursue a legally binding grazing requirement. During the first half of February 2017, the House of Representatives requested the government to prepare a legally binding grazing requirement in case less than 80% of the dairy cows is grazing in 2020. However, as mentioned before, the House of Representatives decided later in February 2017 to introduce a legally binding grazing requirement. At the moment, the consequences of this motion are unclear.

4.4 The role of the private sector in ESBO provision and enabling factors

The grazing premium offered by milk processors link farming practices to product quality. Such a premium is therefore embedded in a marketing strategy, which potentially is stronger than public sector driven approaches. Cheese from CONO Kaasmakers (Beemsterkaas) is produced from 100% grazing milk, 120 days a year at least six hours a day. Inspection of grazing and assurance of the quality is through CONO Kaasmakers (with on-farm visits) and an independent body (Qlip – quality assurance in agrifood: http://www.qlip.nl/en/), inspecting through a selection of farms (offer a high quality product on the market, including the active marketing of milk from grazing. The intensity of production is below that of other parts in the country. The size of the home plot remains a critical feature of the farm to enable grazing.

5 Potential pathways towards an enhanced provision of ESBOs

There are several tensions and synergies between the provision of ESBOs:

Synergies are created among the four ESBOs: landscape character and cultural heritage, farm animal welfare, soil functionality and species and habitats. The grazing premium offered to dairy farmers is important to acknowledge the final products (e.g. cheese) are based on farming systems grazing for a considerable part of the year. It reflects the appreciation by consumers and is part of a business strategy towards the national and international market (e.g. Germany). The grazing premium creates synergies with open landscape features. A premium of €2 per 100 kg of milk will be a major incentive for farmers, and might exceed the Pillar I pay-

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7 Dutch Parliament, House of representatives, Motion 34000-XII-80, 30 October 2014
8 Dutch Parliament, House of Representatives, Motion 34313, no. 8, 6 February 2017
ment in the CAP (see Table 4). It is an important feature towards consumers farmers are rewarded for the provision of public services, and securing animal welfare. Happy cows having access to fresh grass is perceived to add positively to the health and nutritious conditions of animals. Such ESBOs contribute to the quality of cheese. Grazing is an important instrument towards nature management, with less mowing of grass, different types of grass and improved soil conditions.

Monitoring of grazing and enforcement of the rules (120 days of grazing, at least 6 hours a day) remain a challenge. Monitoring of grazing is currently implemented by CONO Kaasmakers, and the dairy farms keeps track of outdoor-grazing through a calendar. The co-operative visits the farm to inspect outdoor-grazing. Quality assurance needs to be implemented through independent bodies. In order to assure the quality, Qlip (quality assurance in agro-food) does perform a selection of farm visits to monitor outdoor-grazing. More advanced ICT technology (e.g. GPS system) could create synergies with the maintenance of open landscapes.

Image is important for the provision of ESBOs, especially the ESBO on landscape character and cultural heritage. Management of landscapes through grazing systems are important for the image of a region. Grazing is appreciated by the local population, as expressed by media attention. Some farmers also invite school classes to visit their farm and explain the contribution of the farm to the region and beyond.

Environmental policy remains an important challenge for dairy farming in the Netherlands. Phosphorus rights are going to be introduced in 2017, equivalent to the maximum allowable amount of phosphorus from livestock manure during a calendar year. It remains to be agreed how extensive production systems are affected. Meanwhile buy-out programs have been implemented during the first quarter of 2017.

Labour requirements of outdoor-grazing could create tensions with maintaining open landscape features. Grazing requires additional labour for transfer of dairy herds, but reduces some of the labour needs for mowing of grass. Compared to in-house production-systems, Grazing is more unpredictable and requiring more labour.

Image motivates farmers to maintain grazing. Pasture grazing is an important feature of the region towards local population. The image towards the local population is a feature of outdoor-grazing. Moreover, membership of a co-operative CONO Kaasmakers promotes quality products, including milk from outdoor-grazing systems. The special quality of the grass is achieved from the sea-wind, adding to the taste of the cheese.

The price of land is a key socio-economic factor for outdoor-grazing, mainly with an increase in milk production. Additional land is needed to enable an increase in production (among others because of environmental legislation). Land prices are high (the order of magnitude of €80,000 per hectare), especially in the highly productive clay area with bulb growing as intensive production systems and high revenues per hectare.
So far, the rules for grazing focus at 120 days per year, with a minimum of 6 hours a day. However, the number of grazing days in the western part of the Netherlands exceeds 180 days. There might be scope to introduce a graduation of grazing premium, with a higher payment if the number of grazing days is considerably higher. Organic farming, for example, already introduced grazing rules with grazing for at least 6 months (15th April to 15th October), at least 8 hours a day. This might create niche products, potentially with higher prices, and could acknowledge the provision of ESBOs that exceed national average.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The social-ecological framework (SES framework) was designed with a view to gradually build a comprehensive picture of the main interactions among the resource systems in place, their drivers, key actors and outcomes. This framework was grounded in a couple of expert interviews in Steps 1 and 2, complemented with a literature review. Interviews in stage 1 and 2 were designed, taking into account the comprehensive view of the framework.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

Corporate social responsibility is a key feature of the marketing of CONO Kaasmakers, with focus on a fair price for farmers, happy cows (to reflect high animal welfare conditions) and high levels of soil functionality. Grazing is the farming system in place, which is linked to the ESBO in place, i.e. provision of landscape character and cultural heritage.

7.2 Key findings on governance arrangements and institutional frameworks

Pasture grazing is branded by the cheese makers and other dairy processors in the Netherlands. The current premium for outdoor grazing is governed by dairy processing companies in the country. Milk processors have adopted diverse systems with respect to the level of payment and requirements. In our case study, CONO cheesemakers offers a premium of € 1 per 100 litre of milk (situation 2016), subject to outdoor-grazing of 120 days (at least 6 hours a day). The company will double the premium from 2017 onwards, to be € 2 per 100 litre of milk. Dairy farmers who comply with outdoor-grazing requirements receive the premium if the cows stay out for at least 120 days and a minimum of 6 hours a day. The premium is to acknowledge appreciation by the consumers for outdoor grazing and evidence to offer a ‘fair price’ to farmers. Outdoor grazing is important in branding the cheese.

Including the value chain more explicitly in the methodology is important for private based mechanisms. A number of challenges remain that could potentially affect outdoor-grazing in the future, and subsequently the provision of ESBOs:
• It remains a challenge what is the perspective of public goods related to dairy farming in the coming ten to twenty years. The sector does currently face a highly volatile market and considerable price fluctuations over time. It is important how to strengthen the link between economy and ecology. Farmers tend to focus on modernization, increasing production and intensification. A new link between economy and ecology (e.g. to link nature with water management) could offer perspectives to dairy farming. This needs to be explicitly included in the methodology.

• A fixed premium (e.g. subject to the provision of milk with grazing) might be provided to the farmer with grazing, also to acknowledge the provision of public goods (e.g. landscape management, nature management). Moreover, primary production would be delivered to a volatile global market.

• It remains unknown what is the role of public sector for the maintenance of public goods. The public sector (e.g. provincial authorities) might be mainly to facilitate the provision of public goods, rather than control and transfer payments. Example: collectives in the Netherlands have bought drones to monitor nests for birds in grassland.

• Farmers appreciate that the premium is targeted at farming practice and therefore is legitimatized. In this sense, a premium for grazing can be explained to their (non-farming) neighbours as something positive.

7.3 Other enabling or limiting factors

Several factors enable outdoor-grazing and subsequently support the provision of ESBOs:

• The business payment scheme does acknowledge outdoor grazing is a quality premium for dairy farmers. Branding outdoor grazing will enable dairy farmers to maintain landscape management, possibly with other environmental and social benefits from dairy farming.

• Outdoor grazing showed a declining trend in the past decade and stabilized in the recent past. In order to meet the availability of grass to be able to feed the dairy herd, farm structure features are critically important to maintain outdoor grazing. The two most important ones are the number of dairy cows and the size of field parcel near the stable.

• Appreciation by consumers is a key factor enabling outdoor-grazing. It is also perceived by consumers as a notification of quality of production. The size of the parcel near the farm house is a key factor whether or not dairy farmers are able to maintain outdoor grazing.

The main factors limiting outdoor grazing relate to the abolishment of milk quota. The abolishment of milk quota induced an increase in the number of dairy cows in the Netherlands, which eventually reduces the possibility to feed all dairy cows from the grassland that is near the farm house. In addition, manure legislation tends to stimulate livestock producers towards in-house production systems, mainly to control emissions and dispose livestock manure.

Payments for delivery of public goods might be most appropriate if it could be linked with product quality rather than public payments. Public policy aims to reverse the decline in outdoor-grazing and have 80% of the cows in outdoor-grazing by 2020. It remains a challenge
how outdoor-grazing could be secured in the coming ten to twenty years. Such an understanding could offer perspective to the dairy sector in a highly volatile market.

The figure shows the declining trend of outdoor-grazing. Recently, there is a stabilization in the number of grazing cows. While 90% of the cows were managed by outdoor-grazing in 2001, this figure reduced to 70% (2014). The number of cows with outdoor-grazing in the western part of the Netherlands exceeds national average.

7.4 Contributions to EU strategic objectives

The grazing premium from the dairy sector is directly linked to the marketing of products (e.g. milk, cheese, ice). Retail sector in Germany, for example, is increasing demanding the grazing is assured through digital measuring systems. Different digital systems are approved to assure grazing does comply with the system of grazing for 120 days and at least 6 hours a day. Criteria to approve these digital system are robustness, trustable and useful at the farm (https://drimble.nl/dossiers/agrifood/41486401/drie-meetsystemen-toegelaten-voor-wei-deregistratie.html). The systems approved are from GEA (www.gea.com), VSM and the Internet House (http://www.hetinternethuis.nl/Het%20Internet%20Huis%20-%20Weide-gang%20-%202017%20-%20Digitale%20Flyer.pdf).

7.5 How about the transferability of the approach/mechanism used?

Grazing is on the decline throughout Europe, and some northern European countries (e.g. Sweden) have introduced mandatory regimes for grazing. Other countries (e.g. Austria) have established markets for the delivery of milk from organic production and fully making use of hay to feed the animals. The Dutch Grazing Foundation (Stichting Weidemelk) also initiated efforts to enhance grazing at dairy farms in Germany. There are at least three factors critical for the successful transfer of mechanisms towards other regions and approaches:

- a. The business premium is linked to the story of grazing.
- b. Skills of grazing and grassland management needs to be improved. Knowledge transfer about grassland management needs to be improved, among others with farmers who transform from indoor-production towards grazing systems. The Dutch Grazing Foundation does guide a few hundred dairy farmers who want to re-introduce grazing in their production system. Grass could again become part of the future of the CAP.
- c. Dairy market (processing and retail) is transforming and increasingly targeted towards grazing.

Related to these factors, grazing needs to be implemented in modern production systems (e.g. automatic milking system, with milking robots to be integrated with grazing systems; increasing scale of production).
8 References (including projects docs, evidence reports etc.)


Wageningen UR Livestock Research, report 687, Wageningen.


9 ANNEX: Reflections on the case study methodology used

9.1 Objectives and activities undertaken with initiative/stakeholders

CONO Kaasmakers is interested to participate, and this was confirmed in October 2016. The existing premium for outdoor grazing is governed by dairy processing (e.g. cheese makers in co-operatives like CONO Kaasmakers). Milk processors have adopted different systems, and CONO Kaasmakers has decided to increase the premium from 2017 onwards. It was mutually agreed to study the premium from the business sector in the context of appreciation and valorisation of ESBOs (mainly landscape value) through farmers, consumers of milk products (e.g. cheese, ice) and people living in a region. We consider the business case to be very innovative in the context of Europe.

The premium for pasture grazing is an initiative taken by the dairy sector. The case study is highly relevant in the context of the abolishment of milk quota regime, and the volatile dairy market. Following the rapid increase of milk production in the recent part which increases pressure on the manure market. There is a discussion to introduce additional manure legislation. Farmers complain that quota on the production of phosphorus in manure is increasingly felt as a new type of legislation to control milk production. Manure legislation could increase the share of farming with in-house production systems. Grazing is politically sensitive as illustrated by the hearing in the Dutch parliament on the topic, July 2016. Parliament has recently decided not to introduce a mandatory system of permanent grazing.

The case is relatively small with respect to the area, which complicates the potential for upscaling. Pasture grazing is declining in Europe, due to intensification of production and increase of animal production per farm. The learning potential is embedded in the factors that play a role. Replicability also depends on the context in other areas. Other products sold as specific niche markets for different attributes of products could learn from this case. There is potential to compare the premium for outdoor grazing, initiated by the business sector with CAP support payments and milk prices.

The following stakeholders are interviewed:

- May 25, interview with Franck Kuiper, Province Noord-Holland. Discuss the importance of collectives in the context of agri-environmental programs, and the increasing importance of provincial authorities towards agriculture and nature management.
- June 2, interview with Grietsje Hoekstra, CONO Kaasmakers, Westbeemster. Discuss premium for outdoor grazing. Outdoor-grazing is considered essential to secure product quality (mainly cheese). The premium has stopped the decline in outdoor-grazing. The size of the home-plot might become a constraint with an increase in the number of dairy cows per farm.
- August 5, interview dairy farmer in Lambertschaag.
- August 5, interview dairy farmer in Midwoud.
- August 12, interview dairy farmer in Hobrede
• August 29, interview with Grietsje Hoekstra, CONO Kaasmakers, Westbeemster. Reporting on the interviews and discuss initial plan for a follow-up. A proposal will be send to CONO Kaasmakers before September 15.
• December 13, interview Kees-Jaap Hin, Dutch Grazing Foundation (Stichting Weidegang), to discuss incentives for pasture grazing
• December 22, 2016. Interview Franck Kuiper, Province Noord-Holland.
• January 24, 2017. Interview Sjaak Hoogendoorn, chair of the collective Water, Land en Dijken (WLD). Discuss the experiments on Pillar II programs to compensate for grazing, as part of the experiments towards collectives in part of North-Holland.
• March 10, 2017. Workshop with stakeholders (CONO and farmers) on the future of grazing and the relevance of the Common Agricultural Policy.

9.2 Judgement on the process

There is a good interest in the agribusiness to contribute to European discussions, including the CAP. However, dairy farmers face highly volatile market conditions (e.g. market prices highly fluctuate) and there is major debate on the future of environmental legislation in the Netherlands, largely affecting dairy production. Therefore, we need to match the longer-term ambitions of PEGASUS with the current debates in the farming sector.

9.3 Supporting data and statistics

Additional data are used from the Sustainable Dairy Chain and the Farm Accountancy Data Network in the Netherlands.
CASE STUDY

SKYLARK (NETHERLANDS)

D4.3 | Final Version | March 2017

Judith Westerink, Anne van Doorn, Wageningen Environmental Research

www.vandenborneaardappelen.com
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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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10.1 Objectives and activities undertaken with initiative/stakeholders ..................371
10.2 Outcomes and further steps ..............................................................................372
10.3 Judgement on the process .................................................................................372
1 Introduction: What is the case study about?

This case study focuses on the Skylark foundation: an organisation that unites arable farmers, food processors and stakeholders in the supply chain to stimulate a joint effort to improve sustainable arable farming. In total 388 arable farmers are member of the foundation, managing over 45,000 ha (8.7%) of arable land in the Netherlands (Annual report 2015). An individual sustainability plan is the core element used by Skylark members in realising and communicating sustainable arable farming. Unlike what the name seems to suggest, Skylark does not specifically focus on the conservation of the skylark, but rather on sustainable land management. In summary, the Skylark approach is interesting as governance arrangement, and as private initiative it is relevant in the search for innovative governance arrangements. Interesting features of the approach are the focus on intrinsic motivation, tailor-made sustainability plans, social learning among farmers, the involvement of food processing industry, and the attempts to get recognition for the farmers’ sustainability efforts in CAP greening.

Table 1: Overview of case study

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Netherlands (Skylark Foundation) with embedded case of Midden Brabant group in area of De Dommel Water board.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Skylark: arable farming. De Dommel area: arable farming, intensive cattle breeding, forestry, nature reserves.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; Case Study)</td>
<td>De Dommel area is 150,000 ha; Skylark Midden Brabant farmers manage 1,900 ha</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Water quality, water quantity, soil health.</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Netherlands: supply chain companies, consultancies, Ministry of Economic Affairs. Midden Brabant group: De Dommel Water board</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Skylark meetings and activities: private, including the farmers. Specific projects: sometimes public.</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>2002</td>
</tr>
<tr>
<td>End date of initiative</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>

As the organisation is rather large and sub-divided into regional farmers’ groups, the Pegasus case study focuses on a regional group in Midden Brabant, between the cities of Eindhoven and Tilburg in the south of the Netherlands (Figure 1). This group consists of 9 arable farmers (2016). They have mostly large-scale farms, are not organic, and one of them is a front-runner farmer practising precision agriculture. This case study focuses on the ESBO’s soil and water because of the interests of this regional farmers group.

The case study region, the working area of De Dommel Water board, covers approximately one fourth of the Province of Noord-Brabant. The 9 farmers of the Midden Brabant Skylark group together represent approximately 1,900 ha (including land outside the Dommel area, interview 2) and the area of the Dommel Water board is app. 150,000 ha (www.dedommel.nl).
The case study region is a predominantly small-scale landscape on sandy soils, in which farmland is intersected by forests, small nature reserves and creeks. Because of the main interests of the group, we focus in the case study on water and soil related benefits. Because of the sandy soils, drought is an issue in summer, but in lower parts peak water can be problematic. As a result mainly of intensive farming practices, water quality is poor, as critical loads of nitrogen deposition are structurally exceeded. Water quality and quantity are related to soil management and farmers acknowledge this relation (interviews 2,3,4). According to group members, raising soil organic matter is a main issue in relation to soil fertility and soil moisture (interview 3,4). Based on the interviews and the ESBO’s of soil and water we identified the regional Water board De Dommel as main governmental stakeholder.

Figure 1: Location of farms participating in the Skylark Midden Brabant group and the working area of De Dommel Water board
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

CASE STUDY: Skylark

Key ESBOs considered:
1. Water quality
2. Water availability
3. Soil health

RESOURCE SYSTEM
Area of Water Board De Dommel, small-scale landscape close to cities, with small rivers flowing to Meuse

RESOURCES UNITS
Arable farms of Skylark participants Midden Brabant: arable land, buffer strips and ditches. Main crop: potatoes.

ACTION SITUATIONS
Choice of product, hiring land, land management, drainage. Skylark members meet to improve sustainability, incl. improvement of soil organic matter. They aim for collaboration with Water board for layout of buffer strips along shores in return for land to be leased elsewhere.

ACTORS
Direct: arable farmers, Skylark, Water board, food processors. Indirect: other farmers incl. livestock, local population, province, drinking water companies, state, EU

GOVERNANCE SYSTEM
Private: Skylark as network of farmers learning from each other, personal farm plan, food processing industry asking for sustainable products. Public: WFD, ND, CAP, AES, property rights, etc.

MACRO-ISSUES
Extreme weather events
World market
Advancing technology

Figure 3
Summary of the SES framework for Skylark case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)
2.2 Description of the SES

2.2.1 Social, economic and political settings

On a national level there is a decrease of area under arable production and number of arable farms (see Annex 9.2). At the same time, the average size of farms is increasing as well as land prices. Farm incomes slowly rise, but fluctuate. Payments from agri-environmental-climate schemes (AECS) contribute approximately 1% to farm income on an average arable farm (www.agrimatie.nl), while direct income support constitutes 47% of the farmers’ income. Between 2004 and 2014, the number of arable farms in the Province of Noord-Brabant diminished with 37%, while other farming systems in Brabant decreased with 22% in the same period. Main crops are potatoes, cereals and root crops (CBS).

The most important crop in the case study area is potatoes. Other crops are mainly grown for rotation purposes, including unions, carrots and maize. All Skylark participants in this group sell the largest share of their production to traders and food processing companies (such as Rijko, Ardo, Farm Frites) and not to local markets. This is a result of the sandy soils (narrowing down for instance the type and quality of potatoes) and the large size of the farms (limiting the options for local marketing: local markets are considered too small) (interviews 2,3,4).

According to the interviewees expansion of farms in the case study is a result of some farmers not having successors while others take over the holdings of the ones that suspend (interview 2, 3, 4). Interviewees relate this to the extent to which farmers have been able to invest in modernisation and enlargement. Farms that are too small and old fashioned are considered not attractive to the new generation: another barrier is the high amount of office work that is nowadays part of the job (interview 3, 4, notes of meeting). All participating farmers have personnel (interview 3). There is no notable movement of new entrants: because of the high costs of starting a farm, new entrants normally appear in urban agriculture or nature-oriented farming (based on leasing low-cost low-productive land in nature reserves).

In the case study region arable farming has increasingly become a high-tech operation. All participating farmers use advanced machinery and technology for cultivation, irrigation, harvesting and storage. The farmers use technology to combine more sustainable practices with lower costs. One of the participants is a front runner in precision agriculture, collecting all kinds of data about the land and the crop. He saves on his pesticide costs by counting bugs in the field and adapting the dose to the subarea in the field as well as to the weather forecast (interview 4). Another farmer has a subsoil system to transport water from a wet area on his farm to a dry area during winter: this saves him the costs of at least one time irrigation in summer (interview 3).

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1 See http://www.farmhack.nl/resultaten-farmhack-1-datavisualisatie-pieperboer/ for a report of a hackaton based on his data
Resource systems and resource units

Skylark regional networks consist of arable farms that are scattered across a region. The case study region also has other types of farms, such as livestock farms. Arable fields are intersected with ditches that are part of the water system. The ditches drain to creeks and creeks to rivers. The water levels and flows at farm level are managed through a sophisticated system of ditches, sluices, and sometimes drains. At regional/watershed level the water is managed by means of canals, dikes, sluices etc. Water systems are delineated as governance area: Water boards cover watersheds. However, creeks flow from Belgium to the Netherlands and the rivers from the case study Water board area flow into the river Meuse. The farmers manage the ditches, but the Water board has set rules about irrigation and the maintenance of ditches. The Water board maintains the larger water ways. The area has several zones where groundwater is protected for drinking water production, this is a provincial responsibility (Figure 3). In water that is currently collected, traces of pesticides are found dating back 25 years (interview 3).
This region used to be farmed by small-scale mixed farms. Because of the poor sandy soils, large areas were covered by heather. When artificial fertilizer came available, most heather fields were converted to farmland: both for arable production and for keeping livestock. In the period after WWII, many creeks and small rivers were canalized to improve drainage and to save space. Eventually, most farms in this region specialized as arable farm, dairy farm or intensive livestock farm. Most dairy and other livestock farms still own land where feed is harvested (mainly grass and maize). However, most livestock farms currently keep more animals than they can feed from the own land and much feed is imported. As a result, the amount of manure has become a problem. For arable farmers, on the other hand, it is very easy to get animal manure in the neighbourhood. Since manure policy has become more strict, farmers complain that they cannot apply the amounts that the crops require (interview 3). Land prices are high, as a result the arable farming practices are quite intensive.

The sandy soils drain well. In summer, farmers need to irrigate their crops. In case of extreme droughts, irrigation is prohibited, but normally farmers are allowed to irrigate. However, with heavy rains, excess water can also be a problem (Figure 4). In June 2016, large areas in the South of the Netherlands flooded as a result of heavy rains and high water levels in the rivers. As a result, many farmers lost their crops and the water board for months was very busy handling claims, because in many cases the insurances did not cover the income foregone of the farmers.
Figure 4: 2 June 2016: fields of participants of Skylark group Midden-Brabant have flooded as a result of heavy rains and high water levels in rivers.

The case study area of De Dommel consists of a relatively small-scale landscape with forests, swamps, heather, arable fields, grasslands, ditches and creeks, villages and cities. In potential, it is an area rich in biodiversity. However, on the whole, biodiversity is in decline and especially the farmland species (Heunks et al., 2009). Of the farmland target species, only badger and barn owl are improving. In general, the target species with an upward trend are associated with swamps and heather, in which habitats much has been invested in the last decades. The case study area has a population of target species of arable fields, including the Skylark, which was observed by one of the authors.

2.2.3 Related ecosystems

Small rivers such as the Dommel flow into the area from Belgium. There have been projects for improving water quality at the other side of the border as well. The quality of the water flowing into the Netherlands has improved (interview 5). However, there seems to be little cooperation between the water authorities Waterschap De Dommel (NL) and Watering De Dommelvallei (BE). From the area of Water board De Dommel, the water flows into the area of Aa en Maas near the city of 's Hertogenbosch, where it flows into the Meuse river. There is coordination between the two Water Boards and Rijkswaterstaat, the national agency that manages the main rivers, to prevent that too much water is added to the Meuse at once (interview 5). In summer, care is taken that not too little water flows into the Meuse to maintain enough depth for ships (interview 4). Further downstream, outside the case study area, Meuse water is harvested for drinking water for the inhabitants of Rotterdam region. In effect, the

drinking water companies downstream have no influence on the land management in the case study area. However, also in the case study area, drinking water is harvested and the Province has designated ground water protection areas (see also 2.3 and Figure 3).

Another link to higher levels of scale is through feed imports. Arable farmers in the CS area retrieve the animal manure locally, but livestock farmers import much feeds from abroad, including soy. As a result, the area has an excess of animal manure. Because of environmental regulations (see 2.2.4), part of this must be brought to other areas, at the cost of the livestock farmers.

### 2.2.4 Actors and governance systems

**Governmental actors and main instruments**

Relevant governmental actors, their main instruments and their impact at farm level are summarized in Table 2, as far as relevant to arable farming and the ESBO’s of soil and water.

**Table 2: Governmental actors and instruments relevant to arable farmers in CS area**

<table>
<thead>
<tr>
<th>Tier of government</th>
<th>Main instruments for agri-environmental issues</th>
<th>Impact at farm level</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>CAP 1st pillar cross-compliance. Greening</td>
<td>Greening measures have in general little impact at farm level as most arable farmers comply with the Ecological Focus Area measure by sowing catch crops after the main crop, a practice that does not interfere a lot into the conventional practice. As for the crop diversification measure, farmers generally do comply without any effort as the measures does not imply additional requirements to the conventional practice.</td>
</tr>
<tr>
<td></td>
<td>CAP 2nd pillar</td>
<td>Some arable farmers participate in AES, and RDP provides for subsidies for precision agriculture, see province</td>
</tr>
<tr>
<td></td>
<td>Nitrates Directive</td>
<td>Limit to amount of animal manure, above which artificial fertilizer still can be applied. This discourages use of animal manure and compost.</td>
</tr>
<tr>
<td></td>
<td>Crop protection rules</td>
<td>Limited choice of products and rules for application.</td>
</tr>
<tr>
<td></td>
<td>Water Framework Directive</td>
<td>Indirectly through Water board policies</td>
</tr>
<tr>
<td></td>
<td>Bird and Habitat Directives</td>
<td>Stricter rules for farms surrounding Nature 2000 reserves (see State)</td>
</tr>
<tr>
<td>State</td>
<td>Meststoffenwet (manure act, based on Nitrates Directive)</td>
<td>The amount of N that can be applied depends on soil type, crop and derogation. Arable farms are constrained in hiring land from livestock farmers because of manure rights. Crop residues cannot be applied as mulch on other farms.</td>
</tr>
<tr>
<td></td>
<td>Tax reduction</td>
<td>Tax reduction is possible for constructing environmental friendly installations.</td>
</tr>
<tr>
<td>Tier of government</td>
<td>Main instruments for agri-environmental issues</td>
<td>Impact at farm level</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Research funding</td>
<td>Some farmers participate in state-funded research projects on farming practices and innovation.</td>
<td></td>
</tr>
<tr>
<td>Plant disease regulations</td>
<td>Seed potatoes need to originate from the own farm or be certified and can only be planted at the own farm.</td>
<td></td>
</tr>
<tr>
<td>Management of main river discharge i.r.t. climate adaptation</td>
<td>Indirect, through agreed amounts of water that can be discharged from smaller rivers into main rivers by water boards.</td>
<td></td>
</tr>
</tbody>
</table>

**Province**

<table>
<thead>
<tr>
<th>Spatial planning</th>
<th>General rules for farm locations, including minimum distance to inhabited area for livestock farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES (part of RDP)</td>
<td>The AES in the Netherlands is aimed at measures to enhance biodiversity and/ or water quality. Main measure for arable farmers is buffer strips (&gt; 25 - 150 cm baseline 3).</td>
</tr>
<tr>
<td>RDP (based on 2nd pillar CAP)</td>
<td>The RDP includes a subsidy for acquiring instruments and machines for precision agriculture. Water board aims to use RDP subsidy for knowledge dissemination on soil and water.</td>
</tr>
<tr>
<td>Ground water quality (including related to the harvesting of drinking water, see Figure 3)</td>
<td>Designation of ground water protection areas</td>
</tr>
</tbody>
</table>

**Water board**

| Regulations for water quality | Water board monitors surface water quality and sanctions farmers who do not comply with the rules. |
| Management of water levels/ water quantity (keur) | Permits are needed for watering in summer. Farmers depend on water boards for sufficient drainage. Farmers are obliged to manage depth of ditches. |
| Subsidies for buffer strips | Sometimes integrated with RDP and AES |

**Municipality**

| Spatial planning: zoning plans and building permits | Life is easier for arable farmers than for livestock farmers |

Farmers have to comply with EU and national environmental legislation. The recent Dutch manure act has made the rules more strict also for arable farmers (interviews 2,3). Policies for landscape and nature management are however made by the Provinces. Also the national Agri-Environment Scheme (AES) is implemented by the province. The AES include options for laying out buffer strips: the first 25-150 cm are mandatory along all waterways, the additional hectares of wider buffer strips can be subsidized. While the main rivers and their dikes and coastal defence are a national matter, the Water boards are responsible for water quality and water quantity issues in the regional watersheds and thus for implementing the EU Water

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3 Depending on crop and application technique. Intensive crops such as potatoes: 150 cm. Grains 25 cm.
Framework Directive in their area. Water boards are public authorities with democratically elected representatives. They are traditionally close to the agricultural sector because the water levels that they set, determine possibilities for production. Most Water boards have subsidy schemes for farmers to enhance water quality and to compensate farmers in designated areas for occasional flooding (storm water storage). Water boards are also involved in restoring canalised creeks into their more natural profile, often in collaboration with the Province and nature organisations. Municipalities are responsible for spatial planning, together with the Province. Intensive livestock farmers have been involved in fierce discussions in this densely populated area when they opted for building ‘mega-stables’ and had to apply for building permits. Compliance with rules is controlled by means of sampling by a range of public officials, notably those from AID, NVWA and Water board.

**Land ownership and tenure**

Because arable farmers prefer to specialise, land is exchanged among farmers to enable crop rotation in order to prevent the development of diseases in the soil. Arable farmers spend most of the winter period ‘talking around’, trying to arrange land for next growing season. Sometimes this is arranged through a formal lease contract, but often this is an oral agreement (interview 3, 4). Also land of livestock farmers is included in this rotation. As a result, there is very little permanent grassland in the area. The farmers complain that their attempts to manage the soil sustainably with crop rotation are hindered by regulation: because of national rules for the prevention of plant diseases, seed potatoes cannot be grown on land of others; and land that is leased out by livestock farmers can no longer be counted in the manure administration (interview 3, 4, notes of meeting). Because of this, and because of income support being linked to land use rights, arable farmers often work the land of livestock farmers without a lease contract and sell the produce to the livestock farmer (interview 2). Farmers are concerned about land changing managers all the time: not all colleagues take good care of the land so it is wise to sample the soil before hiring it (interview 2, 3, 4).

The innovative governance arrangements represented and proposed by Skylark Foundation are described in section 4.2.

**Other actors**

Other relevant actors in the region are drinking water company Brabant Water, other farmers in the area (non-Skylark participants, mainly arable and livestock farmers), agri-environmental cooperatives, nature conservation organisations (owners of most nature reserves) and large water consuming companies such as Coca Cola and Bavaria brewery. Much regional environmental policy development is done in networks of governmental and non-governmental actors. An example is the plan ‘Conscious Brabant’ (Brabant BEWUST) of farmers union ZLTO, the four water boards, the province, and sector organisation Cumela. The plan is aimed at extension and capacity building of farmers. Another example is ‘Clean Water for Brabant’ (Schoon Water voor Brabant) of de province, drinking water company Brabant Water, ZLTO, agri-environmental group Duinboeren and the water boards. This project (since 2010) aims to reduce the use of pesticides/ herbicides to protect groundwater.
2.2.5 Action situations

Buffer strips are seen by the Water board as an effective measure to improve water quality (interview 5), although the farmers criticize that buffer strips in their opinion are not laid out at the most vulnerable locations (notes of meeting). The level of the public payment is considered appropriate, but farmers do not like to lose production space. In spite of research supporting the multiple value of bufferstrips in the Dutch situation (Bos et al, 2014), sometimes even commissioned by the Skylark Foundation (Alebeek, 2015), most farmers of this Skylark group do not see added value to use the buffer strips also for biodiversity (it is unlikely that the research reports have reached these farmers). They question the effectiveness of natural pest control and even mention adverse effects (notes of meeting). The precision farmer does see added value: to enhance natural pest control and to improve relations with citizens (interview 4). However, buffer strips are less likely to be implemented on land that is only hired for one year. See section 4.2.3 for the proposition of the Skylark MB group about how to enhance water quality.

Raising soil organic matter is seen as a key measure both by farmers and by the Water board. The farmers expect that raising organic matter will result in a better soil structure, and therefore less stagnant water on the land. The soil will hold the water better, so they hope to save on irrigation. Also, they expect the soil to be more fertile and able to absorb fertilizer better, reducing emissions. Raising soil organic matter is, according to the farmers, currently limited by legislation about the application of fertilizer and by the practice of rotating land between farmers. Possibly, it is also limited by farmers’ knowledge and by the crop varieties used. For instance, according to one farmer, the current variety of maize was developed in a period when much manure could be applied, and now requires much manure to grow well (interview 3). In addition, farmers seem to prefer chemical fertilizer over animal manure and animal manure over compost. The limited ‘space for manure application’ as a result of legislation is then filled with animal manure and chemical fertilizer and only few farmers use compost.

The Water board is increasingly interested in soil issues because of the relation with water quality and quantity (interview 5). The Water board tries to find farmers who want to use the biomass resulting from maintenance of Water board owned water ways and shores. It would keep the biomass in the area and could improve soil organic matter (interview 5). However, farmers are reluctant because of the legal limits to the application of manure (interview 3). In addition, the water board views water policy often in combination with nature policy. Projects to restore natural river beds and integrated area plans are coordinated by the province (interview 5).

2.3 Levels of ESBO provision, trends and determinants

For decades, much animal manure has been applied to the land in the case study area: this has enriched the soil but nowadays it is too high in phosphate and too poor in soil biodiversity (interview 4).

The water quality in the waterways of the region is in unfavourable condition: in the waterways that are monitored in relation to the Water Framework directive, the quality ranges from
‘moderate’ to ‘bad’ (Figure 5). The objectives of the Nitrates Directive are not reached (interview 5). The Dutch State of the Environment (PBL 2016) states that specifically in this part of the Netherlands (the southern sandy soils) the mean nitrogen concentration in groundwater is considerably exceeds the maximum value of 50 mg/Lt. Nevertheless, the water board sees improvement as a result of the efforts over the years, including buffer strips (interview 5). Water quality in the CS area is poor as a result of intensive farming practices.

Figure 5: Water quality according to WFD criteria in De Dommel area. Source: IHW.

The water board and the MB Skylark group agree that information provision on water quality to the farmers has been poor (workshop 10 March 2017). The water board monitors the state of the larger water ways, while the farmers are interested in more specific information relating to their land and the effects of their farming practices. So far, the water board has provided information on levels of N and P in the larger water ways, but not on pesticide residues or on aquatic biodiversity.

Water quantity at times is a problem both in terms of too much and of too little water. In the sandy soils, water tables can be low in summer. At the same time, the area has only small differences in altitude, which makes it hard to drain excess water from the area in case of heavy rains. Soil health is vulnerable as a result of the sandy soils, decades of high application of animal manure and the use of heavy machines. Farmers are worried about soil fertility and structure. An analysis of provision and demand of ecosystem services (De Knegt et al 2014) shows that in this region soil fertility is too low for what is demanded for agricultural production. Also soil compaction, loss of soil organic matter and erosion by wind are threatening soil related ecosystem services.

Intensive arable production in the CS area is both a result and a driver of high land prices. These high land prices are a threshold for farmers to implement buffer strips. Another barrier
is the practice to rotate land among farmers. The use of land for only one year makes investment in soil organic matter less attractive, and buffer strips less sustainable. Land is therefore key in designing incentives for sustainable development of farming in the area both in the sense of land tenure and stewardship.

Regarding soil-related ESBO’s, there is market failure for the long term. Water-related ESBO’s are hard to govern because of fragmentation of stakeholders both spatially and institutionally. In addition, it is difficult to trace back pollution to the source. This is especially the case for ground water. Also, unpredictable weather conditions require more resilience in landscape and farming practices to deal with both drought and excess water. The latter still has received insufficient attention.

*How Skylark farmers analyse the levels of ESBO provision and determinants*

The case study Skylark group is aware that management of the arable fields influences the water quality and also the water quantity in the sense of amount of runoff and peak levels in the rivers, as well as ground water levels in periods of drought (interviews 2,3,4, meeting). The water quality is affected by runoff and leakage of nutrients towards groundwater and surface water, as well as by residue of pesticides and fungicides that end up in ground water and surface water through runoff and air. Skylark links water quality to the need to irrigate: a good water quality is beneficial for the farmer (website).

The group links water quality and farm management to soil conditions (interview 2,3,4). According to interviewee 3, the sandy soil is suitable for a wide range of crops, but because the soil is so easy to work, farmers have become careless in its management. Group members are critical about farmers wasting their soil structure, which they notice as stagnant water on the land (report of Water Day). The group has an interest in raising soil organic matter: to improve soil structure and fertility, support soil biodiversity, reduce leakage of nutrients, improve water storage capacity and reduce sensitivity to crop diseases (interviews 2,3,4).

The Water board monitors water quality and water levels, but not many ditches on farms are monitored. Farmers wish for a more precise monitoring system to be able to locate problems and match solutions such as buffer strips to sites where they make sense (notes of meeting). Soil indicators are measured by a few individual farmers only. As one participant remarked: “Farmers know a lot of what happens above ground, but nothing of what happens in the soil” (interview 4). Skylark has organised courses to teach farmers how to dig a soil profile and how to assess soil structure. (See Annex 9.3 for share of Dutch Skylark participants taking specific measures.)

*Appreciation of and demand for ESBO’s soil and water*

There is no well-functioning market for the ESBO’s soil and water. Soil is partly reflected in land prices: in the case study area land is sold for €65,000–70,000/ha (http://landprijzen.nl/landbouwgrond/ and http://www.boerderij.nl/landbouwgrond/grondprijzen/?gebied=3008), and leased for prices between €1,200-2,000 /ha/yr (interview 2). However, long term soil health is not reflected in lease prices. The market for water is fragmented into drinking water, water quality and water quantity. For water quality measures by farmers, the water board has budgetted €1,05 M in the period 2014 -2020. In addition, €2 M is to be invested in projects to rearrange the hydrologic system, and for WFD...
measures in rural area to be complemented with RDP funds (begroting De Dommel 2016). For drinking water, Brabant Water had a turnover of 170 M€ in 2014 (www.brabantwater.nl). However, the working area of Brabant Water is bigger than the case study area and it does not reflect the value of the part of the Meuse water originating from the case study area which is harvested for drinking water downstream by e.g. Evides (www.evides.nl). At national level, Ecorys (2012) estimated a national expenditure on water quality and availability of 25 billion Euros between 2009 and 2015, of which 20 billion public expenditure. This is however not a reliable indicator of value or demand.

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

The farmers of the Midden Brabant Skylark group are familiar with laying out buffer strips for improving water quality. However, most of them prefer grass strips that are mowed regularly over multifunctional, biodiverse buffer strips that could also provide e.g. pollination and pest regulation. More biodiverse strips are not very hard to lay-out, but farmers fear weeds and pests coming in from the buffer strips. As a result, there is very limited biodiversity delivered as side-effect of the delivery of water quality. More biodiverse strips would also enhance landscape amenity.

A better water quality will benefit the biodiversity in water bodies. In addition, better water quality in the Dommel watershed would reduce the costs of purification for drinking water downstream (Meuse, see section 2.2.3). However, water quality in a much larger area would need to improve to achieve that.

Improving soil health is important to sustain the production capacity of the land for future generations: for food security as well as the economic sustainability of farming in the area. A good soil health implies well-functioning soil biodiversity, which in turn will benefit organisms that feed on soil life, including specific farmland birds.

3 Shifting societal norms, collective learning and voluntary actions

Skylark is a private initiative. The process for setting up the Skylark Foundation started in 2002 when the Heineken brewery approached a couple of its suppliers in Flevoland whether they could offer sustainable barley. These farmers viewed their farms as a whole and suggested that they would need to consider the production methods of other crops as well, because of the need for rotation (interview 1). They involved additional food industry companies: Suikerunie (sugar) and Van Liere (onions). With the aid of RDP subsidy, a project was organised and in 2009 a Foundation was set up. By now, a range of food processors, suppliers and advisors is involved in Skylark. Skylark is funded by the companies in the chain as well as by the participating farmers. At times, public funding is acquired for specific projects, but the meetings of the regional groups and the composition of the farm plans is purely privately funded.

The investment of farmers in time and money to be able to participate in Skylark is considerable: this demonstrates their motivation to participate in the network, to learn from peers and to improve their sustainability achievements (interviews 1 & 2). In addition to the intrinsic motivation of the farmers, the demand from the food processing companies for sustainable operations to improve their corporate social responsibility has enhanced their commitment.
produce is a motivator. Some of those companies require their producers to have a Skylark certificate (see section 4.2.2). Lastly, the progressing environmental regulations are a driver for farmers to innovate towards more sustainable practices (interview 2). See section 4.2.2 for the Skylark sustainability indicators.

We presume that food chain companies have developed a larger interest in sustainable produce as a result of public discourse, market demand, and increasing awareness with their own personnel. While food chain companies participate at the national level by means of funding and taking part in the board of the Skylark Foundation (see also sections 4.1 and 4.4), they do not interact much with the regional groups. The regional groups choose their own topics on which they want to learn more as a group, and they may collaborate with local partners.

In Skylark, ‘peer review’ of sustainable arable farming practices during the group meetings and farm visits is seen as an important element for the awareness raising and intrinsic motivation of farmers (interview 1). All Skylark participants must compose a plan for each year, specifying their sustainability actions (see section 4.2). In the Skylark regional groups, farmers discuss each other’s sustainability plans and at the end of the year the actions and results. Regional groups are led by an acknowledged regional coordinator and consist of 8-10 farmers who meet at least five times a year at each other’s farms (interview 1). Often, they combine a discussion at the kitchen table with a field visit. In addition, interregional meetings are organised about specific themes (see also Nijman 2015). Each group has a budget for organising their meetings. The groups are stimulated to invite advisors from Skylark partners to contribute to these meetings (not the chain companies but the consultancies). Participants are obliged to attend at least eight meetings in total per year (interview 1, 2). ‘Peer to peer exchange is crucial’ (interview 1). By meeting in small groups, farmers challenge each other in striving for sustainable practices. They meet regularly, visit each other’s farm, learn from each other’s experiences and set joint learning goals. Common themes for Skylark groups to work on are soil health and water quality. In the Midden Brabant group, this learning process triggered the wish to collaborate with the water board.
For the Skylark group Midden Brabant, the Water board is their main partner in the improvement of water quality, and indirectly, soil health. In January 2016 the regional coordinator organised a meeting with Water board De Dommel, the neighbouring Skylark group Oost Brabant and Water board Aa en Maas to discuss possibilities for collaboration. In March 2017 this was followed-up in a meeting of the Midden-Brabant group and De Dommel water board (report of workshop 10 March 2017). The farmers consider land as an enabling factor in taking sustainability actions. For that reason they proposed the Water Board to work out a governance arrangement with land as incentive to improve water quality (see section 4.2.3). The farmers and the water board agreed to enter into a joint process of learning and exchange of data and information (see section 4.2.3). The farmers have expressed an interest in getting to know the water system better (report of workshop 10 March).

Skylark groups tend to go through development phases (interview 1). At first, they are busy discussing each other’s sustainability plans. After a few years, they choose specific themes to learn on, such as soil health. The first groups in Flevoland have now started to consider their social environment and discuss themes such as licence to produce and short supply chains.

This case study suggests that knowledge and motivation of farmers are key factors for sustainable delivery of ESBOs. Specific practices, information and use of technology influence the level of delivery. The Skylark case shows, that participating farmers are motivated to learn from each other and copy good practices. In addition, as a group they are able to collaborate with authorities. Therefore the governance arrangement of regional farmers groups and sustainability plans is expected to be an effective strategy.

For the delivery of additional ESBOs, such as landscape amenity and biodiversity, the social learning strategy could benefit from involving citizens and environmental groups. So far, most
Skylark Midden Brabant farmers have very limited interaction with citizens (see section 4.1). In addition, monitoring of ESBO’s could provide feedback to their efforts (see section 4.2.2). The precision farmer is already putting this into practice to the extreme (see his website).

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

To safeguard water quality, water supply and soil health, collective action is needed. While water is a mobile resource, soil is not. However, because much land changes user all the time, soil can be considered a collective resource as much as water, in spite of often stable land ownership (see section 2.2.4).

4.1 Organisational capacities, leadership, networking and communication

The Netherlands have a tradition of farmers’ cooperatives and study groups. Skylark fits into this tradition. The first group started in the reclaimed polders of Flevoland (see section 3), but groups have now been set up in all Dutch regions with arable farming. In total 388 arable farmers participate in Skylark in 40 groups; they manage in total 8,7% of the arable land in the Netherlands (interview 1, Skylark website, Skylark annual report 2015). Skylark at national level has a board with representatives of farmers, food chain companies and consultancies, a quality committee with farmers and food chain companies, and an advisory committee with representatives of research and educational institutes, civil society organisations and public administration (they are all listed on the Skylark website).

The national Skylark organisation has interactions with the NL Ministry of Economic Affairs, mainly about the greening of the CAP and the Skylark CAP certificate (see section 4.2.2). In addition, Skylark is involved in a policy platform about sustainable arable farming (Akkerberaad). In Europe, Skylark is connected to the European Initiative for Sustainable Agriculture. Skylark would want to discuss the possibility for Dutch authorities to become launching customers for sustainable food products, but so far this has not succeeded (interview 1).

So far, the Skylark group in Midden Brabant has very limited interaction with citizens and environmental groups. The precision farmer of interview 4 is an exception, and the farmer of interview 3 ‘misses society and its appreciation’. Most group members have a negative image of citizens, as having no knowledge of farming and being too critical, and they do not see delivering to local markets as a serious option (notes of meeting, interviews 3, 4). However, the group members are well involved in networks of farmers such as the farmers’ union ZLTO. The relationship with the agri-environmental cooperative, organising the participation in the agri-environment scheme, is not very close (interview 2). The farmers feel that as a group, they have a stronger position in interactions with governments and other actors (interview 3, notes of meeting). They feel that they are being taken seriously, because they are large farmers (interview 2,3). The participants and the coordinator are positive about the social capital within the group: they are motivated to meet and they trust and learn from each other in spite of their being competitors for land (interviews 2,3,4).
The Water Board acknowledges the value of the Skylark Midden Brabant group (Rob van Veen, pers. comm. 31 October 2016, interview 5). The Water Board is eager to develop collaboration with farmers because of the need to improve water quality, and expects that the Skylark farmers are seen as examples by other farmers in the area. The Water Board officials hope that if they manage to develop a good collaboration with the Skylark farmers, others will follow (RvV pers. comm.). Collaboration with private actors is part of the new mode of governance of the Water Board (interview 5). In addition to farmer organisations, the Water Board has relations with an extensive network of companies (including e.g. polluting industry), citizen initiatives, environmental groups, nature and landscape organisations and other water boards in the Netherlands and Belgium (interview 5).

For improved provision of ESBO’s, expanding the network of the Skylark group with citizens and environmental groups could be beneficial. A limiting factor is the lack of economic prospect from local produce: local food cannot be an issue to connect farmers and citizens in a positive way. Also on-farm recreational activities are not seen as a serious business case for these large arable farmers. Licence to produce may be their main motivator for seeking interaction with citizens and environmental groups. The collaboration with the water board may pave the way for a more outward looking attitude with the Skylark farmers. The water board could help them get in touch with potential partners. In addition, they could follow the example of the precision farmer, who is already very outward looking and has good relations with citizens and environmental groups. One way to stimulate this could be to dedicate one of the regional meetings to ‘how to develop relations with citizens’.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

4.2.1 The Skylark approach of peer review en social learning

The Skylark approach of peer review en social learning has been described in chapter 3. We mention it here as innovative governance arrangement, because social learning may influence attitudes and eventually behaviour. It is innovative because it is a different strategy from the traditional instruments of regulations and subsidies. In addition, this social learning is not organised by a governmental agency, but by a private organisation of farmers and parties in the chain.

4.2.2 The Skylark sustainability indicators, farm plans, monitoring and certificates

The three basic principles of Skylark are: collaboration in the chain, sharing knowledge, and a system of continuous improvement (interview 1). The Skylark foundation carries out its objectives according to 10 sustainability indicators (including soil health & fertility, plant protection, water management, biodiversity, see text box below and Annex 9.1, where they are translated into ESBOs). These indicators were discussed in 2003 in the first Skylark group of around 10 farmers in Flevoland (this was a EU-funded RDP project). Skylark does not set performance levels for the sustainability criteria, rather the approach focuses on the process of improvement. This means that all farmers who wish to improve, can participate (interview 1). The participants can choose from around 200 sustainability actions, of which a number is listed in Annex 9.3.
Box: Sustainability indicators used by Skylark (www.veldleeuwerik.nl):

1. Product value
   a. Economic sustainability
   b. Balance of revenues and costs
2. Soil fertility
   a. Soil structure
   b. Soil recovering capacity
3. Soil erosion
   a. Topsoil organic matter
   b. Cover
4. Nutrients
   a. Fertilisation
   b. Balance NPK
   c. Use of rest products
5. Crop protection
   a. Technique & methods
   b. Products (pesticides/ herbicides)
6. Water
   a. Water quality
   b. Water quantity for irrigation
7. Energy
   a. Machines/ fuel
   b. Storage/ climate
   c. Alternative sources
8. Biodiversity
   a. Above soil
   b. Soil biodiversity
9. Human capital
   a. Human capital
   b. Social capital
10. Local economy
    a. Relations with other farms
    b. Relations with other firms

Skylark participants are in general the larger arable farms. Technology is important to them and they learn the latest developments from each other. Of all sustainability criteria, above ground biodiversity is the least popular, by lack of incentives and because the cost-revenue balance is not attractive (interview 1). Soil health and soil biodiversity are much more interesting to the farmers, as well as water quality (interview 1,2,3,4). In the case study group, local economy is considered the most difficult criterion (interview 2, 3, notes of meeting).

Each year, a farmer develops a plan for his/ her own farm with the aid of an advisor. The farmer can choose which sustainability indicators to work on, but participants must have given attention to all 10 Skylark indicators within 4 years. Their efforts (not their results) are monitored in the Skylark database of ‘sustainability profiles’ which the participants fill out themselves. Attending regular group meetings is obligatory to stay a member of the foundation and to obtain a ‘Skylark’ certificate for sustainable farming.

According to the national coordinator, food processing companies increasingly require proof of sustainability performances (interview 1). The Skylark method of self-assessment with sustainability profiles has been acknowledged the silver level of SAI’s FSA (Farm Sustainability Assessment: annual report). Skylark participants receive a certificate which gives them an advantage with some market parties. However, because each participant has his/her own approach, it is not easy to explain the meaning of the certificate (interview 2).

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44 SAI: Sustainable Agriculture Initiative, a global food & drink value chain initiative, see www.saiplatform.org
In addition to the regular Skylark certificate for participants, the foundation managed to negotiate that arable farmers with an additional Skylark-CAP certificate are eligible for a number of alternative packages in the CAP greening (equivalent practice). Participants appreciate this: it confirms their view that Skylark helps to reduce bureaucracy (interviews 3,4). Skylark aims for a status of ‘green by definition’, just as organic farms (interview 1).

However, because performance is not monitored in terms of results, the effectiveness of the Skylark approach cannot be measured. A study carried out by students of Wageningen University pointed out that for many of the 200 measures it is very hard to find scientific evidence of their effects (Bisperink et al 2016). In addition, ways of working and physical conditions at farms can differ greatly. This makes predicting outcomes based on measures extremely hard. Much more monitoring would need to be done at farm level to get insight into impacts of the Skylark approach. However, even then linking measures to results would be very difficult, not in the least because of the complexity of the social-ecological system.

For water quality, the participants of the Midden Brabant Skylark group would welcome more and more fine-grained monitoring by the Water Board (notes of meeting).

The Skylark participants in Midden Brabant are well aware of the soil and water related ESBO’s. However, thinking in terms of sustainability is more familiar to them than ESBO’s. The introduction of vocabulary of services and beneficial outcomes was welcomed in the regional meeting attended by a researcher (notes of meeting). Their learning process could be further supported with knowledge and practical examples with respect to the ESBO’s as well as favourable farming practices. In addition, a monitoring scheme for those ESBO’s could support their efforts and provide feedback (see also the section on learning 3).

4.2.3 An arrangement for exchanging water quality measures for land lease

The Skylark group tries to set up a collaboration with the Water board to develop buffer strips along shores as well as reed fields in lower areas to improve water quality, in return for land elsewhere. For this, they want to develop a new governance arrangement for buffer strips. The envisioned buffer strips are much broader than the mandatory 0.25-150 cm.

In addition, or as alternative, they propose the layout of a reed field to filter the water that originates from a group of farms (notes of meeting, interview 4). They proposed to the Water board that instead of subsidy, they would like to be able to lease land from the Water board to compensate for the production space (interview 2,3, report of Water Day). The Water board owns 180 ha in the region (interview 3). They request a preferred position when the Water Board gives out land to farmers. The idea could be extended with land that is owned by the province, municipalities, nature organisations and rural estates.

Such a governance arrangement needs to be negotiated between the Skylark Midden Brabant Group and Water Board De Dommel:

1. What measures do the farmers offer?
   a. Size, layout, management and duration of buffer strips and helophytes.
   b. Suitable sites and spatial coherence
c. Other measures
d. Added value of Skylark membership for Water Board

2. What do the farmers request in return?
   a. Available subsidies?
   b. What land is suitable (size, distance, zoning status, ...)?
   c. Type and duration of contract for land tenure, price for lease of land

3. How to select farmers?
   a. Criteria, order of importance
   b. Who selects?

4. How can the Water Board justify this kind of ‘support’?
   a. Examples from elsewhere
   b. Pilot

5. What agreement is needed about reporting, monitoring and evaluation?
   a. More fine-grained water quality monitoring, for a better insight in the relation between effort and result
   b. What kind of report does the Water Board expect from the farmers about the implemented measures?

6. How and when will Water Board and Skylark evaluate, with what outcome are they satisfied?

Using land as an incentive to promote provision of ESBO’s is innovative. As a rule, financial incentives are provided. However, by the Skylark participants in Midden-Brabant, land is considered as more convincing than money. Some of them participate in the agri-environment scheme in which buffer strips are also a management option, but they do not find the scheme very attractive because of the high number of rules and the low popularity of the agri-environmental cooperative (interviews 2, 3). Some farmers will prefer a payment, others will prefer land in exchange (interview 2). In the Netherlands, there are a few examples of schemes in which land is used as incentive to promote provision of ESBO’s (Westerink et al., 2010). Nevertheless, although this arrangement is still in an experimental stage, similar solutions could be relevant in other regions with high land prices.

However, the Water board is reluctant to give a preferred position to some farmers above others (interview 5). For that reason they do not wish to further develop the idea. Even a workshop with water board officials and the Skylark MB group of farmers did not change their opinion (report of workshop 10 March 2017, see also Annex 10). Nevertheless, the water board is planning to change its land policy and to select land managers based on sustainable land management. What this encompasses, still needs to be developed. Skylark farmers can apply for this land, but they will not be favoured over other farmers who can show the desired sustainability requirements.
Table 3: Assessment of Skylark governance arrangements

<table>
<thead>
<tr>
<th>Arrangements</th>
<th>Skylark social learning</th>
<th>Skylark sustainability plans and certificates</th>
<th>Skylark land for water quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advantages</td>
<td>Appeals to intrinsic motivation, development of skills, peer-to-peer</td>
<td>Accessible to all willing farmers, individual approach, pressure from food processors, private initiative</td>
<td>Proposal by farmers: motivation to participate</td>
</tr>
<tr>
<td>Transferability</td>
<td>Well transferable: in case of low social capital reviewing each other’s sustainability plans may be less feasible. On the other hand: social learning can build social capital</td>
<td>Requires high levels of organisation</td>
<td>Experimental idea, but maybe relevant to other regions</td>
</tr>
<tr>
<td>Difficult issues</td>
<td>Limited view due to absence of citizens</td>
<td>Meaning of certificate is not clear because of individual approach. No monitoring of results/ESBO’s</td>
<td>Needs to be developed</td>
</tr>
<tr>
<td>Support</td>
<td>Supported by parties in the chain</td>
<td>Supported by parties in the chain</td>
<td>No support from Water board: wants to avoid privileges</td>
</tr>
</tbody>
</table>

Instead, in the workshop of 10 March 2017 alternative pathways were identified on which the Skylark farmers and the Water board wish to collaborate:

- Exchange data and knowledge about farming and water system between farmers and water board: start a process of mutual learning and joint field visits.
- Try out and monitor ‘smart’ buffer strips and reed filters on land of one of the Skylark participants
- Work towards a more robust water system (i.r.t. flooding and drought) and tailored water management, including areas that are allowed to flood against compensation.

4.3 The role and impact of policy in ESBO provision

4.3.1 Influence of policy instruments on ESBO provision

See section 2.2.4 for an overview of main environmental policy instruments at the various levels of government.

There is very little policy aimed specifically at enhancing soil health (Van Doorn et al., 2017). However, the Nitrates Directive and subsequent national and regional policies obviously impact on soil health. On the one hand, the limits on fertilisation set per type of crop and soil type limit the amount of fertilizer that can be applied. This prevents over-fertilisation. However, the limits for animal manure and compost are stricter than those for chemical fertilizer. As a result, the Skylark farmers in the CS area feel constrained by the legislation in their efforts...
to raise soil organic matter (interview 2, 3, 4, see also section 2.2.4), while soil organic matter is essential for soil health. In addition, they are not satisfied with control and sanctioning that gives penalties without giving a chance make amends and correct the problem. They understand that strict rules are needed for the ‘bad guys’, but they feel that they deserve more room for manoeuvre if they can prove that they strive for more sustainability (interview 3, 4).

The lack of policy instruments for soil health may become problematic considering the practice of ‘land rotation’. Raising soil organic matter is a long-term activity. Land owners cannot include prerequisites in land lease contracts (Pachtwet) – tenants must comply with GAP anyway -, so they cannot demand that the tenant applies compost. Land owners can only steer through selection of tenants that they trust to take care of the soil, and they can make informal agreements. When tenants lease the land for only one season, which is increasingly the case due to specialisation in crops, there is little incentive for the tenant to invest in soil health on that land. At the same time, tenants do not know the quality of the land they hire. Since both tenants and land owners have limited tools to steer towards improving soil health on the longer term, while all would benefit from that, land has become a common pool resource. If farmers do not manage to self-organise and self-govern the stewardship of the soil (Ostrom, 1990), policies are needed.

So far, considering the insufficient water quality to WFD standards in the case study area (see Figure 5), policies aimed at improving water quality seem to have been largely ineffective. As the agriculture in the region is one of the most intensive in Europe, the sector puts a large environmental pressure on natural resources. Driven by market forces (among other things), farmers tend to intensify and specialize their production, resulting in very high concentrations of livestock in the area and in intensive practices in arable farming. Clearly, both environmental regulation and agri-environmental schemes are not sufficient to improve the situation. For the bigger arable farms, agri-environmental payments do not contribute substantially to the farm turnover. The intensive livestock farmers do not have enough land to feed their animals, so they use it in an intensive way and agri-environmental management to them is not attractive. Not only agriculture is a major pollutant, also a number of large industries and urban areas contribute by releasing polluted water to the surface water. However, according to a water board official, levels of nutrients in the water are improving as a result of the regulations (interview 5). Although hard to measure, she also sees the benefit of buffer strips. Effectiveness of buffer strips may vary greatly as a result of weather circumstances and location (interview 5). The water board therefore agrees with the Skylark farmers that buffer strips need to be carefully planned.

The water board has put several policy instruments in place to safeguard water quality and water availability:

- Regulations about water levels and management of waterways (Keur)
- Regulations about emissions via air and water (Algemene regels)
- Subsidies for water storage on farmland and buffer strips along waterways (StiKa, in collaboration with agri-environmental collective, see section 4.3.2)
- Permits for irrigation, on condition of farm plans to save water and reduce drainage (beregeningsbeleid, bedrijfswaterplannen)
• Agreements with other public and private actors, such as Deltaplan hoge zandgronden: plan to keep water in the area as long as possible in collaboration with province of Brabant, other water boards and farmers’ union ZLTO
• Projects, such as Schoon water voor Brabant, to reduce pesticide emissions to the surface water
• Monitoring of water availability and water quality through a mesh of monitoring points (meetnet)

The water board is also interested in soil because of the interaction with water, but does not have policies itself and depends for this on other tiers of government, especially the province and the EU. Through the rural development programme, the water board tries to promote knowledge transfer about the relation between water and soil. See also section 2.2.5.

In the region most farmers receive direct payments from the CAP, all arable farmers in the region have to comply with the EFA measure (Ecological Focus Areas, part of the greening requirements). The far majority of the farmers has sown catch crops as EFA, resulting in more than 4,000 ha of EFA in the region. However, significant environmental effects are not expected as the catch crops will not develop sufficiently. In case EFA’s would have taken the form of bufferstrips or managed field margins the environmental impact would have been greater, but the incentive to implement these types of EFA’s was too low.

4.3.2 Interaction of policies with private schemes: agri-environmental cooperatives

In the Netherlands, as early as the nineteen nineties, farmers started to self-organise to manage environmental issues and to collaborate in landscape management (Polman, 2002). Since then, a range of scientific articles has been published on the Dutch agri-environmental cooperatives (e.g. Glasbergen, 2000; Franks & McGloin, 2007; Westerink et al., 2015). In various ways, agri-environmental cooperatives have been instrumental in the implementation of agri-environmental policies. They have always had a role in motivating farmers to participate in agri-environment schemes. Increasingly, they have become active in the spatial planning of agri-environmental measures and in monitoring of results (Westerink et al., 2015). As of 2016, the revised agri-environmental scheme is mostly implemented by the agri-environmental cooperatives, which now cover the whole territory of the Netherlands. Many of the smaller cooperatives had to merge or to form an umbrella organisation in order to be able to comply with the criterion of ‘professionality’. These larger ‘collectives’ compose a management plan for their area to apply for agri-environmental subsidies with the province. In turn, the collective recruits farmers in its area to participate in the management and takes care of the contracting, control and payment (Westerink et al. in review). Individual farmers can no longer apply for agri-environmental subsidies with the province: they need to negotiate with the collective.

Traditionally, the larger part of the agri-environmental budget in the Netherlands was spent on conservation of meadow birds. Suitable areas for meadow birds are mainly the lowland grassland areas. This is also where the more active agri-environmental cooperatives were situated. By now, there are also some strong collectives in arable landscapes (especially Groningen and Flevoland).
Our case study area does not have a tradition of high participation in AES and of active agri-environmental cooperatives. In the current scheme, a limited budget was allocated to this region. ANV Kempenland is the agri-environmental cooperative here: it has joined the Midden-Brabant collective. That participation in the agri-environment schemes and membership of agri-environmental cooperatives do not have a strong tradition in this area may be due to a number of factors. First, unlike the meadow areas there is not one dominant farm sector. The diversity in farmers may have diminished a shared sense of urgency. Second, because of the small-scale landscape, there are few meadow birds and therefore little budget available. Third, this is an area of intensive arable farming and intensive livestock farming. With only few natural limitations to production, farmers do not feel the need to integrate nature into their farm. Therefore, although there is an agri-environmental cooperative and there are management options open to them in the agri-environment scheme (such as buffer strips), not all farmers in the area identify themselves with the agri-environmental cooperative (interview 2).

Interestingly, around 2006 (when the AES was still a national affair), the province of Brabant was very active in developing an alternative agri-environmental scheme together with the water boards. This StiKa (StimuleringsKader) is still operational.

4.3.3 Coherence of policy mix

As no EU policy framework for soil exists and also no policy on national level has been put in place, there is a lack of policy for soil health. Although the Nitrates directive and the subsequent Netherlands Manure act are intervening on soil related issues it is not sufficient to safeguard soil health.

For water quality and water availability there is a more coherent policy mix. Not only are policy instruments at place at EU, national, provincial and water board level, and are instruments for water and biodiversity interlinked, public policies are combined with private action, in projects and agreements and through the agri-environmental cooperatives. Also in our case study of the private Skylark Midden Brabant group, collaboration with the water board is developing. Nevertheless, water quality is still insufficient, mainly as a result of market pressure and the lack of effective environmental regulation and agri-environmental policies. The AES in the Netherlands are mainly focused on biodiversity goals and therefore only to a limited extent effective for water objectives.

4.4 The role of the private sector in ESBO provision and enabling factors

See sections 3 and 4.

Figure 7 and Table 4 give an overview of foods chain companies that are partners in the Skylark Foundation. Many of them mention their participation in Skylark on their website.

See the Skylark website for an overview of consultancies and knowledge organisations that are partner in Skylark. The knowledge organisations include producers of pesticides and chemical fertilizers, laboratories, R&D companies, a bank and the farmers union. These knowledge

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5 This is dynamic. The website of Skylark has an up to date overview.

6 http://veldleeuwerik.nl/de-partners/de-adviesorganisaties/
partners cannot take part in the board. According to Martijn Buijsse (pers. comm. 23/2/2017), the knowledge partners support the strive of Skylark for integrated farming. They have an interest in a good image of conventional farming and a skilful application of their products, reducing negative impacts on the environment.

Because such a large number of farmers and a wide range of chain companies participate, the Skylark initiative is robust. By enabling all willing arable farmers to move towards more sustainability, the initiative has the potential for a great reach and a big change. However, the sustainability ambitions are not clear in the sense of verifiable targets for the sustainability criteria. Also, the stake that suppliers of chemicals have in Skylark may slow down a real transition of the sector.

Figure 7: Food chain companies participating in Skylark Foundation (2016)

Skylark aims to gain room for manoeuvre for its farmers: room for alternative pathways to sustainability than the in their view often hindering regulations. However, in our view, Skylark’s strive to get all arable farmers to move towards sustainability can be supported by more ambitious and at the same time less detailed regulations. In other words: more ambition AND more room for manoeuvre.

http://veldleeuwerik.nl/de-partners/de-kennispartners/
Table 4: Food chain companies participating in Skylark Foundation (2017)

<table>
<thead>
<tr>
<th>Name</th>
<th>Crops/ products</th>
<th>Role in the chain</th>
<th>International?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suikerunie</td>
<td>Sugar</td>
<td>Processing &amp; trade. Producers’ cooperative.</td>
<td>International market</td>
</tr>
<tr>
<td>Kooppmans meel</td>
<td>Flour (grain)</td>
<td>Processing</td>
<td>NL</td>
</tr>
<tr>
<td>Limagrain</td>
<td>Seeds (grain)</td>
<td>Supplier</td>
<td>Part of Limagrain Europe</td>
</tr>
<tr>
<td>Nedato</td>
<td>Potatoes</td>
<td>Producers’ cooperative</td>
<td>International market</td>
</tr>
<tr>
<td>Gebr. Van Liere</td>
<td>Onions</td>
<td>Production, processing &amp; distribution</td>
<td>Market mainly Dutch supermarkets</td>
</tr>
<tr>
<td>JWK</td>
<td>Onions</td>
<td>Processing &amp; distribution</td>
<td>International market</td>
</tr>
<tr>
<td>Holland Malt</td>
<td>Barley --&gt; malt</td>
<td>Processing</td>
<td>International market</td>
</tr>
<tr>
<td>Heineken</td>
<td>Barley --&gt; beer</td>
<td>Processing &amp; distribution</td>
<td>International market</td>
</tr>
<tr>
<td>Hazera</td>
<td>Vegetable seeds</td>
<td>Supplier</td>
<td>International</td>
</tr>
<tr>
<td>HAK</td>
<td>Root crops, arable crops</td>
<td>Processing &amp; distribution</td>
<td>International market consumer products</td>
</tr>
<tr>
<td>For Farmers Hendrix</td>
<td>Feed</td>
<td>Processing &amp; distribution</td>
<td>Delivers to livestock farmers, international market</td>
</tr>
<tr>
<td>CZAV</td>
<td>Various (arable, horticulture, feed for livestock)</td>
<td>Cooperative: delivers seeds to growers and feed to livestock farmers. Collective purchase of arable produce.</td>
<td>NL</td>
</tr>
<tr>
<td>Coca Cola</td>
<td>Sugar</td>
<td>Processing &amp; distribution</td>
<td>Multinational</td>
</tr>
<tr>
<td>Bejo</td>
<td>Vegetable seeds</td>
<td>Supplier</td>
<td>NL</td>
</tr>
<tr>
<td>HZPC</td>
<td>Potatoes</td>
<td>Processing &amp; distribution</td>
<td>Multinational</td>
</tr>
<tr>
<td>Agrifirm Plant</td>
<td>Various (arable, horticulture, arboriculture)</td>
<td>Producers cooperative</td>
<td>NL</td>
</tr>
<tr>
<td>Aviko</td>
<td>Potatoes</td>
<td>Processing &amp; distribution</td>
<td>International market (retail)</td>
</tr>
<tr>
<td>Agrico</td>
<td>Potatoes</td>
<td>Cooperative: delivers seed potatoes to growers and sells produce to retail</td>
<td>International market</td>
</tr>
</tbody>
</table>

5 Potential pathways towards an enhanced provision of ESBOs

To improve water quality in the case study area, lower levels of fertilization are needed (especially the use of fertilizers that easily wash out (slurry manure, chemical fertilizer)) as well as lower emissions of pesticides. In part, there are technical solutions for this such as precision farming. Networks of farmers and chain parties such as Skylark can aid innovation and the spread of more sustainable practices. Broad buffer strips can further reduce emissions to reach the surface water. Preferably, these buffer strips are multifunctional to also benefit biodiversity, pollination, natural pest reduction and landscape amenity. Also, a spatial design would be needed to locate buffer strips at suitable locations and to create the coverage needed to really have an impact. This implies that a number of farmers needs to be involved: either their efforts need coordination by a third party (such as the water board) or they would...
need to self-organise (Westerink et al in review). Groups such as Skylark and the agri-environmental cooperative could be a vehicle for that.

However, it is questionable whether a good water quality can be achieved without reducing intensity of production with lower inputs and probably lower production levels. This directly impacts on the farm businesses and their income and will not be supported by the farmers. More ambitious environmental regulations can help create a level playing field for reducing intensity of production, but they will meet with resistance. Governments would need to negotiate and collaborate with sustainability-oriented farmers’ networks to design accompanying measures such as extension and programmes for innovation.

To improve the availability of water and reduce problems with peak water, the water board could collaborate more closely with farmers and other land holders to work out plans to optimise shortages and oversupply of water throughout the year and within the area. The current system is based on quick removal of water from agricultural land: this is not sustainable towards the future. Capacity for water storage is needed, not only to be able to solve storm water peaks (such as in June 2016), but also to deal with dry periods in the growing season (which may occur more often as a result of climate change. A combination may be sought with goals for biodiversity and recreation in a landscape design.

To improve soil health, organic inputs should replace chemical inputs (including fungicides) as much as possible. Compost, mulch and stable manure should get a privileged position over chemical fertilizer and slurry manure. Not only would this need a change in farming practices and farmer attitudes, it would also need a change in regulations. For instance, it would be good to diminish the exceptional position of chemical fertilizers in the manure legislation where the limit on the use of animal manure is more strict than the limit on the use of chemical fertilizer. Also, the rules currently prohibit application of crop residues from other farms because of hygiene: this could be made easier. Much can be learnt from organic agriculture. Skylark spreads knowledge of soil management from the organic sector to its conventional farmers.

In addition, to deal with the problem of diminishing soil health due to ‘land rotation’, collective action of farmers is needed. They would need to develop a self-governance arrangement for yearly the exchange of land use rights within a network of farmers who wish to invest in the land and be sure that others do the same (Ostrom 1990).

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework was helpful in considering various relations and levels of scale within the system. Because ESBO provision is central, both social and ecological aspects inevitably need consideration. In other words: ESBOs and SES are part of the same paradigm. It enforces an interdisciplinary approach of ecologists and social scientists. This is an advantage in gaining understanding of complex issues. However, the SES is so multi-faceted, that research of the many relations mainly relies on mere qualitative descriptions.
We used the SES framework to look for data and documents and filled gaps through interviews. The interview questions were based on the SES framework, but tailored to the interviewee.

When explaining the SES framework and ESBOs to the farmers of the Skylark MB group, the farmers understood the essence. Especially the idea of ecosystem services and public goods appealed to them, they recognized the demand from society for a wide range of ESBOs. They felt frustrated that in their perception society increasingly demands more from farmers, without payment (notes of meeting). Although the basic idea of interdependencies between the social and the ecological appeals to many stakeholders (this is our experience also in other projects, see for instance Westerink et al 2017), in our view the wording (SES, ESBOs) is not attractive in interaction with stakeholders. In scientific discourse, we propose to stick with social-ecological systems, public goods and ecosystem services, because these terms are broadly accepted and used in literature. In interaction with stakeholders, we have good experiences with ‘landscape’ and ‘landscape services’ (Westerink et al 2017).

Common pool resources of course are at the core of Ostrom’s conception of the SES (Ostrom 2009). From that point of view, in Pegasus we consider ecosystem services, public goods and common pool resources (or collective goods, or quasi-public goods). Some ecosystem services are public goods (such as landscape amenity), some are private goods (such as potatoes), some are club goods (such as access to private parks) and some are common pool resources (such as fish in the sea) (see also Costanza et al 2014). Not all public goods etc. are ecosystem services, however. And then there is also natural capital as related concept. See for an attempt to get some order in the concepts Jones et al 2017.

The framework could be improved by giving the ESBOs a place: in our view, ESBOs can be represented as an arrow from resource units to actors. There also needs to be an arrow from the action situation to the ESBOs, because many ESBOs require labour before they can be enjoyed (Jones et al., 2016).

For not place-based initiatives, the ecological part of the SES would need to be redefined to be able to consider how the social system is influenced by the ecological system and vice versa. For issues of dynamic change, some arrows will need multiple descriptions. A narrative is a good way to capture both complexity and dynamics.

In decision-making, the SES framework can help policy makers to see the bigger picture. Of course they often do consider the bigger picture, using their skills in their policy practice, but the SES framework can support doing that in a structured way.

For identification, quantification and valorisation of ESBOs, this version of the SES framework does not seem to have much added value.

The action-oriented approach gives the opportunity to observe the actors in the action, with gives additional insight into motivations and power relations to interviews and documents only. Also, it helps to investigate the practical value of scientific concepts. A danger of an action-oriented approach is the loyalty evolving from the social capital developed between the
actors and the researchers. This may hinder objective observation and reporting. Combining involvement with distance is a major challenge of the researcher in an action-oriented approach. Another challenge is to balance confidentiality with research. More observations are made and information gathered than can be reported ethically.

In the Dutch context, interaction between researchers and farmers, collaboration between farmers and authorities, and networking are standard practice. An action-oriented approach may be easier to accomplish in the Netherlands than in many other parts of Europe.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

In the area of De Dommel, where most farmers of the Skylark Midden Brabant group have their arable farm, water quality is below the norms of the Water Framework Directive. For a large part, this is due to intensive farming practices. Environmental policies so far have not yet resulted in a satisfactory water quality. The Skylark Midden Brabant group has chosen water quality as one of the issues they want to work on. One of the strong features of the Skylark approach is that farmers are motivated to move towards sustainability by their peers and their supply chain partners. In their yearly sustainability plan, they specify the actions that they choose to take on their farm.

In addition to water quality the farmers have chosen to work on water quantity - both availability in times of drought and management of excess water - and soil health. As individual land managers, management of soil structure and soil organic matter are feasible actions on land that they use for multiple years: for the management of water quantity at landscape level they need the water board. However, an increasing share of the land that is hired is hired for only one season, as a result of progressing specialisation in especially potato growing, combined with the need for crop rotation. This practice of ‘land rotation’ discourages farmers to invest in the land they use short term, especially in soil organic matter, which makes them worry about the behavior of the other farmers that have used that piece of land, and about its quality.

Farmers represent the demand side for soil health, but so far they have not managed to self-govern its provision. The demand for water quantity is both with farmers and with downstream areas, which may translate to safety in lowland areas (including cities). For that reason there is public policy on water quantity. The demand side for water quality is represented by the drinking water companies in the region as well as downstream and the water board. While there is very little public policy aimed at soil health, water quality is heavily regulated at the EU, national, provincial and water board level.

7.2 Key findings on governance arrangements and institutional frameworks

While the environmental regulations have not yet succeeded in achieving a satisfactory water quality in the case study area, they did result in raising awareness with the farmers of the Skylark Midden Brabant group. This is supported by the demand for more sustainable produce
by the Skylark supply chain partners. Therefore, European, national and regional legislation are useful to support private initiatives such as Skylark and collaboration between private and public parties, such as between De Dommel water board and the Skylark Midden Brabant group of farmers.

The Water Framework Directive has been translated to regional circumstances by the State and the Water board (for water quantity there is more room for regional tailoring than for water quality, interview 5). Nitrates Directive has been translated to regional and crop-specific circumstances by the state. However, the interaction between the various policies and legislations at farm level needs to be considered better. An example is the combination of the Nitrates directive and land use rights, constraining the raising of soil organic matter, impacting on soil health, water quality and water availability.

The Skylark approach of social learning, involvement of the supply chain, and challenging farmers to improve in terms of sustainability represents a set of governance arrangements that have the potential to contribute to a better provision of a wider range of ESBO’s than only food. It has that potential because the approach is aimed at behavioural change, and is accessible to all willing farmers, regardless of their performance level. At the same time, this is the weakness of the approach, since the focus on efforts makes it very difficult to show the difference made at farm and national level in terms of impacts.

7.3 Other enabling or limiting factors
Macro-issues such as extreme weather events can dominate the discussion and the focus of farmers. In our case study, the attempts to work on water quality in collaboration between the group of farmers and the water board was overshadowed by the effects and aftermath of the extreme rainfall in June 2016. The risk of drought in summer are then easily forgotten by the farmers, when pleas are made to remove water faster from the area (workshop 10 March 2017). Such short-term reactions can diminish the focus on long-term sustainability and resilience.

7.4 Contributions to EU strategic objectives
The Skylark approach contributes to EU strategic objectives of sustainable growth because of its focus on enhancing sustainability performance of conventional arable farmers, with a broad range of sustainability indicators. Through the involvement of the supply chain, the approach is embedded in the market. However, many Skylark participants choose the less ambitious options, resulting in less than optimal provision of ESBOs. In part, this is due to the low market value of Skylark membership: not all Skylark supply chain partners require Skylark membership of their suppliers or pay a premium price to Skylark participants.

In addition, the Skylark approach contributes to smart growth because of its focus on social learning, enabling farmers to get acquainted with new technology, try out new things, and discuss innovations in farmer groups.
7.5 How about the transferability of the approach/mechanism used?

The Skylark approach is based on collaborative learning among farmers, involvement of the supply chain, and challenging farmers to improve through the yearly sustainability plans (Interview 1, Martijn Buijsse pers. comm. 15-3—2017). In England and in Poland, initiatives have started to develop a similar approach. While the principles of collaborative learning, involvement of the supply chain, and challenging farmers to improve are transferred, in both countries the initiatives are tailored to the local needs and culture (Martijn Buijsse pers. comm. 15-3-2017). Farmers and supply chain parties are brought together to design their own set-up with respect to sustainability indicators, meetings and organisation. In Poland, there is more focus on capacity building of the farmers, while in England the initiators focus on precision agriculture, water quality and soil health (Martijn Buijsse, 15-3-2017).

We believe that the learning approach is transferable to many other regions in Europe, even – or maybe especially - to regions where collaboration among farmers is less frequent than in the Netherlands. Social learning may be a step before collaboration because it is less threatening than full collaboration, while it still builds social and human capital.

In addition, a strong feature is the focus of the Skylark approach on conventional farmers. In order to enhance the provision of ESBO’s, a growth of the number of organic farmers is not sufficient; also conventional an intensive farmers will have to change their practices. For such behavioural change, innovative public and private governance arrangements are needed. In our view, the Skylark approach can be an inspiration for such governance arrangements aimed at conventional farmers throughout Europe.
8 References

Skylark website: www.veldleeuwerik.nl (including annual report 2015)
Website precision farmer Van den Borne: www.vandenborneaardappelen.com
Website agri-environmental cooperative: http://anvkempenland.nl/

Interview 1: Martijn Buijsse, national coordinator (29 April 2016)
Interview 2: Brigitte Kroonen, regional coordinator Midden-Brabant group (29 April 2016)
Interview 3: Martijn Thole, farmer, Skylark participant, water board administrator (19 May 2016)
Interview 4: Jacob van den Borne, arable farmer, Skylark participant (25 May 2016)
Interview 5: Marinka de Wit, water board official (19 May 2016)
Pers. comm. Rob van Veen (31 October 2016) meeting with Rob van Veen and Marinka de Wit from De Dommel water board to discuss Steps 3+4 (with Brigitte Kroonen and Martijn Thole)

Notes of meeting Skylark Midden Brabant group (25 May 2016)
Report of ‘Water Day’: meeting of Skylark groups Midden Brabant and Oost Brabant with Water boards of De Dommel and Aa en Maas (19 January 2016)
Report of workshop ‘Water Day follow-up’: meeting of Skylark group Midden Brabant with Water Board De Dommel (10 March 2017)

CBS: Centraal Bureau voor de Statistiek www.statline.nl
Wateratlas Provincie Noord-Brabant: http://kaartbank.brabant.nl/viewer/app/wateratlas

Brabant BEWUST: http://agrarischwaterbeheer.nl/content/brabant-bewust

Literature

Bisperink, Chris; Hendriks, Peter; Kraak, Lars; Stegeman, Rick; Bente, Marjolein, 2016. Een analyse van duurzaamheidsmaatregelen van de stichting Veldleeuwerik. Hoe verduurzamen wij onze teelten op economisch en ecologisch verantwoorde wijze? Academic Consultancy Training Team 1688.


Westerink, J., Opdam, P., van Rooij, S., Steingröver, E., 2017. Landscape services as boundary concept in landscape governance: Building social capital in collaboration and adapting the landscape. Land Use Policy 60, 408-418.

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# ANNEX

## 9.1 Translation of Skylark indicators to PEGASUS ESBO's

<table>
<thead>
<tr>
<th>Skylark indicators</th>
<th>PEGASUS Framework, selected for case: soil and water</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicator</strong></td>
<td><strong>Sub-indicators</strong></td>
</tr>
<tr>
<td>1. Product value</td>
<td>Economic sustainability</td>
</tr>
<tr>
<td></td>
<td>Balance revenues and costs</td>
</tr>
<tr>
<td>2. Soil fertility</td>
<td>Soil structure</td>
</tr>
<tr>
<td></td>
<td>Soil recovering capacity</td>
</tr>
<tr>
<td>3. Erosion</td>
<td>Topsoil organic matter</td>
</tr>
<tr>
<td></td>
<td>Cover</td>
</tr>
<tr>
<td>4. Nutrients</td>
<td>Fertilisation</td>
</tr>
<tr>
<td></td>
<td>Balance NPK</td>
</tr>
<tr>
<td></td>
<td>Use of rest products</td>
</tr>
<tr>
<td>5. Crop protection</td>
<td>Technique &amp; methods</td>
</tr>
<tr>
<td></td>
<td>Products (pesticides/ herbicides)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Water</td>
<td>Water quality</td>
</tr>
<tr>
<td></td>
<td>Water quantity for irrigation</td>
</tr>
<tr>
<td>7. Energy</td>
<td>Machines/ fuel</td>
</tr>
<tr>
<td></td>
<td>Storage/ climate</td>
</tr>
<tr>
<td></td>
<td>Alternative sources</td>
</tr>
<tr>
<td>8. Biodiversity</td>
<td>Above soil</td>
</tr>
<tr>
<td></td>
<td>Soil biodiversity</td>
</tr>
<tr>
<td>9. Human capital</td>
<td>Human capital</td>
</tr>
<tr>
<td></td>
<td>Social capital</td>
</tr>
<tr>
<td>10. Local economy</td>
<td>Relations with other farms</td>
</tr>
<tr>
<td></td>
<td>Relations with other firms</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 9.2 Supporting data and statistics (source: CBS)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, total</td>
<td>194,940,340</td>
<td>183,901,711</td>
<td>26,168,250</td>
<td>24,467,021</td>
<td></td>
<td></td>
<td>14.9%</td>
</tr>
<tr>
<td>Arable</td>
<td>61,353,235</td>
<td>51,727,912</td>
<td>8,510,813</td>
<td>6,343,187</td>
<td>32.5%</td>
<td>25.9%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Uncultivated, total</td>
<td>13,028,562</td>
<td>16,188,484</td>
<td>1,631,186</td>
<td>1,750,780</td>
<td></td>
<td></td>
<td>7.9%</td>
</tr>
<tr>
<td>Potatoes, total</td>
<td>16,386,447</td>
<td>15,625,247</td>
<td>1,723,843</td>
<td>1,872,690</td>
<td>20.3%</td>
<td>29.5%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Root crops, total</td>
<td>5,136,480</td>
<td>5,499,019</td>
<td>1,067,423</td>
<td>1,016,744</td>
<td>12.5%</td>
<td>16.0%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Cereals, total</td>
<td>22,626,080</td>
<td>19,312,819</td>
<td>3,236,255</td>
<td>1,970,637</td>
<td>38.0%</td>
<td>31.1%</td>
<td>6.9%</td>
</tr>
<tr>
<td>Grass seeds</td>
<td>2,532,533</td>
<td>1,201,363</td>
<td>455,066</td>
<td>189,763</td>
<td>5.3%</td>
<td>3.0%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Trade crops, total</td>
<td>1,175,385</td>
<td>1,158,140</td>
<td>207,452</td>
<td>171,682</td>
<td>2.4%</td>
<td>2.7%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Legumes, total</td>
<td>547,461</td>
<td>285,347</td>
<td>57,513</td>
<td>17,029</td>
<td>0.7%</td>
<td>0.3%</td>
<td>0.4%</td>
</tr>
<tr>
<td>Sugar beets</td>
<td>9,773,335</td>
<td>7,509,401</td>
<td>1,200,222</td>
<td>872,553</td>
<td>14.1%</td>
<td>13.8%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Other arable crops</td>
<td>645,358</td>
<td>364,727</td>
<td>167,469</td>
<td>78,705</td>
<td>2.0%</td>
<td>1.2%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Fallow</td>
<td>2,530,156</td>
<td>771,849</td>
<td>395,570</td>
<td>153,384</td>
<td>4.6%</td>
<td>2.4%</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>83,794</td>
<td>65,507</td>
<td>14,792</td>
<td>11,550</td>
<td></td>
<td></td>
<td>-21.9%</td>
</tr>
<tr>
<td>Cultivated land</td>
<td>82,575</td>
<td>63,830</td>
<td>14,455</td>
<td>11,070</td>
<td></td>
<td></td>
<td>-36.8%</td>
</tr>
<tr>
<td>Arable farms, total</td>
<td>28,320</td>
<td>19,183</td>
<td>6,655</td>
<td>4,206</td>
<td>45.0%</td>
<td>36.4%</td>
<td>-8.6%</td>
</tr>
</tbody>
</table>

### Share of land surface 2012

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Agriculture in the Netherlands</td>
<td>54%</td>
</tr>
<tr>
<td>Agriculture in Middle-East Brabant</td>
<td>60%</td>
</tr>
<tr>
<td>Water in the Netherlands</td>
<td>9%</td>
</tr>
<tr>
<td>Water in Middle-East Brabant</td>
<td>2%</td>
</tr>
</tbody>
</table>
9.3 Statistics from the Skylark Annual Report 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating arable farmers:</td>
<td>388</td>
</tr>
<tr>
<td>Acreage of Skylark participants:</td>
<td>&gt;45,000 ha = 8.7% of arable land in the Netherlands</td>
</tr>
<tr>
<td>Number of partners:</td>
<td>63</td>
</tr>
<tr>
<td>Skylark consultants:</td>
<td>42</td>
</tr>
<tr>
<td>Supra-regional knowledge meetings:</td>
<td>38 (&gt;600 participants)</td>
</tr>
<tr>
<td>Meetings of regional groups:</td>
<td>300 (6 per week)</td>
</tr>
<tr>
<td>Regional groups:</td>
<td>40</td>
</tr>
<tr>
<td>Sustainability measures in indiv. plans:</td>
<td>2,837</td>
</tr>
<tr>
<td>Crops: have to grow:</td>
<td>80 (74% grains, potatoes, sugar beets)</td>
</tr>
<tr>
<td>Potatoes for consumption:</td>
<td>372,000 tons (24% of Dutch demand)</td>
</tr>
<tr>
<td>Sugar beets:</td>
<td>500,000 tons (94% of Dutch demand)</td>
</tr>
<tr>
<td>Grains:</td>
<td>130,000 tons (9% of Dutch demand)</td>
</tr>
<tr>
<td>Onions:</td>
<td>180,000 tons (176% of Dutch demand)</td>
</tr>
</tbody>
</table>

Of all participants, the following share takes the following sustainability actions:

- Sowing catch crops after main crop: 92%
- Own marketing concept: 8%
- Decision support system pest reduction: 54%
- Use of compost: 52%
- Production of solar energy: 44%
- Using farmyard manure: 60%
- Precision fertilizing: 27%
- Visits from schools: 26%
- Active in boards: 52% within agriculture, 41% outside agriculture
- Multi-annual buffer strips/field margins: 24%
- Irrigation depending on sensor: 34%
- Poles for birds of prey: 59%
- Voluntary sampling eelworm in soil: 64%
- Regular soil profiling: 67%
- Making balance soil organic matter: 73%
10 ANNEX: Reflections on the case study methodology used

This section focusses on the action mandate and its implementation by the research teams. It provides an overview of the participatory process, and its outcomes. It has to be discussed with the actors whether and in which format this section can become published. It has to be available internally for the comparative analysis but could be removed before publication.

10.1 Objectives and activities undertaken with initiative/stakeholders

The action-oriented research was carried out in collaboration with the Skylark Midden Brabant regional group of arable farmers and De Dommel water board.

In steps 1+2, the research team spoke to the national coordinator of Skylark, who agreed to recruit a regional group that was interested to work with us. The Midden Brabant group responded, after which the research team spoke to the regional coordinator of this group. In addition to studying documents and the website and conducting a number of interviews, one of the researchers participated in one of the regular meetings of the Midden Brabant group. The draft report of steps 1+2 was shared with the national and regional coordinators.

Based on the research in the first phase (steps 1+2) the research team formulated three options for further collaboration in the case study in steps 3+4:

1. Support the development of a governance arrangement for laying out buffer strips and/or helophytes in exchange for the right to lease land from the Water board. Such an arrangement could include more spatial design and more intensive monitoring. To be developed in collaboration with the Water board.
2. Making buffer strips more multifunctional: not only water quality, but also biodiversity, natural pest reduction and pollination.
3. Developing collective action for raising soil organic matter. Much land exchanges land user each year. Soil health and soil quality have become a common pool resource: can soil management be developed in a collaborative way and how? Fuelling discussions in the Midden Brabant Group.

In consultation with the regional coordinator we selected the first option. This is an idea that was developed in the group itself, and explorative discussions with the water board have already taken place. The group was not enthusiastic about the second option, because most farmers did not believe in the added value of natural pest reduction. The third option is urgent and innovative, but would require a longer and more extensive process than can be realised within Pegasus.

In a meeting with the water board, the research team and the Skylark regional coordinator proposed to explore the possibility for developing such an innovative governance arrangement for the improvement of water quality. The water board agreed to a joint workshop with the farmers of the Midden Brabant Group and water board officials. A researcher and the Skylark regional coordinator jointly designed a programme for this workshop. The Water Board was requested to present a map with the water quality situation of the area.
10.2 Outcomes and further steps

The workshop was held on 10 March on the farm of one of the participants. Main goal was to discuss possibilities for collaboration between the Midden Brabant group and the water board. Main issues were water quantity and water quality. There was still a lot of tension because of the floods in 2016 and the financial procedures afterwards. The water board presented a map of water quality, but the farmers asked for more and more fine-grained information. They were not only interested in N and P, but also in levels of pesticides. In addition, they wanted to see a more direct feedback between their actions and the water quality, and to have insight into the water quality of the smaller water bodies adjacent to their farmland.

The water board was not willing to explore the proposal of the farmers for an exchange between buffer strips and the ability to lease land from the water board. They did not want to favour the Skylark farmers over others. However, the water board is planning to change its land policy and to select land managers based on sustainable land management. What this encompasses, still needs to be developed. Skylark farmers can apply for this land, but they will not be favoured over other farmers that can show the desired sustainability requirements.

Instead, the farmers and the water board agreed to develop their collaboration further in the following directions:

- Exchange data and knowledge about farming and water system between farmers and water board: start a process of learning and joint field visits.
- Try out and monitor ‘smart’ buffer strips and reed filters on land of one of the Skylark participants.
- Work towards a more robust water system (i.r.t. flooding and drought) and tailored water management, including areas that are allowed to flood against compensation.

10.3 Judgement on the process

The group of Skylark Midden Brabant arable farmers and the researchers hoped to have made more progress in working out a governance arrangement together with the Water board. However, the Water board was preoccupied with handling the aftermath of the storm water floods in June 2016, and was not willing to go along with the proposal of the farmers for using land as incentive for water quality measures. Nevertheless, there is now agreement on further collaboration. The limited time available for action-oriented research in Pegasus did not match with the pace of development in the stakeholder interaction in the case study.
CASE STUDY

SMALL-SCALE PERI-URBAN MOSAIC IN MONTEMOR-O-NOVO (PORTUGAL)

D4.3 | Final Version | February 2017

Nuno Guiomar, Teresa Pinto-Correia, Rocío Juste

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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<tr>
<th>Region or locality</th>
<th>Montemor o Novo, Central Alentejo, Portugal.</th>
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<tbody>
<tr>
<td><strong>Main Farming/ forestry system</strong></td>
<td>Large scale extensive silvo-pastoral systems.</td>
</tr>
<tr>
<td></td>
<td>In the surroundings of the municipality main town: characteristic small-scale mosaic of farm units between 1 and 5 ha, sometimes up to 20ha. Small scale policultural mosaic in the surroundings of towns and villages, contrasting with the large scale farm structure in the rest of the territory, is characteristic of the region.</td>
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<tr>
<td><strong>Area (ha) of initiative (&amp; Case Study)</strong></td>
<td>Case study area is approx. 1600 ha</td>
</tr>
<tr>
<td><strong>Key ESBOs covered</strong></td>
<td>Rural vitality and Sustainable Food Production.</td>
</tr>
<tr>
<td><strong>Total no. of farmers/ foresters involved</strong></td>
<td>About 300 farmers.</td>
</tr>
<tr>
<td><strong>Other key stakeholders involved</strong></td>
<td>The Local Administration, Cooperative MINGA, Liga dos Pequenos e Medios Agricultores, Citizen Network (Rede de Cidadania de Montemor), local NGO.</td>
</tr>
<tr>
<td><strong>Source(s) of funding</strong></td>
<td>No public funding.</td>
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<td><strong>Start date of initiative</strong></td>
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<td><strong>End date of initiative</strong></td>
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1 Introduction: What is the case study about?

The study takes place in the municipality of Montemor-o-Novo, in central Alentejo. In the surroundings of the municipality main town, as well as in the other, smaller, towns, the landscape is composed of a characteristic small-scale mosaic of farm units between 1 and 5 ha, sometimes up to 20 ha. The case-study focuses on this specific area, the small-scale mosaic landscape, those farms units between 1 and 5 ha. An important characteristic of this area is its rurality with the proximity of Lisbon, and along the main axis of transportation Lisbon-Madrid. The average population density in the municipality is 14 inhabitants per km, and despite being so close to Lisbon, the population has in average decreased by 7% since 1991. The small scale mosaic is nevertheless an area with higher population density, being the low density for the whole municipality strongly influenced by the large extent of the territory occupied by large estates, with very few inhabitants. In the municipality agriculture is still a significant activity in employment, with 14% of the active population still working in the agricultural sector, and this sector is the second most important employer in the municipality (see Table 1). The overall landscape is dominated by large-scale extensive silvo-pastoral systems, in large estates ranging in size from 100 to 1,000 ha.

The total area occupied by these small-scale-farms, is small in relation to the remaining large-scale estates. However, although the number of these small-farms units is decreasing along the years (Figure 1.), this mosaic becomes of foremost importance, due to several reasons: i) it is the everyday landscape of the majority of the municipality population, living in the municipality town or in the surrounding small farms, ii) it is highly attractive to new comers, due to the small size of the farm units and proximity to the town and services; iii) it provides production linked to consumer through short supply chains; iv) it preserves practices and know-how specific to the region (e.g. irrigation by gravidity), which are being abandoned in other land use systems.

Figure 1: Farms units evolution according UAA types. Montemor-o-Novo

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1 Portuguese National Institute of Statistical
The analysis focuses on two ESBOs: sustainable food production and rural vitality. Previous research in the area and the related references, have demonstrated these small farms have a role on both.  

The main actors to consider in small-scale farming in Montemor-o-Novo are: older traditional farmers, lifestyle farmers (some of them new-comers and some originating from the area), some new farmers and landowners who use the farm as a secondary/weekend residence.

Regarding sustainable food production, the production in these small farms is dominated by traditional Mediterranean high-quality products, as olive oil and olives, sheep for meat, winter and summer vegetables, fruits. The diversity of products and the traditional production techniques, especially concerning water use and irrigation by gravidity, strongly contribute to this sustainability. Further, the relation to short supply chains, together with the contribution to

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the household consumption and economy, is one of the contributions to the sustainability of this food production. Furthermore, in most cases, the farm household does not depend solely on the farming income – and thus, there is a capacity to maintain farming despite variations in productivity and income associated with production. Nevertheless, there are issues of scale, as farmers face constraints in accessing the market, due to their small size. There are also issues of environmental quality, due to deficient knowledge level and information of farmers. Mostly for traditional farmers, the use of chemical inputs may compromise the quality of the products and the environmental quality in the farm and its surroundings.

Attending to rural vitality, it has been identified as a potential important way to sum up synergies in this context. The attractiveness of the small-scale farms to newcomers, or to the new generations of families from the area, together with the proximity to the small town of Montemor and the interaction of new actors with the local ones, has created a new turn into a vital rural community, which maintains its rural character but also has been renewed. Most important, the separation between social spaces which often has been described in literature as the process which takes place when newcomers of different types settle in the rural landscape, does not seem to take place here, where a new and mixed community is being shaped. This happens probably due to the complex pattern of actors and to the traditional hybridity of Mediterranean rural relations (Gallego Bono 2010; Arnalte-Alegre and Ortiz-Miranda 2013), based on intense interdependencies among different types of farms and actors. As described by Woods (2011), there is a high diversity in farm managers profiles never seen before in Southern Europe, which is added to the characteristic social dynamism present in small scale farm areas in Alentejo (do Carmo 2007).

The future seems to be promising here, with several ESBOs’ provision at the same time, especially if collective actions are enhanced and developed, as we will see later in this report.

The present case study pays particular attention to the farmers and their collective actions, their linkage with the other actors of the SES. This is why we identified and studied the action of several relevant actors for our case study:

- The direct actors are the small farmers; these are of different types, as described above. Furthermore, there are formal actors, as the local administration of Montemor-o-Novo, a recent local cooperative of producers named Minga (1,5 years old), a farmers syndicate called LPMA (already existing for a few decades), specialised associations, aiming at cultural, environmental or economic outlets such as bee keeping and honey production and hunting.
- Other important actors are first and foremost the consumers, local consumers or consumers linked to the farmers by direct sales in short supply chains, and a citizen network named Rede de Cidadania de Montemor-o-Novo, who has as main goal to contribute to the sustainability of the municipality and has in the last 6 years engaged much in the preservation of small-farms and local production.

There is nevertheless no formal initiative concerning all small farms in this area, and no formal acknowledgement by the related authorities, of their role in rural vitality or food production. Thus, formally there is no voice of these small farms and farmers, and no well-defined project.

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
or initiative. The analysis undertaken here focus on the above mentioned actors and their actions, as a process which can be considered together.

2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

[Diagram of the social-ecological system (SES) with various components and relationships labeled.]
2.2 Description of the SES

In Montemor-o-Novo, small farmers (direct actors) have the potential to maintain and enhance the rural vitality and the sustainable food production. Crucial factors appear to be improving their exchange of know-how on farming practices, their capacity of networking within them and with other actors, and their access to markets (action situation).

The existing collective actions which support in different and non-coordinated ways the small farms in Montemor-o-Novo, provide economic, bureaucratic and technical support to the small-farmers. There are interesting synergies as small farmers provide farming information and know-how to the new-comers, and these last ones contribute to renew of the rural community and keep small farms in production.

As a consequence of the global and national economic crisis, the rates of unemployment are high in Portugal, and this shows an important influence on the structure and operation of the small-farms system. Urban people (actors), mainly young adults, often with an academic background, search for other opportunities and move to rural areas in search for these new opportunities (in farming or in other rural activities). Further, and as a result of societal changes the demand for non-commodity functions, as nature conservation, new and second housing, leisure and recreation, are also increasing. Montemor-o-Novo, due to its proximity to Lisbon and attractive landscape, is also demanded accordingly (Pinto-Correia et al 2013).

Concerning the Governance System, the policies at European or national scale need to be considered centrally, as indirect drivers (see 2.3) for this SES. Small farming remains un-seen by most sectoral policies including agricultural policy is no specific national agricultural policy. The implementation of the Common Agricultural Policy is mostly focused on large scale and specialised farming, aiming to promote its competitiveness and positioning in the global market. Due to a series of interconnected reasons, small farming remains outside the focus (Pinto-Correia et al 2015). Small farms often do not comply with requirements for support in investment, or transaction costs are too high for them to be eligible for production support – this may happen for instance with Organic or Integrated farming, where certification and technical aid may be too expensive for a small unit, and not compensated by the support to be received. The existing policies favour large and specialized farmers, and these can be considered as competitors on the market: the financial aid for investment as well as subsidies for production allocated to these larger farmers reinforces their higher competitiveness in food markets. Despite the quite different market targets that small farms main have in relation to large and specialised farmers, payments within the agricultural policy context strengthen the unbalance.

From the spatial planning perspective, there may be a different influence on this SES. There is national legislation, regarding farm structure and land use, and this national legislation has to be respected and implemented both in regional and local spatial planning instruments and land use permissions. The rather rigid regulation means that farm structure cannot easily be changed, and farm units below 7,5 ha cannot be aggregated or subdivided. Further, the classification of urban and rural zones, defined in municipal plans, sets strong constrains on urban development on agricultural land. Thus, the resource units structure, the small farm plots, are
kept unchanged. In the last decades, their production function has progressively been reduced, while their interest for other uses has increased – so their price in the market has gone up, following their residential value and not their productive value. In this sense and according to Pinto-Correia and Primdahl (2009), while functions in the landscape are deregulated, changes in structure are increasingly regulated – in an attempt from the spatial planning administration to maintain the landscape qualities of the place. And in fact this may be seen as a positive contribution from public policies, both at national and at regional and local level, to maintain the small farm SES. The price has radically gone up – but still the farms are there and there is a very weak urbanization expansion going on. Without this farm structure, the whole revival of the small farms would not take place, in any case.

There are thus two main types of public policies mechanisms interfering with the small farms in Montemor-o-Nov: agricultural policies targeting large farms and keeping small farms unseen, and spatial planning regulations guaranteeing the maintenance of the small farm units and the use of their land as agrarian land.

2.3 Levels of ESBO provision, trends and determinants

The small-scale agriculture has been long characterized by the low volume of its production, the difficulty in distinguishing between what is produced and what is consumed, the lack of professional training, and the lack of farming technology (Bandarra and Jazra, 1981). The idiosyncrasy of small-scale (see 2.2) farming in Montemor-o-Nov related to the ESBOs analysed on our case study, rural vitality and sustainable food production, implies to look at them attending to social and ecological performance measures.

Thus, the indicators used comprise:

**Social performance measures:**

Two scales of analysis were used, farm level and local level. Attending to the farm level it is observed how within the small farmers, there is a group much aware of the sustainability requirements in the farm management, and apply sustainability principles to decide on their practices. The cooperative Minga supports market linkages for small farms together, but only for those farmers who follow a sustainable production pathway, thus increasing awareness and application of sustainability principles. New-comers are often searching for a new lifestyle and therefore also more aware of environmental and socially friendly principles.

Related to the local level, the demand for short supply chains of sustainably produced food is increasing since a few years. Initiatives as the 'Kilometer 0' in cantines and restaurants of the municipality (food produced with very low transportation costs, with products originating from the municipality territory) or MINGA allow the general public to access locally produced food products through their short supply chains shows there is a growing interest in this kind of products and derived food. "Sustainable food production is a response to the growing public awareness of the current impact of food..."
production on the environment, as well as trends for healthier and ethically produced food. Sustainable food is organic, local and fresh.”

**Ecological performance measures:**
The production of the small farmers serves different targets: consumption in the household and enlarged family, distribution to neighbors and friends, sales at the farm and locally, and sales to the external market, or sometimes directly to urban consumers (Pinto-Correia et al 2015): This diversity in destination of production, makes the small farming stronger in face of crisis, than other ways of farming. Small farms have resisted so far, despite being already in the last 40 years seen by the agricultural regime as farms with no future in the market. A quantitative indicator may be the number of farms that are maintained even with no formal connection to the global market.

**Key drivers and limiting factors**
The economic crisis has led to a higher social value attributed to farming, thus a collective awareness has been changing. This way, some young qualified families have moved to Montemor in the last 8 years, to take care of family farms which were out of use for one or two generations or were used extensively while they could have a more intensive use. This also means they have moved into houses which were left with no inhabitants for the last one or two generations. Further, two land banks have been created in the municipality. Land banks create the possibility for people who do not own land or cannot afford to formally lease land to use land from others, to a farming activity. There are different ways a land bank can be built up. In Montemor-o-Novo, there is one created by the Rede de Cidadania, where some owners who do not use their land, have made it available, in small plots, for people who would make a vegetable garden, with no payment required (except in some cases for the use of water for irrigation). There is another set up by the Liga dos Pequenos e Médios Agricultores, with the support of the Municipality Council, making municipal land available also in small plots and for vegetable and fruit production. These plots are located in one single area, outside the town of Montemor-o-Novo, and water is for free – therefore highly interesting for more intensive and market oriented production. Water availability and costs is always a limiting factor in the vegetable and fruit production in the Mediterranean.

On the other side, the local administration (municipality council) expresses the will to maintain small-farms and small farmers, but there is no local legal framework which supports higher intervention. The farming sector depends from central administration and has no delegation at the local level. The local municipality develops some actions to promote awareness on small farming. Further, it supports some of local action groups: some formal, such as Minga, a new distribution cooperative, Liga dos Pequenos e Médios Agricultores dos Concelho de Montemor-o-Novo (Union of the small and medium farmers of the county of Montemor-O-Novo), or other informal, like Rede de Cidadania de Montemor (Montemor citizenship network), or farmers organized as local products distribution groups. These local action groups are also promoting awareness campaigns for the importance of healthy food and food changing according to the seasons, thus linking to local production, with the support of the local administration. The will of the informal citizen network helped to gather the actors and to show to the municipality

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3 Arno Kompatscher (IT/EPP), President of the Autonomous Province of Bolzano and Regional Councillor at the European Committee of the Regions
that it was possible to build with small farmers. Despite, questions as the distribution of the small farmers production or the direct connection to collective procurement (cantines, health system, etc) could still benefit much from a more target investment from the local authorities.

Public procurement in particular, which is managed by the local administration for schools and third age homes, could engage in using local products, thereby supporting directly small farms. Despite this mechanism being used in other municipalities in Portugal, it is not yet used in Montemor-o-Novo. There is an initiative for a Km0 school canteen, but only partial and only functioning one day a week – thus a very limited impact on the local production.

Another important driver is the demand for local products in the local market and through short supply chains that has been increasing slightly, as small farmers reported. Consumer attitudes, mainly of urban and more informed consumers have been changing in recent years, the sense of more awareness for the quality and specific characteristics of local products; societal demand for local products and thus also for small scale farming is increasing, turning it into an opportunity.

A limiting factor is the fact that many elderly farmers are without successor. This fact can partly be balanced with newcomers and the increasing interest in lifestyle farming. The main challenge here is the transmission of specific knowledge and know-how from these farmers who do not have any formal education but have accumulated experience, to the newcomers. Traditional intergenerational learning happened while working together, within the family and neighbor network. From older and traditional farmers to urban newcomers settling in the area, this transmission of know-how and knowledge requires new processes, still not developed.

As expressed in 2.2, the focus of the Common Agricultural Policy on large and specialized farming, is considered by some of the local actors as a considerable limitation to small farms, by lowering their turnover and the market chains they have access to. Some local actors consider that Europe is by this, distorting competition. As previous research has shown, small farming is kept as an unseen farming, not only in the formulation of the CAP, but also by its implementation in the Portuguese context (Pinto-Correia et al 2015a and 2015b). Even if rural development regulations express a willing to support farming contributing to rural development and rural communities, supports are still much concentrated in Pilar I and the large scale farming, than on rural development measures truly targeting small farming.

In the interplay of all the described factors, what is observed is that, despite some odds, small farming is maintained and even renewed in the Montemor-o-Novo surrounding area. And strongly supporting this renewal is the fruitful connexion network among local actors. This can be considered as a facilitator of social capital, mainly developing in informal spaces, which have been growing in number and strength. There is thus a high potential of strengthening the cooperation, the reciprocity and the collective actions, mainly grounded on the existing small initiatives, as the cooperative MINGA, the citizen network Rede de Cidadania, the association Liga dos Pequenos e Médios Agricultores. Being different in nature, but with similar goals and interconnected actors, these entities create complementary spaces for sharing and learning.
A drawback is the limited tradition on collaborative functioning, through networks. There is a strong tradition in Mediterranean rural communities, which are characterised by their hybrid composition, of collaborating closely in a one-to-one basis. And even highly advanced collaboration forms, where parts of the property rights are transferred by the land owner to others, for example – but always on the basis of unformal agreements and always one-to-one agreements. Associative or other network involvement has much less tradition. The trust in a community of actors, and sense of belonging to a collective, is thus limited. Actors responsible for launching the collective actions remarked that, despite many common objectives, small farmers remain mostly in an individualist logic. Recent entrepreneurs (with a highly educated profile, often newcomer) invested in the construction of a resilient network in order to help securing the small-farms existence and production. This should be local, qualitative, fair and environmental friendly, as suggested by the following interview’s quote: “Farmers distrust already a lot so we have to build a relationship based on trust: what is important is the commitment, and feeling what is important (aka: the value system).” (Administrator Minga cooperative). Still, there are constant constraints to the functioning of such a network, due to the lack of trust in the collective and lack of commitment of small farmers with the group.

In this sense, and regarding the provision of the ESBOs, their reinforcement and support in the long term would require a more intensive investment in collective actions collective actions which increase the connections between small-farmers, promote trust between them and create new ways of cooperation. For this, also training for cooperation and networking would be required. To engage in close collaboration, besides formal knowledge, soft skills are much required, and these can only be obtained if unformal project base training is set in place. In this context, this could be a fundamental step for rural vitality to be revitalized and the sustainable food production to grow with a stronger basis.

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

Sustainable food production

On top of the sustainable food production in Montemor-o-Novó, some additional social and economic benefits were identified:

- The increasing awareness by the small farmers about environmental and social issues makes increase the collective awareness on this and vice versa.
- Initiatives like MINGA, which is fostering and promoting ecological production, is opening new markets, access to new consumers, and creating green employment.
- The diverse spectrum of short supply chains established and used (direct sale, basket, market, specific shop, online, ...), shows the innovating capacity of the different actors involved in this case study.
Rural vitality
Attending to rural vitality:

- Newcomers and urban people coming back to their family houses, involve the land reclamation of the small plots as well the recovery of the old family houses.
- Also these newcomers and urban people, are bringing with them new innovative ways of farming or new connections to the market, or they are aiming to recover traditional ways of farming, helping preserving know-how which contributes to the sustainability of the farming process.
- The increasing collective awareness is leading to new projects to connect farmers and the market.
- Also related to the last point, some initiatives as the land banks from the Liga dos Pequenos e Médios Agricultores and from the Rede de Cidadania, aim for sustainable local solutions, based on social innovation.
- The new dynamics created also increase the level of appreciation of local inhabitants and local farmers, for the community and the place they live in; there is an improvement of the collective local self-esteem, which contributes to the interest in staying in the area and creating new bindings and new projects, which in turn create more economic activity and social capital.

3 Shifting societal norms, collective learning and voluntary actions

- Is there evidence in the case study of shifting societal ‘norms’ in relation to expected environmental or social behaviour among farmers or foresters or those with whom they deal in supply chains?

Concerning the small farmers studied in this case study, we can distinguish different categories: older traditional farmers, lifestyle farmers, some new specific farmers and landowners who use the farm as a secondary/weekend residence. These categories are particularly important when we talk about the existence or evidence of shifting societal norms in our case study.

Traditional farmers: who have done this activity all their life but see it more as a subsistence activity, even if they sell part of their products. They present an increasing environmental and social concern, or at least they are aware of societal concerns and demands for more sustainable production forms and product quality. Nevertheless, they don’t change fundamentally their ways of farming and according to Costa (2013) it seems they don’t have the intention.

New specific farmers: farmers who see farming more as their main activity and develop it as high quality niche production, often organic or biodynamic. This fact represents a change in the common thinking about agriculture, where the social, environmental and health concerns are gaining importance. There are also the ones more prone to work in networks and contribute explicitly to a collective action, also to support a better connection to the market or creation of new markets.
**Lifestyle farmers**: who have moved into the area due to the attractiveness of the rural ambience, the local landscape and the proximity of the city of Montemor, but also practice farming in their land. The origin of lifestyle farmers, involves foreigners, urban newcomers, local and returnees. The main characteristic of this group is their common concern about food production, the search for a better and “green” quality of life and the promotion of the natural resources. Since the 90’s, Montemor-o-Novo is hosting this group of new farmers, and the number of them is increasing. This group represents the evidence of a real change in societal norms, more than a change, and an evolution.

By the interaction of these different actors, who are neighbours or meet in informal meeting places such as the market or events organized by the Rede de Cidadania or the Cooperativa Minga, social norms are changing. The former rural community is turning into an even more hybrid community with different actors mixing – and this contributes to shifting social norms.

- To what extent does the innovation or success or potential of the case study incorporate collective learning?

Despite the difficulties in working in networks and trust in the collective, most of the farmers believe in interpersonal relationships and networking as a way to improve and promote the small farming (Costa 2013). They are thus open to support each other, and the newcomers and lifestyle farmers are welcomed by traditional farmers, if there are technical questions about farming or a need of information.

All exchange of information between the direct actors of our SES, happens in informal channels. This means, there is no formal space to this exchange of information between small farmers.

Concerning the exchange of information between small farmers (direct actors) and others actors: local administration, cooperatives, local consumers and the citizen network (Rede de Cidadania), we find different situations:

- First, the local administration doesn’t exchange information with the others actors (indirect and direct). The local administration collaborates in some initiatives created by MINGA (cooperative) or Rede de Cidadania, but it is not involved in depth with them. At the same time, most of the farmers state that an important obstacle for their access to the market is the complex bureaucracy where the local administration doesn’t give them any help to solve this situation.

- Second, the case study shows that the exchange of information is between the other actors (the citizen network (Rede de Cidadania), the cooperative (MINGA) and the local consumers) and between some farmers. Thus, Rede de Cidadania promotes and informs to the local consumers about sustainable ways of consumption and also offers plots of land to be farmed; Liga dos Pequenos e Médios Agricultores and MINGA offers legal, financial and technical consultancy to their farmers and connect them to local consumers by different ways described earlier (local shop, market, online shopping,
short supply chains) and Rede de Cidadania together with MINGA foster initiatives together to reach the local consumers and improve their environmental and social awareness.

Concluding, the exchange of information between small farmers responds to a cultural and traditional way of communication. This way the cooperative and the citizen network are the actors which configure formal spaces to the exchange of information. The local administration in this sense is neither an obstacle nor a promoter (as it might be) of improvement of inter- and intrapersonal relationship between all the actors in our SES. In this way, the local administration doesn’t create spaces or mechanisms to enable this exchange of information, nevertheless, support in some ways initiatives triggered by the collective actions, thus the role of the local administration in this issue it could be said that doesn’t exist.

In January 2017 an initiative was launched by the Municipal Council, which is a step forward in actively supporting small farming, and paying particular attention to the environmental sustainability: the municipality has organized a series of training sessions on organic farming and soil improvement, in the different localities in the municipality territory. There are one day training sessions, lead by an experienced organic farmers who is also an agronomist, and are free to anyone who wants to attend. In this way, it is expected that also more traditional farmers will receive information and training on environmental requirements for sustainable farming and will be able to apply new methods and technics in their practice, combined with the traditional knowledge. This may be a sign of a new involvement of the local administration in this process.

- What changes or processes in the case study have happened not because of policy or market instruments (incentives or regulations or changes in institutions) but simply because of individual or collective motivations to change, among the key actors or groups of actors?

The most important change observed in a short term is the increase of the environmental and social awareness. This is reflected in the cooperative MINGA, which started in 2015, and its incomes and people interested in its work are growing very fast. Also, the Rede de Cidadania which began in 2010 is still working with the population of Montemor and another entities, this means a change in the perception of the environmental and social issues being all of them more important in this county, as the Rede de Cidadania says on its description⁴ “it is a movement that is aware and acts towards new social, economic, environmental and cultural paradigms that enhance the construction of a sustainable future closer to the people”


This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

Regarding the existence of a social network/collective action that can improve the provision of the ESBOs, rural vitality and sustainable food production, we must again refer to the different entities mentioned before in sections 2, 3 and 4: MINGA, Rede de Cidadania, Liga dos Pequenos e Médios Agricultores and MARCA a local association for development.

In Montemor-o-Novo, there is no social network or collective action that comprises all of the actors of the SES. In spite of this, and as referred to earlier, there are several collective actions and a citizen network that have the potential to improve the provision of the ESBOs.

This way, MINGA with just one year of operation has reached a small group who farmers who need consultancy, inhabitants who wanted to change their consumption habits, farmers who wanted to change their traditional way of farming to a sustainable one, and so on. the group of people interacting with Minga is growing and as such its influence is expected to grow.

The Liga dos Pequenos e Médios Agricultores, offers also technical and financial consultancy for the farmers and access to plots of land through the land bank, as well as the Rede de Cidadania. And MARCA not exclusively in the agriculture area but including it, promotes the formation of associations and work directly with some farmers through development projects.

Inside of MINGA Cooperative

The leaders of some of these collective actions have close relationships with the population, as it is the case of the responsible of Liga dos Pequenos e Médios Agricultores. The founder of MINGA is not from Montemor-o-Novo and is building his network and relation with specific groups of the population, step by step. The Rede de Cidadania is composed of people both from the municipality and newcomers, but acting since 7 years, it is recognized by most inhabitants. Nevertheless, these leaders that don’t have an institutional position or influence to arrange changes in a short term. This fact can be considered an obstacle for the development in the provision of the ESBOs. It could be dealt with with more involvement and compromise.
from the local administration, so that formal institutions also apply in their practices principles and actions that contribute to the support of small farmers.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

In some cases, the local administration supports initiatives from collective actions, in other cases it is not a facilitator as it might be, as is the case of the complex bureaucracy for accessing to the market for the farmers. Nevertheless, according to the Strategic Charter of Montemor-o-Novo, an official document from the local administration where is settled the objectives and the future actions for the local administration, some governance arrangements concerning the ESBOs studied can be found. They are the result of the participative processes of the Agenda 21:

- **Land banks:** For the one promoted by the Liga de Pequenos e Médios Agricultores, the local administration provides plots of lands free of charge or low cost. The objective is to promote the local farm products and the creation of community spaces for local production, socialisation and cohabitation. For the land bank promoted by the Rede de Cidadania, the Municipality has provided financial support to its divulgation, and to obtain small technical equipment required for the fencing of the plots and the water provision. The land in this case is private land. On both cases, the support of the municipality is important for the implementation.

- **Green taxes incentives:** Incentives to whom give land to the land bank. Thus, there is a reduction on the property tax up to 50%, this is a national measure but implemented at a local level.

- **Km0 food in canteens and restaurants –** the initiative is a joint project of the Rede de Cidadania and Municipality. The Rede has dealt with Restaurants, and the Municipality with the school canteens. The KM0 food is only served in very limited occasions, but the concept has been spread in this way, through the schools and children. The Rede de Cidadania has engaged with the Restaurants, and promotes a monthly event (a km0 dinner) announced in the radio and through the Rede contacts, so that the concept is also spread in this way, and the restaurants created new business opportunities. This is still a small initiative, but as created higher awareness of the quality of local food and the role of consumers in protecting it.

Concerning to the land bank by the Liga dos Pequenos e Médios Agricultores, the plots are managed by the Liga, and the local administration just provides the land but it is not engaged directly with the people who use or manage the land. The general perception about the local administration is that they do not engage in this area.

In this context, alternative governance systems at small-scale, are emerging. Small farmers organize themselves, deciding individually, what they produce, how they produce and when they produce, and most important how they use the land. The exchange of related information occurs through informal channels, this kind of governance system, subtle, in some way is due to the land character, and determines the provision of the ESBOs. Regarding sustainable

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5 Lei n.º 63/2012, de 10 de Dezembro
food production, the new ways of farming, techniques and the administrative procedures to become “organic producer” are communicated both informal channels and formal through the cooperative Minga or the Liga dos Pequenos e Médios Agricultores.

The same is observed with rural vitality, where newcomers find the information they need by the informal communication, spreading it to others potential newcomers, and maintaining the rural community.

MINGA, Rede de Cidadania and the Liga dos Pequenos e Médios Agricultores are positioning themselves as alternative governance systems, introducing new ways of farming, increasing the social and environmental awareness, promoting local products and production, etc. These collective actions are based on participative democracy procedures, making the farmers involved and engaged. In MINGA was born just a year ago, and aims at shared decisions, in the cooperative assemblies, to decide what is produced and how it is going to be sold. More collaboration training would be needed, but the platform for this collaboration is there, and would hopefully be more effective in the future. Rede de Cidadania and Liga dos Pequenos e Médios Agricultores organized together with MINGA several public actions to involve the society and making known the local products and farmers.

In the case of Montemor-o-Novo, it was important the implementation of the participative processes of the Agenda 21, a point in history, when it seemed that the local administration realized that the population of Montemor-o-Novo had something to say about the management of their municipality. For example, the citizen network (Rede de Cidadania) was born under the Agenda 21 frame, or mostly following some of the Agenda 21 objectives.

In summary, the local administration of Montemor-o-Novo, as states on the Strategic Charter of Montemor-o-Novo, should be more engaged with the provision of the ESBOs by the small farming, also establish a participative governance system and implement measures for accomplish the objectives proposed, connect and create spaces for exchange of information, and facilitate the bureaucracy for the farmers, in order to enhance the provision of ESBOs.

4.3 The role and impact of policy in ESBO provision

Despite the funds for the Diversification in Small-Scale Agriculture (e.g. Regulation (EC) 2075/2000 of 29 September 2000 or the latest Small-Scale Agricultural Regime, included in first Pillar of the new Common Agricultural Policy (CAP), which came into effect in January 2015) to improve agricultural competitiveness and promoting rural sustainability, a significant rate (37%) of the respondents included in the work published by Barroso and Pinto-Correia (2014), conducted in several municipalities of the Alentejo (including our case study), don’t have any subsidy – mainly small-scale farmers. The lack of information and knowledge about the subsidies and bureaucratic procedures makes the access to these subsidies difficult; also there is a general mistrust on the institutions from the part of the small-farmers. From the words of one of the responsible of MINGA: “We don’t have any support from the local administration, and we don’t want it”.
Attending to the policies at the municipality level, the spatial plan is managed by the local administration. According to Pinto-Correia et al (2015), the pattern of land cover, new buildings or the expansion of existing ones, need to respect the regulations, environmental restrictions and conservation measures imposed by different levels of administration, in an increasingly complex set of rules. Although, the local administration expresses the will to maintain small-farms and small farmers, so far it has not engaged in grounded projects aiming to cope with some of the constraints felt by small-farms, like the distribution or the legal requirements (e.g. livestock tracking and welfare reporting) imposed by the national legislation, which is focused on large production units.

The institutional frameworks are lagging behind. As an example, the burden of transaction costs it’s not proportional to the farm and its productive scale, this can be an obstacle, mostly to the use of some policy scheme by small-scale. There are some recent and relevant mechanisms created within the Rural Development programme, but still not set into practice. Since the existing institutional frameworks, as CAP and national regulation, remain not concerned by this type of farming, the construction of a local institutional framework adapted to the territory and its people would be a most significant improvement of conditions of small-farms. Although the Pillar 2 of the CAP, related to the rural development policy, it is focused on the employment creation, the sustainability, modernization, innovation and the quality of the agricultural products, according to Da Silva (2016) in Portugal the beneficiaries of these measures are rural large scale farming and young farmers (Da Silva 2016), it’s not consider the small-farmers as we explained before, they are not consider productive in economic terms.

4.4 The role of the private sector in ESBO provision and enabling factors

In this case study, the private sector has a minor role, due to the fact that the ESBOs we are analysing and the direct actors are mostly related to collective actions. Nevertheless, the private sector engages in some ways with some of the small farmers in Montemor, like processors, traders and the retail sector.

According to *The Enterprises Survey with economic activity in Montemor-o-Novo (2015)*, the problem identify by the private sector in Montemor-o-Novo, is the national economic situation (73.3%) follow by lack of private investment (27.7%) and competition (25.5%), and the main solution to the economic situation in Montemor-o-Novo goes through more private sector investment in the agricultural sector (24.4%). Once again, the importance of the agricultural sector is a pillar on the economic context of Montemor-o-Novo. Nevertheless, the private sector initiatives are mainly targeted to the large-scale farming and intensive farming systems. On the other side, there is also the concern about improving and rising the dissemination and commercialization of local products, which can be the common share of one and another sector.

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6 A local landscape in transition between production and consumption: can new management arrangements preserve the local landscape character? For revision
It can be found some private initiatives, looking forward to improve the rural vitality and the sustainable food production, but they cannot be considered representative of the private sector at all, nevertheless, these initiatives have some interest regarding the provision of the ESBOs:

- A large-scale farm, Freixo do Meio » sustainable and social values » own production and sells directly on farm or in Lisbon » in order to offer and provide sufficient products to their consumers ALSO some products sold come from small farmers.
- The project “Partilhar as colheitas- (Sharing the Crops) Community supported Agriculture”, implements a sustainable system of production-consumption.
- A consortium of large farms promote and sell extensive quality beef, “Solar da Giesteira” » sustainability as a label
- Some Restaurants promote and provide Km0 menus.
- Increasingly small initiatives promote and use the label “local”, “small Farm” »» a Montemor-o-Novo label has been under discussion.

In order to establish the existence of some benefits/risks related to the provision of the ESBOs, as was said, it is a potential on the private sector. Nevertheless is necessary to develop more this research line due to the fact that our ESBOs in Montemor-o-Novo are more related to the collective actions than to the private sector.

5 Potential pathways towards an enhanced provision of ESBOs

The enhancement of the provision of the ESBOs studied in Montemor-o-Novo, rural vitality and sustainable food production, need the empowerment of the collective actions, as well as more active contribution from the local administration. This way, the potential is there, and the ESBOs are being provided, nevertheless is needed to make these provider more effectiveness.

The interest from urban consumers and the societal demand for more rural lifestyles, are important drivers of a continued improvement in the condition of small farming.

A fundamental contribution for the increased resilience of the ESBOs in this context would be the increased collaboration and networking capacity, from all actors engaged in the process. In order to create new products, conquest markets, create new markets; promote better use of inputs and more sustainable farming practices, all this would be achieved in more sustainable ways with more grounded collective actions. There are a few, but so far they remain as limited small initiatives which lag behind when the whole potential is considered – they are only including a small part of this potential.

Regarding to the private sector, as was said in point 4.3, it was identified the potential in some initiatives, nevertheless it is an issue that need to be more analysed in order to see the different mechanism of this sector in the provision of the ESBOs, the governance system and the relation with the other actors.
6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework is quite useful in order to identify the main variables and processes related to the case study, this way it can be built a case study framework on which develop the work through the perspective of explaining and analysing the “why, how, where and when” of these processes and variables. Nevertheless, it is needed to develop this model in a more flexible way, adapting the SES framework to the specific ESBOs and widening the interlinkages that can occur.

Nevertheless, the SES framework in the present case study, enable to provide a holistic viewpoint of the socio-ecological interactions between farmers, collective actions, administration and the provision of the ESBOs.

One of the challenges for the researchers applying participative dynamics with the SES framework is the capability to explain and translate the objectives of this framework to the stakeholders. Nevertheless, using an action-oriented approach allows to establish objectives and a robust background for discussions on the entire complex issues related to the ESBOs. The same way, the action-oriented approach provides more transparency and coherence to the whole investigation in order to have realistic outcomes.

The context of particular territories has to be taken in account in order to adapt the approach, understanding the idiosyncrasy of the particular countries, cultural, economic, environmental and social aspects is mandatory to optimize the approach.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

Small farming in Montemor-o-Novo seems not to have economic or policy relevance for the local administration. Another commitment would mean much for the development of the provision of the ESBOs. However, the collective actions against this trend are arising, proving that another way of governance system is possible and these alternative ways can be sustainable. Although, the private sector doesn’t have an active role related of the ESBOs, it can be said that has a great potential in this sense.

On one side, the appreciation and demand of the ESBOs provision, it has been proved than both, small farmers and society, are aware about the active role of these small farmers in the provision of the ESBOs, as well as in the importance of them. This way, as one farmer said: “we know that what we are doing is good for the society, for the environment, and so on, and we are trying to keep/develop this”.

On the other side, in order to increase the awareness and provision of these ESBOs it is necessary more commitment at the local administration level, simplifying the bureaucracy, improving the educational and environmental policies and supporting and enhancing in a deeper way the collective actions.
7.2 Key findings on governance arrangements and institutional frameworks

Concerning to the institutional framework at the European level, the case study shows that although the small farmers do not receive target support, their activity is affected by the CAP, in the sense, that this one is focused on large-scale farming, what can lower the competitiveness of the small farming.

At the local administration level, as well as at the regional sectorial level of the administration (environment, agriculture) the bureaucratic processes for the small-farmers are being and obstacle for the provision of the ESBOs. Nevertheless, the implementation of the national measure of the land bank and the green taxes (4.2-), shows the relative importance that can have small-farming at a national level not local. The spatial planning, with rules decided at national level and implementation at local and regional level, contributes to the maintenance of a farm structure where small farms are kept as farm units, and no urban expansion is allowed in their land. This is a quite passive regulation, but surely contributes to the land use pattern which supports the ESBOS we are dealing with. So, in a way there are public interventions with limiting effect on small farms, but also some other, of different origin, which support the process of revitalisation of these same small farms.

7.3 Contributions to EU strategic objectives

After the analysis mostly of the collective actions in our case study that provide our ESBOs, it can be said that they contribute to the EU objectives in different ways:

- creating employment (‘inclusive growth’): Initiatives as MINGA or Liga dos Pequenos e Médios Agricultores, through the consultancy and the creation of short supply chains, are creating employment for the farmers and for another people involved on this initiatives. This way, MINGA started one year ago, and now has 8 organic farmers who have a complementary salary, three people working in the shop and in the market. Through consultancy, both initiatives allow the small farmers go into the system and be quantify as new workers.
- enhancing sustainability (‘sustainable growth’): MINGA offers only organic products, this sense, all their producers had to change to the traditional farming to the organic one. The increasing social demand is turning more traditional farmers to organic ones.
- strengthening innovative capacity (‘smart growth’): Newcomers and the collective actions are bringing together to the county of Montemor-o-Novo new ways of farming, and making the local products more interesting and making Montemor more attractive for new initiatives.

7.4 How about the transferability of the approach/mechanism used?

The approach used to provide the ESBOs, rural vitality and sustainable food production, is mainly enhanced by the collective actions, and although is being implemented and it is arising, it can be transferred, according to the focus group, by:
• More extended knowledge about the collective actions existing in Montemor-o-Novo.
• More education to the consumers about sustainable and local food in Montemor-o-Novo.
• More training on close collaboration and network involvement, for all those engaged in the collective actions.
• More effective support from the local administration.

In this sense, there are a lot of small farmers and consumers in Montemor-o-Novo that are facing the same challenges that the collectives actions. This case study shows the enabling and limiting factors for the small farmers and their collective actions in order to provide the ESBOs, this way another farmers and collective actions can adapt all of this information to his own situation and to ensure a long term success.
References


Instituto Nacional de Estatística. Consulted several times.


9 ANNEX: Reflections on the case study methodology used (focus group)

9.1 Objectives and activities undertaken with initiative/stakeholders

The participatory process implemented during the case study was:

- Individual interviews.
- Focus groups: validation process with the main stakeholders, small farmers.

Individual interviews: The main actors involved in these interviews were the managers of the collective actions. This way, we try to understand the main motivations to carry out these actions and to identify the implication of the small farmers on them. Also, the interviews were focused to understand the small farm system in Montemor o Novo and the role of the rest of the stakeholders, mainly the local administration, in the provision of the ESBOs analysed.

Focus groups: The schedule of the participatory process included two focus groups, one with the small farmers, another one involving the local administration and private initiatives. The main objective of the focus groups was to validate the information during the literature revision and the interviews, and analysed points that didn’t come out during the two stages described before.

At the end, one focus group was carry out with the stakeholders, related to the other focus group we found difficulties to contact the stakeholders and to have them involved in this process. In this way, we confirmed as was described in the case study, that the small farming is not a priority for the institutional stakeholders.
9.2 Outcomes and further steps

The main outcome we got was to make a first identification on how the small-farming system works in Montemor o Novo, identifying cultural issues related to the collective actions and channels of communication and bureaucracy obstacles in order to access to the market.

There is an important interest from the ICAAM to complement the collective actions related to small-farming in Montemor o Novo, the results of this case study are going to be used in order to continue working with these stakeholders and understand the cultural, social and environmental issues related to the territory. The ICAAM collaborate in many ways with the Portuguese Rural Network, that also has as an objective to enhance the sustainable small-farming system.

9.3 Judgement on the process

- What were expectations of actors towards this process?
- Were you able to meet expectation and why not?
- What was in your view the added value of the participatory approach?
- What are lessons learned during the process? What did not work well?

The main expectations of the actors who participate in the focus group were related to the process itself, in this way they show their interest in being involved in more focus group and activities which have the objective to enhance the small-farming system in Montemor-o-Novo.

Due to the interest that has the ICAAM in continue working with this sector, we found very possible to build a trustful relationship with them in order to meet this expectation.

The added value of the participatory approach is to empower, in this case, the small-farmers. In this way, their participation in this kind of activities makes them to feel in a position as a decision-maker that they are not use to feel they belong.

As was described before, the main difficulty we found was to involve other stakeholders, mostly from the local administration. In this sense, the Portuguese team is working to find the proper channels and ways of communication to enhance this relationship and to have them involved.
9.4 Supporting data and statistics

Figure 2: Small Farming Montemor o Novo
Table 2: Basic Data Montemor o Novo

<table>
<thead>
<tr>
<th>Montemor-o-Novo (Município)</th>
<th>2001</th>
<th>2011</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>População</td>
<td>18.560</td>
<td>17.377</td>
<td>16.443</td>
</tr>
<tr>
<td>Superfície em Km²</td>
<td>1.232,4</td>
<td>1.233,0</td>
<td>1.233,0</td>
</tr>
<tr>
<td>Freguesias</td>
<td>10</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Idosos por cada 100 jovens</td>
<td>203,4</td>
<td>236,9</td>
<td>264,1</td>
</tr>
<tr>
<td>Famílias</td>
<td>7.131</td>
<td>7.055</td>
<td>-</td>
</tr>
<tr>
<td>Alojamentos familiares</td>
<td>10.091</td>
<td>Pre 10.316</td>
<td>10.340</td>
</tr>
<tr>
<td>% população de 15+ anos</td>
<td>29,6</td>
<td>18,9</td>
<td>-</td>
</tr>
<tr>
<td>sem nível de escolaridade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pensionistas da Seg. Social e CGA em % da população</td>
<td>48,5</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Number of farms Montemor o Novo.

<table>
<thead>
<tr>
<th>Ano</th>
<th>Montemor-o-Novo</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
</tr>
<tr>
<td>Total</td>
<td>827</td>
</tr>
<tr>
<td>&lt; 1 ha</td>
<td>68</td>
</tr>
<tr>
<td>1 - &lt;5 ha</td>
<td>266</td>
</tr>
<tr>
<td>5 - &lt;20 ha</td>
<td>138</td>
</tr>
</tbody>
</table>

Table 4: Working population by economic activity (2011)

<table>
<thead>
<tr>
<th>Economic activity (CAV 3)</th>
<th>Working population (nº)</th>
<th>% of total working population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, animal production, hunting, forestry and fishing</td>
<td>1010</td>
<td>13,97</td>
</tr>
<tr>
<td>Extractive industries</td>
<td>18</td>
<td>0,25</td>
</tr>
<tr>
<td>Manufacturing Industries</td>
<td>795</td>
<td>10,99</td>
</tr>
<tr>
<td>Electricity, gas, steam and airconditioning supply</td>
<td>47</td>
<td>0,65</td>
</tr>
<tr>
<td>Capture, treatment and distribution of drinking water</td>
<td>21</td>
<td>0,29</td>
</tr>
<tr>
<td>Construction</td>
<td>600</td>
<td>8,30</td>
</tr>
</tbody>
</table>

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Wholesale and retail trade; Repair of motor vehicles, motor cycles
Transport and storage
Hotels and restaurants (restaurants and similar)
Information and communication activities
Financial and insurance activities
Real estate activities
Professional, scientific and technical activities
Administrative and support service activities
Public administration and defence; compulsory social security
Education
Social activities and Health
Cultural, artistic and sporting activities
Other personal, social and community services
Families with household employees
International and other extra-territorial organisations

Table 5: Main Problems (N=137)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>National economic situation</td>
<td>73.3%</td>
</tr>
<tr>
<td>Lack of private investment</td>
<td>27.7%</td>
</tr>
<tr>
<td>Competition (national and international)</td>
<td>25.5%</td>
</tr>
<tr>
<td>Lack of public investment</td>
<td>19%</td>
</tr>
<tr>
<td>Lack of public administration support</td>
<td>14.6%</td>
</tr>
<tr>
<td>Others</td>
<td>27.8%</td>
</tr>
</tbody>
</table>

The Enterprises Survey with economic activity in Montemor-o-Novo (2015),

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Table 6: Measures proposed (N=90)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>More public and private investment and support (agricultural area, tourism, training personnel...)</td>
<td>24.4%</td>
</tr>
<tr>
<td>Increase population incomes/purchasing power of the population</td>
<td>23.3%</td>
</tr>
<tr>
<td>Job creation</td>
<td>21.1%</td>
</tr>
<tr>
<td>Improvement and economic growth</td>
<td>10%</td>
</tr>
<tr>
<td>Dissemination and promotion of local products</td>
<td>8.9%</td>
</tr>
<tr>
<td>Others</td>
<td>22.3%</td>
</tr>
</tbody>
</table>
CASE STUDY

MOUNTAIN WOOD AND THE PRODUCTS OF TRADITIONAL LIVESTOCK BREEDS IN SLOVENIAN ALPINE SPACE – AN ATTEMPT TO ENHANCE MARKET VALORISATION OF ESBOs (SLOVENIA)

D4.3 | Final Version | March 2017

Ilona Rac, Emil Erjavec, Luka Juvančič, Stane Kavčič
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1 Introduction: What is the case study about?

Summary: Enhancing rural vitality and preserving habitats through market valorisation of locally sourced products

Table 1: Case study overview

<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Farming/forestry system</th>
<th>Action</th>
<th>ESBOs</th>
<th>Drivers</th>
<th>No. managers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slovenia</td>
<td>Upper Savinja Valley</td>
<td>HNV farming: permanent grassland + sustainably managed forests</td>
<td>Increasing valorisation of locally sourced goods</td>
<td>Rural vitality Grassland/forest habitats Genetic resources Public health and recreation</td>
<td>Economic and social decline Market demand Private initiative Action-based research</td>
<td>212</td>
</tr>
</tbody>
</table>

Geographical and socio-economic characteristics of the study area

The study area includes two mountain municipalities (Solčava and Luče) in the Upper Savinja Valley at the border with Austria in the North of Slovenia, covering 21,300 ha and approximately 2,000 inhabitants (Statistical office of Slovenia, 2016). This remote, sparsely populated area is characterised by small municipalities in a typical alpine setting, over 80% forest cover and narrow valleys nested between the tall peaks of Kamnik-Savinja Alps. The area is settled in a distinctive pattern called celek or ‘celk’, characterised by scattered secluded farms on slopes with a relatively large estate in one piece, i.e. not fragmented (large forest estates, some alpine meadows), and small conurbations in narrow alpine valleys.

Figure 1: Location of case study within Slovenia

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
There were 157 farms in Luče and 55 in Solčava in 2010 (SORS, 2016). The main agricultural activity is ruminant livestock production on permanent grassland and focused on dairy and meat with the local (autochthonous) sheep breed “Jezersko-Solčava” sheep, the autochthonous cattle breed “Cika”, as well as the Brown cattle breed. Farming is not the exclusive or main activity of most of the farms; some are focused on forestry, others on tourism and other economic activities. Thus, of 50 active farms in Solčava, 18 are engaged in tourism and 26 in other supplementary activities. Like elsewhere in the Alps, natural conditions do not allow for intensive farming. A third of the farms are organic, others manage land extensively. Half of the farms are located on altitudes above 1,000 m and all lie in areas with natural constraints. The average size of these farms is 130 hectares (which is atypical for Slovenia, where the average farm size is 6.7 ha). This is a historical legacy since the Middle ages, when some families were granted the right to settle this area, exploit the forest and form independent holdings, which managed to survive even the turbulent times of the communist experiment in the 20th century. Agricultural land usually represents a small share of the holdings; according to our field study investigation, this proportion ranges from 10 to 30 per cent. The rest is mainly forest. Where accessibility and/or the slope of the terrain permit, the forests have been commercially exploited for centuries. Forests have traditionally represented the main (or important supplemental) source of farm income and the main source of capital for investment (Mavsar, 2005).

Table 2: Land use in the study area

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area (ha)</th>
<th>Number of holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>All utilized land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>4504</td>
<td>157</td>
</tr>
<tr>
<td>Solčava</td>
<td>5683</td>
<td>55</td>
</tr>
<tr>
<td>Agricultural land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>1066</td>
<td>156</td>
</tr>
<tr>
<td>Solčava</td>
<td>536</td>
<td>55</td>
</tr>
<tr>
<td>Utilized agricultural area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>983</td>
<td>156</td>
</tr>
<tr>
<td>Solčava</td>
<td>n/a</td>
<td>55</td>
</tr>
<tr>
<td>Fields</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>8</td>
<td>140</td>
</tr>
<tr>
<td>Solčava</td>
<td>1</td>
<td>43</td>
</tr>
<tr>
<td>Permanent grassland and pasture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>954</td>
<td>155</td>
</tr>
<tr>
<td>Solčava</td>
<td>501</td>
<td>55</td>
</tr>
<tr>
<td>Permanent crops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>21</td>
<td>39</td>
</tr>
<tr>
<td>Solčava</td>
<td>n/a</td>
<td>10</td>
</tr>
<tr>
<td>Forest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>3381</td>
<td>149</td>
</tr>
<tr>
<td>Solčava</td>
<td>3732</td>
<td>52</td>
</tr>
<tr>
<td>Unproductive land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Luče</td>
<td>58</td>
<td>157</td>
</tr>
<tr>
<td>Solčava</td>
<td>1415</td>
<td>55</td>
</tr>
</tbody>
</table>

Source: SORS, 2016. 2010 data.

The economic performance of the area is relatively favourable, despite the harsh living and production conditions and isolated location. Historically, this area was managed by large family holdings, operating in a relatively advanced, rational and economically efficient manner, handing their estates down from one generation to another and causing them to consider the long-term effects of their management. A natural consequence of this has been sustainable
land management that has resulted in preserved forest, agricultural land, special aesthetic quality of the landscape and diverse, preserved grassland habitats. The area has been building on its ‘green growth’ character, particularly in the last decades, adapting quickly to the growing market demand for outdoor tourism and agri-tourism. Farmers in the area have always been advanced compared to farmers elsewhere, adopting technological advancements and making use of the natural setting (e.g. transport, primary processing of wood, animal production technologies, tourism) (Mavsar, 2005).

The area is characterized by high-nature value (HNV)\(^1\) farming, in part because the natural constraints dictate it, and in part because it makes economic sense to do so: the species-rich semi-natural grassland habitats, created and maintained using adapted breeds of domestic animals (especially the abovementioned autochthonous Jezersko-Solčava sheep and cattle breed Cika), and well-managed, selectively cut forests, are very attractive to tourists. About 75 % of the municipality of Solčava and 50 % of Luče are protected under Natura 2000 (ZRSVN, 2013). There are two major nature parks (protected areas) in the area, Logarska dolina\(^2\) and Robanov kot\(^3\), which have both been very popular tourist destinations due to their beautiful landscapes since the beginning of the 20\(^{th}\) century (Anko et al., 2007). With growing affluence and mobility of (predominantly) domestic visitors in the 1970’s and 1980’s, popularity of the area increased, which holds in particular for its main landmark, the Logarska valley. The area became a popular destination for daily excursions, putting strong pressure on the local infrastructure, environment, and local community as such. The pressure of tourists during peak seasons created enormous problems with motor traffic congestion, uncontrolled and unauthorized parking, burning and deliberate or accidental damage to natural and cultural heritage. As a reaction to the unfavourable consequences of massive tourism, the local community led an initiative to establish a protected area. In 1992, the local community established a private company Logarska d.o.o. The company has been granted the right to manage tourist visits for the duration of the municipal concession, including the right to charge an entrance fee for motor vehicles to the Logarska valley. This enables it to regulate the market, in addition to providing income to cover the cost of employment of permanent and seasonal staff, which ensures the management of urban and tourism infrastructure – including interpretation and other items of tourist infrastructure (Anko et al., 2007). The case of Logarska d.o.o. represents a unique management practice in which the local community joined forces to preserve their natural heritage.

\(^1\)The essence of HNV farming is its semi-natural character that provides a multitude of habitats and other ecosystem services. See http://www.hnvlink.eu/what-is-hnv/

\(^2\) http://www.logarska-dolina.si/

\(^3\) http://www.solcavska-panoramska-cesta.si/en/destination/the-robanov-kot-valley
**ESBO focus**

As the predominate users of the land in the study area, farming and forestry have decisively marked the cultural landscape, contributing strongly to rural vitality and indirectly, through tourist visits, to public health and recreation. The sustainable practices used here have contributed to the preservation of permanent alpine grassland and forest habitats and traditional breeds (two of them autochthonous), which constitute both important genetic resources and cultural heritage. Based on the interviews and focus groups conducted in the area (see Appendix), we found that there are two main ways in which the delivery of ecological and social benefits from agriculture and forestry can be enhanced.

The first concept is based on ensuring a constant purchase of the meat of the local breeds, which should help to maintain farming and thereby contribute to the preservation of grassland habitats, genetic resources and rural vitality. We dubbed this concept “**Traditional breeds**”, and based on the results of the first two steps of the project (see the Step 1-2 report), our action-based research was directed towards finding the possibility to form a value chain with meat products, which would help to valorise the attributes linked with local livestock production, such as mountain products, organic production and/or local breeds.

The second concept is again founded on the search to improve the economic position of the local population through improving the market appreciation for the locally sourced wood; an important collateral benefit is the contribution towards preserving forest habitats. We call this...
concept “Mountain wood”, borrowing the name from previous attempts of the local community to valorise high quality and special characteristics of local wood species.4

During our action-based research, whose aim was to build upon existing local initiatives, the two concepts have diversified into two distinct socio-ecological systems and we have tried to analyse and develop them both with the cooperation of their respective stakeholders (which naturally overlap to a certain extent). For clarity, this report is structured in a way that clearly separates the two socio-ecological systems. We briefly summarize the events that represented the main milestones in our research in Tables 3 and 4.

Figure 1: National workshop

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4 http://www.solcavsko.info/index.php?id=14

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
## Table 3: Research milestones phase I – Analysis of ESBOs and prioritisation

<table>
<thead>
<tr>
<th>Date and location</th>
<th>Event</th>
<th>Main actors</th>
<th>Main questions</th>
<th>Findings/output</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. September 2015, Solčava (Centre Rinka)</td>
<td>National workshop</td>
<td>Farmers, municipality representatives, CAE, representatives from institutions</td>
<td>What is the general level of understanding of PG/ESS in different spheres of society connected to farming/forestry? Examples?</td>
<td>‘Mountain wood’ singled out as a good attempt at valorisation of high-value products, which could contribute to the enhanced provision of ESBOs. There are no producer groups active for either meat or wood, but farmers realise the potential for value-added.</td>
</tr>
<tr>
<td>15. January 2016, Solčava (Centre Rinka)</td>
<td>Focus group with local actors on institutional drivers of ESBO provision</td>
<td>CAE, municipality representative, farmer (local opinion-maker), freelance entrepreneur Marko Slapnik (‘gatekeeper’)</td>
<td>What are the main characteristics of Solčavsko, it development potential and obstacles?</td>
<td>Forest ecosystem services are undervalued or not valued at all. Communication between people is weak, there is no common private interest, attempts to establish a cooperative have failed; usually the issue is money. There are excessive bureaucratic hurdles related to on-farm slaughter that result in high costs and make sheep-rearing unreasonable. Projects tend to die after financing ends. Big lack of mutual trust. Though there are interesting stories, the locals are weak at marketing them. Locals want to be independent of subsidies.</td>
</tr>
<tr>
<td>5. May 2016, Solčava (Centre Rinka)</td>
<td>Validation of SES for Solčava/Luče</td>
<td>CAE, farmers, forest service representatives, municipality representatives</td>
<td>Testing of the draft SES. What is the farmers’ view of benefits from agriculture &amp; forestry? Are they willing to cooperate to improve their valorisation? How can cooperation be strengthened?</td>
<td>A common brand (for all local products) and market image for the entire area is needed to be marketed to a limited segment of tourists/consumers; mass tourism is unwanted. Value chains must be formed – common interests must be found, as reliance on the public purse (agricultural policy funding, municipality projects) is perceived to be too great. There is a lack of knowledge in many fields (marketing, law, technology) – a multidisciplinary approach is required.</td>
</tr>
<tr>
<td>13.-15. June 2016, Solčava/Luče</td>
<td>Field work (semi-structured interviews)</td>
<td>Farmers, processors, institutional and corporate purchasers of produce</td>
<td>Focus on livestock and grassland habitats. What are the capacities regarding rearing, slaughter, processing? Are farmers, processors and tourist operators ready to cooperate under a common brand?</td>
<td>There is interest, but nobody really ready to carry the initiative. Previously, there were attempts to collectively invest into both, a local slaughterhouse and a sawmill, but both have failed in the final stages of realisation. In both cases, farmers were ready to cooperate in principle, but untrusting, cautious and individualistic. Motivation for collective action on this topic is weak. A feasibility study and economic analysis is prepared on the part of UL, to be presented to local stakeholders at a future meeting.</td>
</tr>
</tbody>
</table>

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5 Chair for agricultural economics policy and law, Biotechnical faculty, University of Ljubljana

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
Table 4: Research milestones phase II – Potentials for valorisation of ESBOs

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Event</th>
<th>Participants</th>
<th>What are the potentials to build on the existing initiative to increase valorisation of Mountain wood?</th>
<th>There is potential, a consortium could be formed to integrate the entire value chain. Research is required to establish a scientific basis for MW characteristics. Project funding is needed in the first stages of value chain development. A project coordinator/facilitator is to be contacted.</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. October 2016, Domžale</td>
<td>Meeting with Alojz Lipnik, forest owner, professional forester (Forest Service) and former mayor of Solčava</td>
<td>A. Lipnik and CAE</td>
<td>What are the potentials to build on the existing initiative to increase valorisation of Mountain wood?</td>
<td>There is potential, a consortium could be formed to integrate the entire value chain. Research is required to establish a scientific basis for MW characteristics. Project funding is needed in the first stages of value chain development. A project coordinator/facilitator is to be contacted.</td>
<td></td>
</tr>
<tr>
<td>6. January 2017, Domžale</td>
<td>Focus group meeting to elaborate on further steps regarding MW</td>
<td>A. Lipnik, Slavka Zupan, CAE</td>
<td>How to approach the “Mountain wood” idea? Who are possible members of the consortium? What do we wish and are able to achieve? What are the main points in terms of content? Which public funding projects are we eligible for?</td>
<td>The project makes sense, but must be oriented towards creating output in the form of final, designed marketable wooden products. The consortium should combine researchers, forest owners, wood processors, a certification house and designers. A project proposal is to be prepared for the RDP measure Cooperation.</td>
<td></td>
</tr>
<tr>
<td>10. January 2017, Ljubljana</td>
<td>Focus group with researchers in wood science</td>
<td>BF (CAE, wood science specialists), A. Lipnik, Damjan Oražem (Director, Forest Service) S. Zupan, Miha Humar (Biotechnical faculty Dean and head of wood science department), Jožica Grčar (Forest Institute)</td>
<td>Are wood science specialists willing to cooperate and see a potential in the field? How to approach research regarding the properties of Mountain wood?</td>
<td>Certification of Mountain wood is recognised as a meaningful step towards market valorisation. Wood science specialists are willing to provide their expertise to define the technological parameters needed for the certification of the timber.</td>
<td></td>
</tr>
<tr>
<td>20. January 2017, Solčava</td>
<td>Workshop with wood processors and wood science specialists</td>
<td>BF (CAE, marketing and wood science), A. Lipnik, S. Zupan, local wood processors</td>
<td>What is the willingness of local entrepreneurs to cooperate? What are the knowledge gaps? What kind of marketing approach is needed? Which products are to be developed?</td>
<td>The term MW must be specified in terms of species and growth conditions, rough physical parameters must be established, prototype products are to be presented. Consciousness of higher quality/value must be established in the consumer.</td>
<td></td>
</tr>
<tr>
<td>27. January 2017, Domžale</td>
<td>Meeting with certification organization</td>
<td>BF (CAE, marketing), Bureau veritas, S. Zupan, A. Lipnik</td>
<td>What are the necessary steps for certification? Which products does it make sense to certify?</td>
<td>Clear and easily enforceable criteria must be established for certification. It makes more sense to define location, growth conditions, time of felling etc., than specific characteristics of the wood, as testing can be very costly. Certificate owner must be determined. A standard must develop over time, so conditions must not be too restrictive. The same certificate can be developed further down the value chain, but it is sensible to start with logs and planks at first.</td>
<td></td>
</tr>
<tr>
<td>1. February 2017, Ljubljana</td>
<td>Meeting with ministry representatives</td>
<td>BF (CAE, marketing, wood science, Forest Service, ministry representatives, S. Zupan</td>
<td>Does the project accommodate the parameters of the envisaged measure – is it possible to form an Innovation partnership and apply for RDP funding (under the</td>
<td>The project seems eligible. There are no limitations regarding project leader. The Ministry welcomes the initiative. Solčava is adequate as a pilot case.</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Location</td>
<td>Event Description</td>
<td>Participants</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>3. February 2017</td>
<td>Ljubljana</td>
<td>Meeting with the company dealing with the design</td>
<td>Lenka Kavčič, S. Zupan</td>
<td>The selected company with experience in design is willing to cooperate in the project. A network of designers should be formed to accommodate the processors’ need for new products. Rules/guidelines for design should also be set, in order to form a brand and reinforce the quality schemes.</td>
<td></td>
</tr>
<tr>
<td>14. February 2017</td>
<td>Solčava</td>
<td>Presentation of the results of the feasibility study about the valorisation of local breeds through the establishment of a value chain of meat products.</td>
<td>UL - Pegasus group and local stakeholders dealing with animal breeds – farmers, processors, cooperative representatives, municipality representatives, tourist operators</td>
<td>Livestock production in the area has untapped potentials for valorisation of ESBOs (HNV farming, traditional breeds). Current strategies in this respect are limited to individual attempts, mainly linked with tourism (gastronomy). Strengthening of the local food supply chains, and increased value-added of primary production are the priorities of the local development strategy, and there is a potential to develop the idea. There must be sufficient economic interest for collective action. The municipality can provide the framework, but cannot substitute entrepreneurial initiative. Willingness of farmers, to enter the existing collective attempts (branded organic beef Ekodar; fresh lamb supply chain, Loška zadruga) remains limited.</td>
<td></td>
</tr>
<tr>
<td>21. February 2017</td>
<td>Domžale</td>
<td>Meeting with core group for MW consortium</td>
<td>BF (CAE, marketing, wood science), Forest Service, S. Zupan, A. Lipnik, L. Kavčič</td>
<td>Practical questions regarding the establishment of the consortium and certification, further elaboration of project proposal for Cooperation. (report pending)</td>
<td></td>
</tr>
<tr>
<td>31. March 2017</td>
<td>Solčava</td>
<td>Kick-off consortium meeting</td>
<td>Researchers (BF, Forestry institute), Forest service, Forest owners, wood processors, certification body, design company</td>
<td>What should the formal structure of the consortium be? Which steps are required by the beginning of the project? How to start research regarding the material? Pilot projects for wooden products? Promotion and dissemination? Coordination? (report pending)</td>
<td></td>
</tr>
</tbody>
</table>
2 Definition of the social-ecological system (SES) studied

2.1 Figure of the SES, using the revised SES Framework

CASE STUDY: ‘TRADITIONAL BREEDS’

Key ESBOs considered:
1. Preservation of grassland habitats
2. Preservation of genetic resources and cultural heritage (traditional breeds)
3. Rural vitality
4. Public recreation and health

RESOURCESYSTEM
HNV farming, grassland habitats (1455 ha), 212 farms with ? cika cattle/ 2000 Jezersko-Solčava sheep

ACTION SITUATIONS
Attempt to organize producers and establish a small-scale slaughterhouse in order to preserve/improve livestock rearing with traditional breeds and preserve grassland habitats

GOVERNANCE SYSTEM
Private action/cooperation with common commercial interest RDP funding for processing facilities

ACTORS
Farmers & associations; processors; tourist farms and operators, hotel & catering establishments; municipalities; consumers and tourists; extension service; cooperatives

RESOURCE UNITS
Lamb/mutton, veal/beef, processed meat/wool; grassland habitats

Figure 1
Summary of the SES framework for the Traditional breeds case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
CASE STUDY: ‘MOUNTAIN WOOD’

Key ESBOs considered:
1. Rural vitality
2. Forest habitat
3. Public recreation and health
4. Education

RESOURCE SYSTEM
3700 ha of sustainably managed (high-cost, selectively cut) alpine forest above 800m, 52 farms, HNV farming

RESOURCES UNITS
High-value wood and wood products, sustainable forest

ACTION SITUATIONS
Initiative to increase valorisation of Mountain wood through:
1. Defining the characteristics of MW
2. Establishing a quality scheme with certification
3. Developing a wood value chain
4. Increasing awareness and appreciation

ACTORS
Farmers/forest owners; TISA; wood processors, traders and craftsmen; consumers and tourists; municipality of Solčava; Biotechnical faculty; Forest service; Forestry institute; Ministry of agriculture, forestry and food

GOVERNANCE SYSTEM
- established consortium combining different private initiatives and public support
Objective: a functioning private company as holder of certification scheme

Figure 2
Summary of the SES framework for the Mountain wood case study
(adapted from Ostrom and Cox 2010; McGinniss and Ostrom 2014)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
2.2 Description of the SES

The broader (macro) setting is the same for both subsystems. The region is remote, with small, sparsely populated municipalities, and has historically been dominated by extensive, large, self-sufficient farmers. Like elsewhere in Slovenia, value chains are weak and primary producers are struggling under the downwards price pressure due to EU accession and opening markets. The processing industry in many sectors was caught unprepared and was crowded out by processed products from better integrated production systems, especially in the wood sector (National workshop; Workshops 2 and 3). There is also general economic decline – the largest agricultural-forestry cooperative (Kmetijska zadruga Mozirje) was liquidated in 2014. On the other hand, an increasing number of consumers are seeking quality, durable products with a known origin (e.g. Workshop 3).

![Figure 2: Main characteristics of the entire socio-ecological system](image-url)

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
‘TRADITIONAL BREEDS’

Figure 3: The Jezersko-Solčava sheep
Source: http://www.ovce.si/

Figure 4: The cika cow
Source: http://www.zoo-ljubljana.si/fileadmin/user_upload/slike/Tiskovna_kmetija/Cika_Jagoda_Rafko_Rokavec.jpg
**Action situation**

In this part of the study, the action-oriented research was focused on increasing the valorisation of the locally sourced meat and wool from adapted traditional breeds (cika cow and Jezersko-Solčava sheep) in order to preserve or enhance the ESBO provision, mainly through maintaining the grassland habitats. Through our interviews, we established that for the farmers to consider increasing (for some even to just maintain) their herds, they would require better access to slaughtering facilities, as the sanitary regulatory regime prevents them from slaughtering on-farm, if they wish to market the meat (processed or unprocessed) (Workshop 2). We focused primarily on the attributes that differentiate local products from their competitors. The fieldwork revealed that these attributes could relate to the origin (e.g. branded products), quality (e.g. organic produce, premium quality), or local breeds (Jezersko-Solčava sheep and cika cattle). In order to build on these attributes, a value chain needs to be established. The products would target selected market outlets on the upper part of the price range (e.g. selected restaurants, delicatessen shops). A local slaughterhouse, pointed out by the local producers, would indeed mean just one of the missing parts of the value chain. Further steps towards adding value and increasing ESBO provision would require solidarity participation of farmers in the scheme, which would ensure a steady supply and additional (or better coordinated) processing/distribution activities.

**Resource system**

The resource system comprises extensive grassland habitats (1455 ha), high in biodiversity. There are 55 farms in Solčava and 157 in Luče, all managed sustainably and many in organic production. In both municipalities, around 90 % of all agricultural land is permanent grassland or pasture. There are about 29 sheep breeders in Solčava and 44 in Luče (SORS, 2016).

**ESBOs**

The main ESBO considered is the preservation of grassland habitats through preserving or enhancing traditional extensive grazing. This would be done through the use of traditional breeds that are adapted to the harsh local conditions, preserving both animal genetic resources and cultural heritage. The increased revenue and decreased costs would help to improve rural vitality and alleviate the trend of depopulation, which is starting to show (SORS, 2014). Finally, preserving traditional practices and healthy semi-natural habitats – if properly communicated to consumers and tourists, possibly under a common brand (e.g. ‘Solčavsko’, akin to Toscana) – would add to the tourist appeal, helping to attract visitors to the region, increasing public recreation and health and reinforcing the improved rural vitality. This initial idea of a common brand has diverged into two specific product groups, possibly to be revived as a single destination trademark at a later time.

**Actors**

The main actors in this SES are breeders and their associations – there are two breeders’ associations in the area (Association Raduha and the Association of breeders of the Jezersko-
Solčava sheep). In addition, there is a felting association (Bicka), whose primary goal is to promote the sheep breeding tradition of the area through traditional felting and wool products from the Jezersko-Solčava breed, which is known for its wool of relatively high quality.

The second group of actors include those who use meat as an input in their trade: processors, tourist farms, hotels and catering establishments; these categories overlap somewhat. There is demand for local meat (in particular lamb) from these entities, which is not always fully met by local production; to meet the demand of their customers, they sometimes resort to importing (expensive) lamb from across the border (Interview, Hiša Raduha). Other tourist organisations are also connected to this group, as are consumers and tourists (visitors), who usually wish to enjoy the full experience that the area has to offer, including lamb dishes.

The municipality of Solčava is participating very strongly in the promotion of tourism, local gastronomic and craft products. Recently, it established a public institution called Centre Rinka, named after a famous waterfall in Logarska dolina, through which it is helping to build on the area’s ‘green tourism’ image and compensating somewhat for the lack of experience in marketing. Through this organization, the municipality links and coordinates activities of local tourism and leisure operators. The Centre also serves as a shop, restaurant and cultural venue, hosting felting workshops, exhibitions and other events.

Figure 5: Centre Rinka (left) and the waterfall after which it is named (right)

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6 Statistical evidence shows that sheep breeding has been decreasing over the last century. As learned through the interviews, at least to some extent, this is also a question of social status. Sheep breeding has been often regarded by farmers as inferior/backward in comparison with cattle breeding.


This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
The strongest local agri-food actor, cooperative Šaleška dolina z.o.o., which is successfully developing a brand of organic beef produce Ekodar (http://ekodar.si/v2/), is searching for new suppliers from the local area (Interview, Ivo Drev). A similar approach (full traceability of produce, innovative approaches to marketing and distribution) could also be successfully extended to the Jezersko-Solčava lamb.

**Resource units**

The main resources of this system are lamb/mutton and veal/beef and processed meat/wool from the traditional breeds. In addition, we consider species-rich alpine grassland habitats as a resource. All these are foundations of the tourist offer and offer of specialty food products, and consequently source of income for the area’s inhabitants.

**Governance system**

The initiative to establish a small-scale slaughterhouse would be based on private action, i.e. cooperation on the part of the farmers (and perhaps other members of the value chain, like processors and distributors), who would have enough common commercial interest to invest in such an undertaking. Public financing (e.g. the RDP measure Establishment of new Producer Organisations (M9), or Cooperation – operation “Short supply chains and local markets” (M16.1)) could serve as a catalyst through funding of physical investments (e.g. processing facilities) or marketing activities (e.g. developing sales outlets and distribution channels).

‘MOUNTAIN WOOD’

![Image](http://www.solcavsko.info/index.php?id=20)

**Figure 6: Mountain wood: Solčava primary school**


This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
**Action situation**

The initiative under this subsystem aims to increase the valorisation of the locally sourced Mountain wood, with the main expected consequence being improved livelihoods (rural vitality) of the local populace, as well as greater appreciation and preservation of the forest habitats. This would take place in the following steps:

1. Defining the characteristics of Mountain wood: Currently there is no exact definition of Mountain wood, but a volume of circumstantial evidence regarding its quality based on oral and written tradition, dendrochronological analyses (Levanič and Čufar, 2000), the persuasion of producers and an increasing demand from the market (National workshop). Though there have been some studies on the parameters defining the characteristics of mountain wood, none of them have been comprehensive. Therefore, scientific analysis is also a part of this initiative, in addition to determining which elevations, locations or land plots are eligible as harvesting sites for such wood. At the moment, it is roughly defined as wood growing at elevations above 800 m (GIS, 2009).

2. Establishing a private quality scheme with certification: As part of its branding strategy, the wood acquired is to be certified after the standards are determined, in order to increase the material’s visibility and trustworthiness.

3. Developing a wood value chain: At the moment, the vast majority of wood harvested in Solčava is sold off as logs or planks (National workshop). There is almost no processing industry in the area, other than a few successful small-scale undertakings. The initiative aims to connect producers, traders and processors, as well as designers and architects, to develop prototypical products with a common market image as high value-added products. The main idea would be to connect local farmers and entrepreneurs, shortening travel times and decreasing the carbon footprint.

4. Increasing awareness and appreciation: The special qualities of this wood and its products must be adequately communicated to the public. This requires a well-aimed marketing strategy and campaign.

**Resource system**

The pilot case, limited to the municipality of Solčava, comprises 3700 ha of sustainably managed alpine forest above 800 m on 52 farms. Similarly to the ‘Traditional breeds’ case, it is part of the extensive, HNV farming conducted by the farmers in this area, which supports rich habitats, high biodiversity and other ecosystem services. Due to the practice of selective cutting and respecting traditional rules, managing a forest in this manner is accompanied by high costs for the farmers/foresters (Workshop 3).

**ESBOs**

The main ESBO in this subsystem is rural vitality, as a consequence of higher value-added for the local populace, resulting in increased employment and better economic outlook. Another very important aspect is the preservation of forests, both as a resource base and as a habitat.

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8 Dendrochronological analyses revealed that the age of the wooden frame of the roof of the parish church exceeds 700 years (Herlah and Slapnik, 2010)
due to sustainable management. If this kind of management is adequately rewarded and recognized by the market, farmers/foresters will be incentivized to stick to them, while on the other hand it may also spur producers in other regions to start using them.

Introducing a strong local brand is expected to increase the visibility of the entire region, resulting in more tourist visits and further improving the livelihoods of those involved. This is connected to the third ESBO, i.e. improved wellbeing (public recreation and health) of visitors. Finally, as part of the information activities under the initiative, educational facilities regarding Mountain wood and the importance of sustainable forestry would be set up.

**Actors**

Farmers/forest owners are the main group in this initiative, providing the resource; some of them are members of the local Association of forest owners TISA. Other partners include people further down the value chain: wood processors, traders and craftsmen, and finally consumers of wood products and tourists. In addition, the consortium comprises research institutions: the Biotechnical faculty (wood science specialists to explore the physical characteristics of the wood and agricultural economists to develop the business plan, certification scheme and marketing strategy) and Forestry institute, as well as the Forest service, which is a possible candidate for certificate owner (though at this point it is just as likely that a firm or institute will be established by the consortium). The Ministry of agriculture, forestry and food also has an important role, as it will be the one initially financially supporting the project (through RDP support, Measure Cooperation M16d⁹), which means that it will have a say in determining the direction of the initiative.

**Resource units**

Mountain wood is wood from trees growing at higher elevations, cut according to specific traditional practices and at certain times, i.e. respecting the traditional rules for defining the time of timber felling (use of lunar calendar). This wood is generally thought to be denser, more durable and therefore better for products that are supposed to last a longer period of time or withstand tougher conditions (GIS, 2009). Products from this wood, crafted taking in account its special characteristics and aimed at the appropriate market segment, could have a very high value-added. In addition, the material comes from forests that have been managed sustainably (selective cutting) for centuries, allowing forest habitats to renew themselves naturally. Similarly to the traditional grazing practices mentioned above, this is something that is duly appreciated by the more knowledgeable buyers.

**Governance system**

The goal of the initiative is to establish a consortium combining different private initiatives and public support. The final objective is to have a functioning private company owning the certification scheme. At the moment, the consortium is still forming and is functioning informally, but it is expected that some kind of legal entity with clear rules will be formed, most probably within the duration of the project PEGASUS.

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2.3 Levels of ESBO provision, trends and determinants

‘TRADITIONAL BREEDS’

1. Preservation of alpine grassland habitats (currently 1,455 ha): Whether or not these are being preserved, can be assessed using ortophoto imaging and expressed as percentage of utilized agricultural land, while the reason that these habitats are being preserved – special species inhabiting them – would have to be assessed differently: most likely with specimen counts.

2. Preservation of genetic resources and cultural heritage (traditional breeds): herd sizes of relevant breeds (Jezersko-Solčava sheep and Cika cattle). There is a marked information gap here due to the fact that the agricultural statistics does not keep records of breeds, whereas other systems, such as public breeding services, keep records only about the breeding herds/flocks and not on the entire population of a breed.

3. Rural vitality: immigration/emigration indices, socio-economic indicators, number of inhabitants engaged in farming, percentage of income from farming, etc. The difference in market price between sheep meat (or beef) of ‘conventional breeds’ and local breeds, such as Jezersko-Solčava sheep meat (or Cika beef) could serve as an indirect indicator.

4. Public recreation and health: Number of tourists (currently reported 18,000 overnight stays\(^1\); Local tourist office data, internal report). Naturally, it would be exceedingly difficult to acquire data that would enable attributing additional visits to improved appreciation of traditional breeds.

The biggest problems regarding the provision of Jezersko-Solčava lambs (identified as a product with the strongest market potential in our field research) are ensuring a steady supply of animals and delivery of lamb slaughtered in registered slaughterhouses and certified/authorised by veterinary authorities; the latter is legally prescribed condition for further preparation and sales of meat products. Interviews with the breeders reveal two main obstacles in this respect; distance to the nearest registered slaughterhouse and increased costs, which surpass the sellers’ price.

As demand for local ingredients in culinary specialties is increasing (JRC, 2013), in particular in tourist destinations, there is a great potential for increasing value-added, but farmers are unable to meet it due to a lack of organized joint appearance on the market. They are dependent on public (CAP) funding (Workshop 2), which additionally reduces their incentives for change (increasing herd sizes, perhaps establishing new grasslands, seeking new ways to market their meat) and cooperation, adding to the already present risk aversion and lack of trust. The main limiting factor is the (lack of) readiness of the breeders to engage in collective action, which also entails economic investment and responsibility. They are ready to connect in the sense of organising events, but not economically. This is also why several initiatives (e.g. organising cooperatives) have failed. On the other hand, there is also a lack of a pull factor in the form of an external organisation ready to bear some of the risk and help with the collective actions.

\(^{10}\) The field study findings (reported figures of overnight stays in interviewed tourist businesses) suggest that the figure underrates the actual situation, as the data only record registered visitors in the municipality of Solčava (which is more frequented by tourists than the municipality of Luče).
‘MOUNTAIN WOOD’

1. Forest as resource base and habitat (currently 7,113 ha): Ortophoto imaging; expressed as percentage of farmland. Specimen counts for species. Difference in market value of plots designated as eligible Mountain wood harvesting sites can be used as an indirect indicator. Quality assessment criteria must also be established for Mountain wood – there is still a large research gap in the physical properties and specific applications of different kinds of wood.

2. Rural vitality: see under ‘Traditional breeds’. The difference in market price between ‘conventional’ wood and Mountain wood could serve as an indirect indicator.

3. Public recreation and health: Number of tourists.

4. Education: number of events/visitors to events/educational institutions.

The main issue related to Mountain wood is the knowledge gap regarding the material’s properties, and a lack of a coherent marketing strategy. Though the appreciation from buyers of primary products is already quite high\(^{11}\) (National workshop), there is little awareness further down the value chain, resulting in less appreciation and lower value-added. Again, there is potential for enhanced provision, but it depends on adequate communication and awareness-

\(^{11}\) The area has a centuries-old reputation of high-quality structural timber, in particular larch and spruce, and ‘self-controlled’ supply of timber by local forest owners. This results in a relatively high price, as illustrated by one of the participants at the February 2017 workshop (local wood processor): »price of larch in Solčava is like price of fish in Dalmatian restaurants - next to none«.
raising. The main factor in the formation of the consortium was the existing good idea and the readiness of different “outsiders” – researchers, Forest service representatives, wood processors and others – to build on it, to the benefit of all involved. If the idea’s fate had been left to the interest of the locals, it is likely that the result would be yet another failed initiative. It is fair to say that the UL Pegasus team has sparked the current process of the formation of the consortium, which is integrating the main local stakeholders along the supply chain. However, the fact remains that the mere formation of the consortium is no guarantee of its success. If local entrepreneurs do not commit to the realisation, failure is almost certain. On the other hand, representatives from national institutions will guarantee the dissemination of the idea into other projects, which could contribute to the realisation of the initiative’s goals. Project funding to get the project going will be crucial.

Figure 8: Previous logo for ‘Solčava wood’, established under a Leader project in 2009-10
Source: http://www.solcavsko.info/index.php?id=24

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

As we have already written above, we believe that improved awareness and appreciation, reflected in a higher market price for both of the main local products, would have numerous collateral benefits. Increased revenues would contribute towards maintaining settlement and thus rural vitality, as well as provide additional opportunities for investment in appropriate infrastructure to continue building on the ‘sustainable tourism’ character of the region. Increased appreciation and understanding could also lead to further investment of time and resources into the integration of new technologies with traditional practices and process optimisation with closed production loops. The products emerging from this region would have a long-term focus, displacing products with short life cycles from the market, thus helping to reduce pollution. New or expanded educational activities could help reach the younger generations and communicate to them the benefits of sustainable farming practices (and consumption patterns). Finally, the case could serve as a successful example for other regions with similar conditions or aiming to achieve similar goals.

3 Shifting societal norms, collective learning and voluntary actions

In both analysed cases (“Traditional breeds” and “Mountain wood”), the main issue of preserving and enhancing the valorisation of ESBOs is related to the improvement of the land managers’ economic situation, and increased value-added throughout the whole supply chain. It is a necessary condition for the provision of ESBOs, which is in turn directly related with the
production of agricultural and forestry goods. Natural conditions, forestry regulation and agricultural support are in fact directing farmers towards the provision of certain ESBOs (e.g. habitat preservation, public health and recreation). However, maintaining settlement in this remote area is conditional upon improving the economic situation by adding value to agricultural and wood products. This is where the lack of working value chains, which we see as crucial, becomes apparent. While land managers are aware of the ESBOs resulting from their practices and higher quality of their products, they are still selling them as ‘generic’ timber, through diversified sales channels, irrespective of its potentials for adding value through (local) processing and addressing more sophisticated (and lucrative) value chains, like eg. designed furniture. Therefore, market valorisation of mountain wood must be increased through strengthened vertical cooperation, high-quality processing, and quality assurance (certification), as was found during stakeholder consultations in the first phase of our research (see Table 2).

It is also symptomatic of the entire region that communication with a serious intent to commit and cooperate economically is absent. The strong individualism has even strengthened since the break of collectivism and the communist experiment at the end of the 1980’s, despite the fact that the cooperative movement was very important for the modernisation and development of family farms before WW2. Farmers do not believe in the advantages of common economic endeavours, especially not the most successful ones, the ones who could lead collective actions. Almost all cooperation takes place in the form of loose interest-associations (e.g. the felting association Bicka). The workshops and interviews conducted during our project have shown that if there is no external element forcing them into economic cooperation, with clear positive changes for individuals, they will continue on their own for as long as possible. The sheer size of their holdings and public financial (CAP) support still allow it.

The main difference between the two subsystems is that there is a greater awareness by those engaged in forestry and wood processing of the need to establish a value chain. For example, both processors present at the Solčava on January 20th, 2017, stated that there is an increasing demand for quality, locally sourced, ‘natural’ materials, and that this potential ought to be realized. However, until now there was never sufficient motivation for serious collective action. It seems that the critical mass has now been reached, to a large extent with the help of our action research, which served as a platform for frequent and fruitful communication between different actors. It is thus only an external impulse that was able to bring about the realisation of an already-present idea. It is fair to say that Alojz Lipnik (former mayor of Solčava, local Forest Service officer, and forest owner), with the help of researchers from UL, was the main motivator behind the apparent success of this initiative. It remains to be seen whether it will gather enough momentum to persist after the conclusion of the pilot Cooperation project. In addition to the need for an external impulse, we are also discovering the importance that charismatic, dedicated leaders have for collective action.

In the meat value chain, on the other hand, this critical mass of producers and processors was never reached, mainly due to a lack of interest of breeders for a collective action, and/or no processors/distributors sufficiently motivated to establish and lead the meat value chain(s). It seems that they are waiting for somebody else to set up a risk-free system that they could choose to enter if and when it suited them. Though we have prepared a feasibility study and
economic analysis for a slaughterhouse and presented it to the community\textsuperscript{12}, we have not been able to spark enough interest for ESBO enhancement under this subsystem and are concluding our research (and reporting) at this point. Whether the information presented at the final workshop (14.2.2017) will be used further, depends entirely on the local stakeholders and their readiness to commit. There were indications at this workshop of the realization that the development of this value chain must be driven by private interest and ‘entrepreneurship action’. In addition, several attendants stressed that cooperation, commitment and communication are crucial for the development of the region in general, and for developing the fresh lamb supply chain in particular. Somehow surprisingly, the willingness of local breeders to enter the existing schemes operating in the region (branded organic beef Ekodar; fresh lamb supply chain, Loška zadruga) remains limited. One possible explanation for this is that the breeders’ individual sales channels are enough lucrative to keep their interest for collective action low.

Measures of public support have different effects on the behaviour of land managers and their interest in collective action. CAP measures, which are important in this area and have a significant effect on the farmers’ economic situation, have contradictory effects. On the one hand, they directly contribute towards ESBO provision by stimulating it, but on the other, by improving the economic position of the most educated and entrepreneurial, they hamper collective action that might be founded on value-added products. Perhaps this is the reason behind the greater readiness for collective action found in the forestry sector, which does not enjoy this level of support. While this is difficult to judge, the hypothesis is commonsensical.

Agricultural policy does offer support for the formation of value chains, including ESBO-based, through measures like Leader and Cooperation. However, in practice, these forms of public support are not yet developed in Slovenia (and probably in quite a few other Member States). Cooperation, a new RDP measure, has proven crucial in the attempt to organise a value chain, as the consortium has formed around the possibility of acquiring funding through this measure. It was the possibility of cost coverage for the network to develop the idea into a final product that stimulated participants to invest their voluntary work. It also merits stressing that the planners and enforcers of Rural Development Policy (i.e. the Ministry of Agriculture, Forestry and Food in the role of the RDP Managing Authority) are inexperienced when it comes to such projects and were even open to exchanges of information and experience. Despite the demand for such measures, the measure Cooperation is still not alive in Slovenia due to administrative hurdles and gaps in human capacity: implementation of the measure is lagging due to lack of experience with such broad and complex measures that involve adaptation of the decision-making process as Ministry level. Implementing this kind of measure demands a higher level of understanding of the issue at hand, as it requires substantive evaluation of proposals, rather than box-ticking. Future CAP reforms should certainly give greater importance to such measures and develop appropriate practices and administrative procedures, as well as ensure appropriate capacity building for administrative bodies tasked with implementation.

\textsuperscript{12} The presentation took place on 14 February 2017 in Solčava.
4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

As indicated, there is currently a consortium under formation for creating a value chain for Mountain wood in order to increase its appreciation and valorisation. We were unsuccessful to achieve something similar in the meat value chain (traditional breeds); in fact, we did not even reach a basic initiative to improve and stabilise purchase with the help of private agents, let alone endeavour to establish the concept of a new product based on ESBO provision. This can in large part be attributed to the lack of a leader (or group of individuals) willing to commit fully, more so than to a lack of potential in terms of market demand. In the case of Mountain wood, the initiator and currently recognized leader is Alojz Lipnik, the local leader, with a strong support from the UL research group. However, the initiative is growing quickly, with new participants joining, and as its functioning becomes more formalized, leadership is likely to be transferred to a group of representatives from the different stakeholders.

Current members of the consortium, which is still informal, include:

- Alojz Lipnik as a person respected by the community (gatekeeper), forest owner and professional Forest Service officer. His interest for cooperation is both professional and private.
- Researchers from the Biotechnical faculty, falling into three categories:
  - The Pegasus group – members of the chair of agricultural economics, whose primary interest is to explore and improve the conditions for successful valorisation (and consequently provision) of local ESBOs.
  - Wood science specialists, whose primary interest is in exploring the mechanical properties of Mountain wood and possibilities for its application. They also wish to improve the notoriously dysfunctional wood value chain in Slovenia.
  - A marketing specialist, brought aboard to determine the appropriate market approach.
- Forest owners, whose primary interest lies in improving the appreciation of their product and consequently in improving their livelihoods or decreasing their dependence on public funding, which is slowly decreasing in real terms.
- The public Forest service, representing the public interest for forests in their environmental and conservational tradition; this organisation has a good understanding of the concept of ESBOs and, what is more, understands that their better market valorisation is in the public interest.
- Wood processors, who wish to gain a competitive advantage and improve their market access by using a resource whose properties are undisputedly superior (i.e., scientifically proven to be of a distinctive quality and certified).
- A certification institution is to be included in the development of the certification scheme.

The next workshop, to be held at the end of March, will determine the content and structure of the new consortium for Mountain wood and find how wide the support for this is regionally.
The main strength of our initiative is in the expertise and experience of the participating actors. Its weaknesses, on the other hand, are the possibilities of not reaching and maintaining a critical mass of forest owners and timber processors willing to participate, and the chance of the initiative losing momentum after the pilot project is concluded. This can be overcome if the scheme shows itself to be economically sustainable in the long run. There are numerous successful examples in the food sector of certification schemes that managed to achieve the same goal; there are also examples of products in the wood industry that are managing to achieve a higher market value by invoking scientific evidence for its beneficial effects (e.g. research on Pinus Cembra conducted by Joanneum Research).

Figure 9: Current members of the informal consortium.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

The main innovation of our initiative is that it is transferring experience from agriculture and the food industry, i.e. establishing a quality certification scheme to improve valorisation in the forestry sector. To our knowledge, there is only one other similar scheme in existence, the ‘Bois du Jura’ scheme, a France-Switzerland transnational scheme certifying wood from this area as protected designation of origin (PDO), transferring logic from the food sector to wood. Another innovative element is the attempt to include such a scheme into the RDP through a new measure, attempting to valorise ESBOs nationally through a private/public initiative. The initiative is building on previous efforts to characterise and valorise Mountain wood (GIS, 2009), which already took some steps in that direction, but never reached enough funding and support. The main novelties in this initiative are:

- Establishing an integrated value chain by communicating with and bringing together a variety of actors who have an economic or scientific interest. In addition, the Ministry of Agriculture, Forestry and Food has already expressed a positive view about the eligibility of the project for the RDP measure Cooperation.
- Creating a certification scheme with clear standards in order to improve the visibility and credibility of the material and its processed products.
- The use of a common and coherent marketing approach.

This is possible mainly because there is a market potential that the local forest owners and wood processor recognise and want to exploit. This potential is backed up by the external

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13 see e.g. http://www.lip-satler.si/en/content/15-woodland
14 http://humanresearch.at/newwebcontent/?page_id=96&lang=en
15 We thank Marie Clotteau from Euromontana for directing our attention towards this scheme.
institutional support offered by the Biotechnical faculty (University of Ljubljana). While the case of Solčava is a pilot project, the main ambition is to create a private brand and quality scheme that includes all mountain areas in Slovenia and even has the potential to spread across the border.

Over the course of our PEGASUS research, it became clear that purely economic incentives are not enough for the majority of locals to cooperate; that there has to be a well-defined, well-communicated and practically risk-free scheme (with an initialised and developed business model and pilot projects at the least) for them to join. This was particularly evident in the ‘Traditional breeds’ case, where we were unsuccessful in reaching a critical mass of supporters that would be willing to leave their current comfort zone. This caution, in addition to the generally present mistrust, is also one of the reasons why we are using a professional facilitator and project coordinator to guide and direct efforts under the ‘Mountain wood’ initiative. This has certainly proven to be valuable, as it has prevented many a misstep that would have resulted in wasted time and resources.

Conversely, if the forest owners and timber processors choose to abandon the initiative (i.e. choose not to provide the ESBOs resulting from the improved valorisation of Mountain wood), there is no point in maintaining a consortium, and it is likely to be disbanded. Thus, the key to enhanced ESBO valorisation lies in the hands of local “providers” of ESBOs and, as it seems, in the hands of the included national institutions (UL, Forestry institute, Forest service) and their ability to acquire additional funding. In the long run, of course, its existence hinges on market realisation.

Public institutions represent a crucial factor in turning a small local scheme into a generic national scheme. The UL research team namely “believe” that such an approach is highly transferable, especially the certification scheme. Though it is to be developed at first for Solčava, it can (and actually should) be applied to other regions in Slovenia or elsewhere in the Alps. There are 316,433 ha of forest above 800 m (roughly a quarter of all forests; Forestry institute personal communication) and currently about 2500 firms in wood processing and furniture production in all of Slovenia – this illustrates the potential for improving economic performance and employment opportunities of the sector. The cooperation of research institutions also adds to the credibility of the entire initiative, which is very important when establishing a certificate. This is an interesting experiment, combining public and private interest.

One of the risks faced by the forming consortium is related to liquidity. Namely, the source of funding that will most probably be the measure Cooperation under the RDP, requires the beneficiaries to cover their expenses themselves, until they are reimbursed. Finding funding for the intermediary period is likely to be a serious issue. A further issue, as indicated above, is that the initiative could die off after funding ends, which has happened to projects in Solčavsko in the past. This is also something that the locals are wary of and was repeatedly pointed out by workshop attendants, as well as by Alojz Lipnik, who attributed much of the existing mistrust to this factor. This is why it is important to prove the concept’s viability in the first few years, as only this will keep producers engaged and attract others into the scheme. Perhaps such a success might also persuade them to transfer the same approach to the meat from traditional breeds.
4.3 The role and impact of policy in ESBO provision

With respect to the agriculture (consisting mainly of livestock production) and its ESBOs (HNV farming, traditional breeds), CAP Pillar II payments play an important role in maintaining herd sizes, and farm incomes, while their role in stimulating collective action (eg. producer groups, vertical integration) and adding value of their produce is disputable. In fact, various payments that farmers are receiving may even be serving to the contrary, as they seem to be fostering complacency. The prevailing part of CAP support currently in place is serving to maintain the status quo at best, while any breakthroughs would demand stronger collective action, or private engagement. While there is policy support for this, e.g. for investment in processing facilities, there seems to be little economic incentive to connect individual investments into robust local supply chains.

It has been crucial for the more successful Mountain wood initiative that there is a new policy measure under the Rural development policy (Cooperation) that allows for such a broad scope of activities and for so many different stakeholders to be involved. The sub-measure (operation) ‘Technological development in agriculture, forestry and the food industry’ is aimed specifically at fostering cooperation between different actors in the relevant sectors, with the final goal of achieving new solutions and innovative approaches to technological advancement in farming, forestry and the food industry. It is under this umbrella that we aim to establish the consortium at first. After the meeting with ministry representatives, who have confirmed that our idea suits their expectations regarding the measure, the path towards a concrete project proposal became even clearer. Without this confirmation, the initiative would most likely have died off. While there are other policy measures addressing specific ESBOs, especially under the Rural Development Programme (e.g. support to producers’ organizations, investment support) there are no others that are quite so comprehensive, allowing an entire value chain to be formed. This is in fact also a learning opportunity for Ministry representatives, who have never before been approached with such a broad proposal.

We are also counting to some extent on financial support from other policy fields, like research funding, support under the ‘Strategy of smart specialisation’, which falls under cohesion support (support for new products based on research innovation) and investment into processing facilities and support to producers’ organisations under the CAP. In addition, the new Local Action Groups (LAGs) under the LEADER/CLLD support have been established and confirmed for the current period, the appropriate legislation (Decree on the implementation of community-led local development in the programming period 2014-2020, OJ RS 42/15, 28/16 and 73/16) has been adopted and the organisations are currently gathering proposals for projects. However, such a broad approach only rarely finds a place in LEADER projects, which are underfunded and often lack project ideas that transcend narrow local boundaries. Generally speaking, of the entire array of CAP measures, none offer comprehensive support to value chains. This should be addressed when programming CAP measures in the next period.

It is important to stress that there are very few measures under the Slovenian RDP, much fewer than the EU regulation 1305/2013 allows for, that support forestry activities; there is a marked lack of support for quality schemes and ‘forest-environmental’ schemes, and we believe that policymakers ought to consider introducing such schemes. Over half of RDP funding in Slovenia is currently dedicated to agri-environmental and climate payments, support for
organic farming and support for farming in areas with natural constraints. These are certainly useful for ESBO provision in this area, as they are helping to keep farmers on the land, but they generally have little developmental momentum. In fact, forestry regulatory policy has been more relevant to the sustainability of the forestry sector. The Resolution on the National Forest Programme (2007) defines the national policy on forest management, guidelines for the preservation and development of forests and conditions for their exploitation or multipurpose use. The Act on Forests of the Republic of Slovenia (1993) regulates the protection, silviculture, exploitation, and use of forests based on forest management plans. In addition, it defines forest functions and introduces the system of forest management planning.

Table 5: Broad policy measures and legislation affecting ESBO provision

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<td>Strategy for smart specialization</td>
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<td>Forestry regulations (National forest programme, Act on Forests)</td>
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4.4 The role of the private sector in ESBO provision and enabling factors

As stated above, we have found little real interest from the private sector to further develop the meat value chain; we believe that this is due to complacency on one side and a lack of private interest on the other.

Despite the fact that funding for mountain wood scheme will originally be governmental and that the main participating institutions, i.e. the University of Ljubljana, Forestry institute and Forestry service, are public, the final aim of the initiative is to establish a working private certification scheme with economic incentives for forest owners and other actors to cooperate.

Some actors in the area, especially timber processors, have already received and acknowledged signals from the market that it is ready to accommodate products with this kind of value added, i.e. products that meet the demands of environmentally conscious consumers who seek quality wood products from forests that are managed sustainably and are durable. However, despite there being some forms of support from the CAP (e.g. support for producers’ organizations), this has not been taken up by primary producers, and as mentioned above,
support for integrated value chains is still missing in the CAP concept of support to a great extent\textsuperscript{16}, and entirely in the Slovenian context.

Another risk that is perhaps present more in private than in public certification schemes is that they can be perceived by consumers as less trustworthy or having lower standards, perhaps even misleading. They may also be enforced less stringently (sanctioning violations and free-riding behaviour) but this ultimately depends on the certificate owner.

5 Potential pathways towards an enhanced provision of ESBOs

The Mountain wood initiative is highly scalable. After the certificate and brand are established, they can be applied (either directly or as an approach) to other mountain forests in Slovenia (316.433 ha above 800 m altogether), and even to the entire Alpine region.

1. Rural vitality: If we choose the difference in market price between ‘ordinary’ wood and Mountain wood as an indirect indicator\textsuperscript{17}, an increase can be expected, though the actual percentage depends on the marketing strategy (i.e., which segment of the market will be aimed at) and its success. Similarly, it is difficult to estimate the number of additional jobs, but given the rich resources, we believe it is far from negligible.
2. Forest as resource base and habitat: If the initiative is successful, the provision of this ESBO should remain the same.
3. Public recreation and health: The local tourist office currently records 18,000 overnight stays yearly, mainly in the municipality of Solčava. It is difficult to predict the extent of the increase that might be attributed only to this initiative. Among other planned activities, the emerging consortium ‘Mountain Wood’ aims to build a sales showroom, mainly for the promotion of the ‘leading theme’ that connects the partners along the Mountain Wood value chain.

The main limiting factor for the survival of the initiative is the ability of the group to establish market viability after it is cut off from public support. This must be taken account of when establishing a formal organisation and care should be taken to select competent people to lead it, or to at least establish rules that prevent a single person or group from advancing only their own interest. This is strongly related to the general lack of trust. It can only be built up slowly and in the meantime, internal shocks must be kept at a minimum. Once the organisation is fully functional, however, it should be quite robust, as the locals are sound entrepreneurs.

While there is plenty of precedent of successful initiatives similar to the Traditional breeds case across Europe, it does not seem to be sufficiently interesting in this region at the moment.

\textsuperscript{16} There are a few cases where policy was implemented in a way that supports more integration, e.g. in the Netherlands, UK and Estonia, but these are exceptions to the rule.

\textsuperscript{17} According to the local Forest service employees and wood processors (information from the National workshop and Workshop 3), the wood already fetches a somewhat higher market price. However, this is difficult to substantiate with hard data, as these market prices are not reported separately.
6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

We believe that the breakdown of the socio-ecological system into variables and sub-variables allows for a satisfactory level of analysis of the main elements that ought to be addressed in order to enhance provision of the desired ESBOs. It considers the interplay of different ecological and social elements and allows for the identification of the crucial relationships between them, highlighting those that can be influenced most effectively through action-orientated research.

However, despite attempting to be as precise as possible without undue reductionism, it still leaves a lot of room for researcher error, as much is left to expert judgement; on the other hand, it is unlikely that this can be avoided entirely when analysing a dynamic socio-ecological system.

Our experience with this type of research has been that it is not sufficient to only address the physical and policy constraints that are pointed out by interlocutors. It is very important to consider motivation for change (both its strength and its nature) and willingness to engage in collective action on a certain matter.

The action-based approach proved very fruitful, as it allowed us to set up the Mountain wood consortium, which is now building towards a very concrete project proposal. In case of the Traditional breeds case, even though our analysis and messages to the community may be facing a lack of interest at the moment, they may still be built upon at a later time.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

While there is existing demand from the market, the idea of increasing the valorisation of Mountain wood was in need of some extra encouragement, which was provided by the University of Ljubljana Biotechnical faculty, and a structured approach towards the steps needed to realize the idea. This way, a critical mass of proponents ready to consider economic cooperation has been reached.

This case, especially when compared to the Traditional breeds case (which is much more supported by policy), shows that public support is not sufficient to enhance ESBO provision considerably, there has to be a strong local initiative, preferably a private one: a market potential (demand) on one side and a sufficient supply (in the sense of economy of scale) on the other. Key actors must be willing to build a story on the basis of a common, private interest; for this, they must of course be both competent and charismatic. A modern, integrated approach is therefore needed: as we have seen, these elements came together in the Mountain wood case; in the Traditional breeds case, the main actors are still relying too strongly on others and staying in their past patterns of behaviour.

However, though public support is not a sufficient condition for success, it is a necessary one; either this or a private investor with sufficient interest and private capital is capable of funding such a project, and the latter seems highly unlikely. We have also stressed the importance of
national and local interests in our report, as well as individual and leadership capacity to create such projects and ideas.

It is also important to have a network of partners with clear roles that they are capable of fulfilling. In the case of Mountain wood, the specific tasks of each actor are clear and logical.

7.2 Key findings on governance arrangements and institutional frameworks

Especially in countries that have undergone transition, it is difficult to gain support for collective actions that brings together different interests and are based on private initiative, even if they generate benefits for all: the successful individual, the general public (ESBOs) and others cooperating in the endeavour. This is perhaps understandable, given the experience with different levels of (forced) collectivisation and perception that this kind of action constitutes ‘doing all the work’ on the part of the potential initiators and free-riding on the part of the rest. Therefore, these kinds of approaches towards policy issues are quite novel and difficult to realise in practice. We believe that this is an innovation in public support, which, if realised, could be a good example for other similar projects. While the RDP measure Cooperation offers this possibility, it should be stressed that the administration (probably not only in Slovenia) is having serious difficulties in introducing such measures. It is difficult to evaluate and select such projects, as well as to devise monitoring methods and indices. The practice of these kinds of projects, which resembles more that of research projects, is very different from that of classical Rural Development policy, and therefore quite limited in its execution. Our case serves to demonstrate the importance of introducing a more bottom-up approach into the CAP, devolving some of the decision making to lower levels and building capacity of administrators, thus bringing policy closer to local needs. Another conclusion is that the needs of policy-end-users would be better met if the planning of project funding was conducted in closer cooperation between the funders and the funded (i.e., proposers of projects). This relates not only to better administration, but also to content: to what policymakers see as policy priorities. They are quite inexperienced in recognising the need for such concerted approaches and forming policy measures to accommodate them; however, this kind of public support, endorsing the creation of value chains, can go a long way towards enhancing ESBO provision.

7.3 Other enabling or limiting factors

It is vital to consider the importance of knowledge, training and education, and to combine competent people from different fields into a multidisciplinary approach that addresses as many elements of the socio-ecological system as possible. Only this kind of initiative can be resilient and sustainable.

7.4 Contributions to EU strategic objectives

We believe that the Mountain wood initiative addresses all three EU objectives of inclusive, smart and sustainable growth. The main ESBOs address:
• sustainability (forest as a resource base and habitat): one of the main aims of the initiative is to support maintaining traditional forestry practices through improving their appreciation on the market; increased consumption of better quality, durable products, should also displace less sustainable products from the market and send signals to other producers to modify their practices.
• social inclusion and employment (rural vitality; public health and recreation): the improved valorisation of Mountain wood is expected to increase revenues and spur the creation of jobs, while the improved visibility of the area should attract more tourists to enjoy the landscape (as well as additionally creating revenues and jobs).
• innovative capacity (education): in addition to the educational value of this pilot project, an important element of its realisation will be to persuade the locals of the importance of innovation in a rapidly changing market setting and equipping them with the capacity to do so.

7.5 How about the transferability of the approach/mechanism used?

The presented case of Mountain wood is mainly innovative in the sense that it generates new questions and offers possibilities for a qualitative shift in the provision of forestry-related ESBOs by introducing quality schemes, bringing together market actors and public institutions as a necessary precondition for this, and opening up new possibilities for the creation of better public measures. We think that this is especially important for countries emerging from former communist regimes. Transition has brought about fairly neoliberal approaches based on individualism, while market subjects are generally unconnected, especially in food and wood chains. This has led to inadequate market stability and economic results for small entities, leading to social degradation for entire social strata and geographical regions, and consequently lower provision of ESBOs.

The example of organising a consortium for Mountain wood is an attempt to create a new approach, to take up good practices from other regions and find solutions for better provision of ESBOs in the future. We believe that the approach itself is transferable and can serve as an informative case, especially for regions facing the consequences of transition.

In countries that still exhibit elements of transition, with somewhat less developed market and government systems in place, creating functioning value chains and efficient support through existing support schemes, can importantly help actors with weaker market positions and undervalued products, i.e. products whose full value is not acknowledged by consumers. This is especially important for many ecosystem services that are currently underrepresented in markets, resulting in a lack of incentives for their provision.
8 References (including projects docs, evidence reports etc.)


Mavsar, R. 2005. Socio-ekonomski pomen gozdov v alpskem prostoru. Zbornik gozdarstva in lesarstva 77, s. 143 - 158


Internet sources:
http://www.ovce.si/ (9.2.2017)
Documentation of research and action progress:

National workshop (Solčava, 15 September 2015):

- Luka Juvančič (BF)
- Tina Kocjančič (BF)
- Emil Erjavec (BF)
- Luka Juvančič (BF)
- Ilona Rac (BF)
- Cvetka Mavrič (Centre Rinka)
- Marko Slapnik (freelancer)
- Alojz Lipnik (Forest service)
- Andreja Borec (Faculty of Agriculture and Life Sciences)
- Anton Breznik (Forest service)
- Ariana Libertin (Ministry of agriculture, forestry and food)
- Barbara Trunkelj (Chamber of Agriculture and Forestry of Slovenia)
- Barbara Zagorc (Agricultural institute of Slovenia)
- Dragan Matijašič (Forest service)
- Igor Ahačevič (Ministry of agriculture, forestry and food)
- Janja Matk (famer)
- Jožica Jerman Cvelbar (Ministry of agriculture, forestry and food)
- Marija Planina (Ministry of agriculture, forestry and food)
- Mojca Čučnik (Ministry of agriculture, forestry and food)
- Uroš Zgonec (Ministry of agriculture, forestry and food)
- Urša Keše (Ministry of agriculture, forestry and food)
- Marjeta Ženko (Chamber of Agriculture and Forestry of Slovenia)
- Miha Koprivnikar (Chamber of Agriculture and Forestry of Slovenia)
- Dominik Pečovnik (Chamber of Agriculture and Forestry of Slovenia)
- Matej Bedrač (Agricultural institute of Slovenia)
- Mojca Tomažič (Institute of the Republic of Slovenia for Nature Conservation)
- Matej Simčič (Institute of the Republic of Slovenia for Nature Conservation)
- Olga Oblak (Chamber of Agriculture and Forestry of Slovenia)
- Vesna Erhart (Association for the development of the Slovenian countryside)
- Stanka Dešnik (Nature park Goričko)
- Andrej Udovč (BF)
- Danijela Bojkovski (BF)
- Ivan Pečovnik (Raduha)
**Workshop 1** (Solčava, 15 January 2016): Focus group with local actors on institutional drivers of ESBO provision. Participants:
- Luka Juvančič (BF)
- Tina Kocjančič (BF)
- Ilona Rac (BF)
- Cvetka Mavrič (Centre Rinka)
- Klemen Matk (farmer)
- Marko Slapnik (freelancer)

**Workshop 2** (Solčava, 5 May 2016): Validation of SES for Solčava/Luče, mandate for the Field work
- Luka Juvančič (BF)
- Emil Erjavec (BF)
- Ilona Rac (BF)
- Jurij Pohar (BF)
- Danijela Bojkovski (BF)
- Maja Vrisk (BF, student)
- Katarina Prelesnik (mayor, municipality of Solčava)
- Aneta Šiljar (Tourist information centre Luče)
- Bernarda Prodnik (municipality Solčava, Bicka)
- Vida Matk (farmer)
- Marko Slapnik (freelancer, Poseben dan)
- Alojz Lipnik (Forest Service, former mayor of Solčava)
- Toni Breznik (Forest Service)

**Field work** (Solčava and Luče, 13-15 June 2016); a series of in-depth interviews with farmers, processors, institutional and corporate purchasers of produce benefitting from ESBO of the CS area (animal production, mountain wood); interviewees:
- Cvetka Mavrič, Mateja Brlec Suhodolnik (Centre Rinka, LAG),
- Bernarda Prodnik (municipality Solčava, Bicka)
- Štefka Goltnik, Sonja Moličnik Oblak (Agricultural extension service Mozirje)
- Bernarda Brezovnik (Agricultural extension service Mozirje)
- Ivo Drev (manager, Agricultural cooperative Šaleška dolina)
- Ivan Pečovnik (farmer)
- Tomaž Marovt (farmer)
- Boštjan Rihter (farmer)
- Klemen Matk (farmer)
- Barbara Petek (caterer, Dom planincev)
- Karli Gradišnik (farmer)
- Helena Krivec (farmer)
- Marko Suhodolnik (farmer)
- Marjana and Matej Vršnik (farmers)
- Franc Ošep (farmer)
- Martina Breznik (innkeeper, Hiša Raduha)
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

- Domen and Vida Matk (farmers)
- Franci Plesnik (hotelier, Kmečka hiša Ojstrica)
- Gregor Plesnik (farmer)
- Nina Plesnik (manager, Hotel Plesnik)
- Avgust Lenar (hotelier, tourist farm Lenar)
- Andreja Bizjak (innkeeper, Na Razpotju)

**Strategic meeting** (Domžale, 12 October 2016): Meeting with Alojz Lipnik, forest owner, professional forester (Slovenia Forest Service) Forest Service) and former mayor of Solčava; present:
- Alojz Lipnik
- Emil Erjavec (BF)
- Luka Juvančič (BF)
- Ilona Rac (BF)

**Focus group** (Domžale, 6 January 2017): Meeting to elaborate on further steps regarding Mountain wood; present:
- Alojz Lipnik
- Emil Erjavec (BF)
- Luka Juvančič (BF)
- Ilona Rac (BF)

**Focus group with researchers in wood science** (Ljubljana, 10 January 2017):
- Emil Erjavec (BF)
- Luka Juvančič (BF)
- Miha Humar (BF, dept. of Wood Science)
- Alojz Lipnik
- Damjan Oražem (Director, Slovenia Forest Service)
- S. Zupan (K&Z Consulting)
- Jožica Gričar (Slovenian Forestry Institute)

**Workshop 3** (Solčava, 20 January 2017): discussion with wood processors and wood science specialists regarding potentials for valorisation:
- Emil Erjavec (BF)
- Luka Juvančič (BF)
- Jurij Pohar (BF)
- Muha Humar (BF)
- Boštjan Lesar (BF)
- Ilona Rac (BF)
- Jožica Gričar (Slovenian Forestry Institute)
- Alojz Lipnik (Slovenia Forest Service)
- Slavka Zupan (K&Z Consulting)
- Alojz Selišnik (wood processor, Melu)
- Stanko Kopušar (wood processor, Tiples)
Meeting with certification organization (Domžale, 27 January 2017):
- Emil Erjavec (BF)
- Luka Jušančič (BF)
- Jurij Pohar (BF)
- Ilona Rac (BF)
- Alojz Lipnik (Slovenia Forest Service)
- Slavka Zupan (K&Z Consulting)
- Peter Bele (Bureau Veritas)
- Nace Kregar (Bureau Veritas)

Meeting with representatives of the Ministry for agriculture, forestry and food (MAFF), regarding the measure Cooperation (Ljubljana, 1 February 2017)
- Emil Erjavec (BF)
- Jurij Pohar (BF)
- Ilona Rac (BF)
- Slavka Zupan (K&Z Consulting)
- Miha Humar (BF)
- Jože Prah (Forest Service)
- Tanja Gorišek (MAFF)
- Marija Žamut (MAFF)
- Uroš Zgonec (MAFF)

Meeting with designer company (Ljubljana, 3 February 2017)
- Lenka Kavčič (designer, AFRONT)
- Slavka Zupan (K&Z Consulting)

Workshop (Solčava, 14 February 2017) - Presentation of the results of the feasibility study
- Luka Jušančič (BF)
- Ilona Rac (BF)
- Maja Vrisk (BF, student)
- Primož Kopač (BF, student)
- Katarina Prelesnik (mayor, municipality of Solčava)
- Ivan Pečovnik (farmer; sheep breeders’ association Raduha)
- Franc Plesnik (hotelier, Kmečka hiša Ojstrica)
- Matej & Marjana Vršnik (tourist farm Robanov kot)
- Matjaž & Martina Breznik (inn owners, Hiša Raduha)
- Branko Petek (farmer and meat processor)
- Boštjan Pihler (farmer and meat processor)
- Helena Krivec (tourist farm Ramšak)
- Milena Marolt (tourist farm Stoglej)
- Terezija Mavrič (Zavod Savinja)
- Janja Matk (tourist farm Matk)
- Mateja Brlec Suhodolnik (Centre Rinka)
Focus group (Domžale, 21 February 2017) – next steps meeting

- Emil Erjavec (BF)
- Jurij Pohar (BF)
- Luka Juvančič (BF)
- Ilona Rac (BF)
- Slavka Zupan (K&Z Consulting)
- Miha Humar (BF)
- Jožica Gričar (Forestry Institute)
- Alojz Lipnik (Forest Service)
- Lenka Kavčič (AFRONT)
9 ANNEX: Reflections on the case study methodology used

As these issues were already covered extensively in the previous sections, we only include a very brief overview here.

9.1 Objectives and activities undertaken with initiative/stakeholders

**Objectives:**
Increasing the valorisation of high-value products through private initiatives to maintain or improve the provision of ESBOs.

**Actions:**
Traditional breeds: field research, feasibility study and economic analysis for a small-scale slaughterhouse
Mountain wood: creating a project proposal for the measure Cooperation, communication with stakeholders and public interest representatives

**Actors:**

**Traditional breeds:**
- Marko Slapnik (‘gatekeeper’): helped pinpoint main issues, facilitated communication with farmers
- Farmers, meat processors, tourist operators, local extension service: source of information regarding the feasibility of the establishment of a small-scale slaughterhouse

**Mountain wood:**
- Alojz Lipnik (‘gatekeeper’): initiator of proposal, facilitator
- Forest owners: providers of Mountain wood
- Wood processors: providers of practical information regarding wood quality/properties, market demand and design ideas; entrepreneurial push
- BF: coordinator and developer of project concept, business idea and plan (CAE); researcher of wood properties (dept. for Wood science)
- Forest service, Forestry institute, Ministry of food, agriculture and forestry: representatives of public interest

9.2 Outcomes and further steps

Traditional breeds: feasibility study and economic analysis for a small-scale slaughterhouse. Presented at local workshop. The main conclusion is that significant private action is required, which in turn needs sufficient economic interest.
9.3  Judgement on the process

Traditional breeds: Farmers had few expectations, as they are themselves sceptical due to bad past experience. It is likely that BF’s output will not fall on fertile ground until there is significant private interest for action (collective or individual).

Mountain wood: Initiative for action came from within the study area. Expectations were not high at the outset, but it gradually turned out that there is interest for this kind of cooperation on all sides. Communication with the right stakeholders and private interest for action were crucial.

Please refer to section 7 for more details.

9.4  Supporting data and statistics

Project proposal for the measure Cooperation (to be provided subsequently)
CASE STUDY

"WATER AND INTEGRATED LOCAL DELIVERY (WILD) PROJECT" (UK)

D4.3 | Final Version | January 2017

Chris Short, Katarina Kubinakova, Eloise Fresnay, Dan Marsh, Janet Dwyer
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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
**List of acronyms**

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<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>AES</td>
<td>Agri-Environment Scheme</td>
</tr>
<tr>
<td>CaBA</td>
<td>Catchment-Based Approach</td>
</tr>
<tr>
<td>CAP</td>
<td>Common Agricultural Policy</td>
</tr>
<tr>
<td>CCRI</td>
<td>Countryside and Community Research Institute</td>
</tr>
<tr>
<td>CS</td>
<td>Countryside Stewardship</td>
</tr>
<tr>
<td>CSF</td>
<td>Catchment Sensitive Farming</td>
</tr>
<tr>
<td>CWP</td>
<td>Cotswold Water Park</td>
</tr>
<tr>
<td>CWPT</td>
<td>Cotswold Water Park Trust</td>
</tr>
<tr>
<td>EA</td>
<td>Environment Agency</td>
</tr>
<tr>
<td>ESBO</td>
<td>Environmentally and Socially Beneficial Outcomes</td>
</tr>
<tr>
<td>ESIF</td>
<td>European Structural and Investment Funds</td>
</tr>
<tr>
<td>FWAG</td>
<td>Farming and Wildlife Advisory Group</td>
</tr>
<tr>
<td>FWAGSW</td>
<td>Farming and Wildlife Advisory Group South West</td>
</tr>
<tr>
<td>GAEC</td>
<td>Good Agricultural and Ecological Conditions</td>
</tr>
<tr>
<td>GCC</td>
<td>Gloucestershire City Council</td>
</tr>
<tr>
<td>GES</td>
<td>Good Ecological Status</td>
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<tr>
<td>GRCC</td>
<td>Gloucestershire Rural Community Council</td>
</tr>
<tr>
<td>ILD</td>
<td>Integrated Local Delivery</td>
</tr>
<tr>
<td>LFRMS</td>
<td>Local Flood Risk Management Strategy</td>
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<tr>
<td>LPs</td>
<td>Landscape Partnerships</td>
</tr>
<tr>
<td>MEA</td>
<td>Millennium Ecosystem Assessment</td>
</tr>
<tr>
<td>NCA</td>
<td>National Character Area</td>
</tr>
<tr>
<td>NE</td>
<td>Natural England</td>
</tr>
<tr>
<td>NEA</td>
<td>National Ecosystem Assessment</td>
</tr>
<tr>
<td>NVZ</td>
<td>Nitrate Vulnerable Zone</td>
</tr>
<tr>
<td>RDPE</td>
<td>Rural Development Programme for England</td>
</tr>
<tr>
<td>SES</td>
<td>Social-ecological System</td>
</tr>
<tr>
<td>SMRs</td>
<td>Statutory Management Requirements</td>
</tr>
<tr>
<td>SROI</td>
<td>Social Return On Investment</td>
</tr>
<tr>
<td>SSSI</td>
<td>Sites of Special Scientific Interest</td>
</tr>
<tr>
<td>TW</td>
<td>Thames Water</td>
</tr>
<tr>
<td>UTCP</td>
<td>Upper Thames Catchment Partnership</td>
</tr>
<tr>
<td>WFD</td>
<td>Water Framework Directive</td>
</tr>
<tr>
<td>WILD</td>
<td>Water and Integrated Local Delivery</td>
</tr>
</tbody>
</table>
1 Introduction: What is the case study about?

The Water with Integrated Local Delivery (WILD) project is a facilitation-based initiative that seeks to develop a broad-based partnership to meet a range of policy priorities, centred on the Water Framework Directive (WFD), to improve the water and land-based environments.

The project areas covers 26,000ha in the central part of the Upper Thames catchment that forms the headwaters of the Thames river basin in central and southern England. The catchment includes stretches of the River Thames extending from its source south-east of Cirencester at Kemble, to Lechlade where watercourses from the plateau of the Cotswolds join the clay lowlands around Swindon.

The geology of the Upper Thames catchment is dominated by limestone that provides significant groundwater resources and the aquifers within the catchment have been classified into the Water Framework Directive (WFD) groundwater bodies. The area contains a wide variety of habitats and landscapes and provides high quality game and coarse fishing in both rivers and still waters. Some watercourses are stocked by their owners and angling associations, to supplement wild stock levels. Most of the area is rural and dominated by farming (72%), with woodland under 10%. Arable land use makes up 43% of the catchment, 29% is grassland and a further 15% is urban including Swindon, Cirencester and smaller market towns. The whole Upper Thames catchment has been designated a Nitrate Vulnerable Zone (NVZ) since 2002. Agriculture is the main land use in the catchment and this does impact on the water environment. Similarly there is an impact from both industry and new and existing housing developments as well as associated infrastructure such as roads and sewage.

According to the Thames River Basin Plan (Defra 2016) the Significant Water Management Issues in the Upper Thames catchment concern both point source and diffuse pollution from agriculture and urban developments. Other issues causing concern are the physical modifications to the river channel, invasive non-native species and erratic water flow.

Table 1 shows the key characteristics of the WILD project.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Table 1: Key features of the WILD project

<table>
<thead>
<tr>
<th>Region or locality</th>
<th>Upper Thames catchment, focused around Cotswold Water park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Farming/ forestry system</td>
<td>Agriculture, mostly commercial arable with some grazing land. Small amounts of private woodland.</td>
</tr>
<tr>
<td>Area (ha) of initiative (&amp; Case Study)</td>
<td>WILD project area is 26,000 ha</td>
</tr>
<tr>
<td>Key ESBOs covered</td>
<td>Water quality, flood protection, rural vitality, soil protection. Reference to species and habitats and landscape character.</td>
</tr>
<tr>
<td>Total no. of farmers/ foresters involved</td>
<td>About 150 farmers, of which almost all have some connection with the initiative.</td>
</tr>
<tr>
<td>Other key stakeholders involved</td>
<td>Three local NGOs acting as main delivery partners; 18 out of 19 local communities fully involved; support from key public agencies; involvement of local university; wider range of partners through Upper Thames Catchment Partnership and Thames Water.</td>
</tr>
<tr>
<td>Source(s) of funding</td>
<td>Re-directing of public investment through Environment Agency, considerable local input through ‘in-kind’ contributions</td>
</tr>
<tr>
<td>Start date of initiative</td>
<td>WILD started in April 2013 but there had be related activity in this area since 2010.</td>
</tr>
<tr>
<td>End date of initiative</td>
<td>March 2016, Phase 2 of WILD covering a wider area started in October 2016 for further three years.</td>
</tr>
<tr>
<td>Further information</td>
<td>Visit <a href="http://www.fwagsw.org.uk/projects/wild-project/">http://www.fwagsw.org.uk/projects/wild-project/</a> or <a href="http://www.ccri.ac.uk/wild/">http://www.ccri.ac.uk/wild/</a></td>
</tr>
</tbody>
</table>

Funding was secured to tackle these issues and this established the base for the WILD project; Phase 1 which ran from April 2013 until March 2016 is evaluated in this report. Phase 2 runs from October 2016 until September 2019. The central aim of WILD was the improvement of the water environment through an integrated approach that meets the needs of WFD (good ecological status of all water courses) and also provides a range of other multiple benefits (economic and social as well as environmental). The project had three objectives:

1. To deliver Good Ecological Status through direct actions in water bodies in the WILD project area according to WFD priorities;
2. To create a framework to addresses other negative drivers on water quality and enable local delivery so protection of the water environment becomes self-sustaining.
3. To integrate and deliver the aims and objectives of strategic policy programmes relevant to the project area using the Integrated Local Delivery (ILD) approach.

As a result it is possible to see that there is a clear focus on one key Environmental and Social Beneficial Outcome\(^1\) (ESBO) (water quality) and to link with other local strategies and priorities. Therefore the potential benefits of this case study are the use of a framework that focuses on the integrated delivery and a desire to maximise the synergies that arise from a multi-ESBO approach.

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\(^{1}\) ESBO is the term used to captures the scope of the desired social and environmental outcomes for agriculture and forestry which the project seeks to enhance. These are often called public goods or ecosystem services.
The WILD project involved the formation of a core partnership between the Environment Agency (EA) (the main funder) and the three NGO delivery partners; the Farming and Wildlife Advisory Group South West (FWAGSW), Gloucestershire Rural Community Council (GRCC), Cotswolds Water Park Trust (CWPT) and Countryside and Community Research Institute (CCRI). The wider partnership involved National Farmers Union, Thames Water, Wildlife Trusts, local councillors, agricultural advisors and key farmers and landowners. Both FWAGSW and GRCC acted as independent facilitators in the development of the partnership and in bringing different priorities and stakeholders together. The CCRI acted as a ‘critical friend’ and develop an on-going and iterative approach to evaluation.

The key priorities within the WILD project concerned the water environment, biodiversity and landscape and local communities. The water environment covered issues such as water quality, water flow, invasive species, flood protection and amenity and was dominated by the implementation of the WFD, issues of drinking water quality and localised flooding (Objective 1). Terrestrial biodiversity had a direct impact on the water environment and there was increasing awareness through integrated catchment management evidence that the two are closely connected, as well as landscape character where key features like hedgerows provide multiple benefits (Objective 2). The local communities within the WILD project area were susceptible to flooding but were also aware that of the benefits of improved water quality (here Objective 3 provided the mechanism by which they could be involved). Included in this priority are also the demands for more housing and the pressure this causes on the existing infrastructure.

The ILD approach was designed to enable policy makers, with different areas of duty, to be part of a complimentary and integrated delivery at a local level (See Short 2015; Short et al 2010). Identifying and integrating locally relevant strategies was achieved by an initial asset scoping exercise that identified the assets, coordinates the related strategies, plans and initiatives and engaged with the relevant contact for each asset and strategy within the WILD area. This requires a specialist facilitator, provided by FWAGSW and GRCC for the WILD project.

Different policy strategies have different spatial and temporal priorities so the WILD project aimed to bring these together by linking them to administrative layers to develop actions that focus on multiple benefits. A secondary consequence is that this binds people to an area where they have a cultural connection, which helps with delivery at the start and over the long-term. Local stakeholders develop expertise and are seen as deliverers of policy and sources of knowledge.

Implementation therefore involved different partnerships for different actions composed of locally relevant teams from agency, Local Authority, NGOs and local farmers and communities to deliver projects that offer multiple benefits and offering coordinated support to local communities. Combining the datasets and partner strategies into a GIS system also helps understand the prioritisation of delivery at different spatial and temporal scales.

Delivery is not spatially confined but embedded across the project area and beyond so that each community can discover what is important in their local area and be inspired and enabled to take action to protect their local environment. The ILD approach enables the identification
and delivery of projects with multiple benefits to landowners and managers, local communities and the whole Upper Thames partnership. It also facilitates the provision and analysis of data on the environment, including water flow data which can impact on plans for future growth and development.

The diagram below sets out the main governance arrangements, these are described in more detail later in the report.

Figure 2: WILD project: governance arrangements
2 Definition of the social-ecological system (SES) studied

2.1 The SES diagram from Steps 1&2 has been revised and updated in Steps 3&4. This is shown in Figure 3 below.

![SES Diagram of WILD project (UK)](image)

Key ESBOs considered:
1. Water quality (RU)
2. Flood protection (AS)
3. Rural vitality (RS)
4. Soil protection (RU)

**RESOURCES**

**ACTION SITUATIONS**
- Key farmers/advisors attempting to implement sustainable practices. Communities receive River Management Plans, introduction of PES by Thames Water to reduce chemical pollutants in water. All show WILD as shared problem solving network for integrated delivery; challenges of linking soil, agriculture, communities, biodiversity & water recognised not all overcome; impact of climate change extreme events discussed, no specific actions but overall activity positive on CC.

**ACTORS**
- Direct: Specialist facilitators (PMAS, SRC, CWPT), farmers, landowners & advisors, government agencies & NGOs, Thames Water, UTCP, local officers. Indirect: Higher awareness in local communities and farming community, local authorities and planning, impact, long-term sustainability/resilience.

**GOVERNANCE SYSTEM**
- Regulatory at national level but local framework established for WPD delivery through local partnership rather than regulation and inspection. Joining up different statutory duties, CAP (graening & cross-compliance) and Pillar 2 (some clashes), new and existing farmer/local networks, private sector involvement in water but not gravel extraction, catchment-based approach.

**Extreme weather events, National policy on catchment management. Multi-national companies involved in gravel extraction.**

**Figure 2: SES Diagram of WILD project (UK)**
2.2 Description of the SES

The WILD case study is concerned with 4 key ESBOs: water quality, flood protection, rural vitality and soil protection.

**Water quality** is a central ESBO to WILD and is mainly addressed via activities to meet the requirements of the WFD, which underpins the project and is supported by other activity such as Catchment Sensitive Farming (CSF) activities. These are a mixture of technical group events and one-to-one visits by CSF officers working closely with WILD in order to reach the farmers and land managers in the area. CSF officers link into the River Basin District Liaison Panels through the EA and they are employed by NE. The key WFD water quality issues involve level of nitrates, sediment and phosphate from both agriculture and urban development. In terms of drinking water, which is a concern to Thames Water (TW), in the levels of metaldehyde and other pesticides, including propyzamide, carbetamide.

**Flood protection** is a key ESBO from a range of perspectives, but each with slightly different emphasis. Parish and community concerns were for the flooding of property and businesses and while farmers noted this, they also highlighted the increase in developed land and the impact this has on the flooding of farm land and the related reduction in productivity. There is a strong link to water quality and during periods of flooding a range of pollutants enter water bodies from both agricultural and urban sources. There is also a link to soil protection, the increase in arable areas, notably for certain crops such as maize and oilseed rape, there is an increased risk of soil erosion in periods of high and extreme rainfall.

**Rural vitality** was seen as a key ESBO by the local communities, especially those that were affected by localised flooding events during times of high rainfall. The impact on communities is considerable when certain streets are regularly affected and as a result these issues featured frequently in the work of the GRCC around emergency planning and attempts to tackle the causes of the flooding, which were often felt to be poor infrastructure maintenance. The WILD project provided communities with an opportunity to highlight these issues and attempt to resolve them by recording them on maps and discussing them with various agencies within the partnership. WILD also enabled volunteers to go out and actively do something to help manage the water environment in a more sustainable way. Farmers were also aware of this aspect and it is discussed in more detail later. There is not a direct link between this ESBO and the others identified, however vibrant communities tend to be more resilient to shocks such as flooding. The project was aware that following flooding incidents some local communities had established flood forums and the discussions had raised issues concerning how the land, road and housing infrastructure were managed.

Farmers were keen to see WILD as a project that highlighted soil protection, and to some extent, soil functionality. This is increasing in importance across the whole Upper Thames catchment and was raised in many farmer-to-farmer discussions. Events showing good practice are popular and there are some good examples locally involving organic and non-organic farms on how land management can improve soil protection and functionality. There is a strong link between soil protection and water quality and flood protection, as well as species and habitats.
In the Step 1&2 analysis (Short et al 2016), both partners and farmers felt species and habitats were core to WILD but this was not the main priority for local authorities and parish/communities who were much more likely to see rural vitality and landscape character as being a key aim of WILD. This is partly because the stakeholders struggle to see the way in which meeting the flood protection ESBO using natural-based solutions actually enhances other aspects of the system such as species and habitats. Key features in the landscape such as stone walls and hedges are important in soil protection, water quality and species and habitats.

Therefore it is clear that the ESBOs interlink and there is recognition amongst the delivery team and key partners that water quality, flood protection, soil protection and species and habitats are all inter-connected. There is a strong link between flood protection and rural vitality, where a community comes together to take action to reduce flood risk and work towards a more resilient management of the water environment.

2.3 Levels of ESBO provision, trends and determinants

Agricultural production in itself is not an ESBO, however it is the dominant land use and changes to the types of land use and the practices associated with them that will have a large impact on the ESBOs being considered here. Although blunt in its approach, using measures of agricultural and land use change provides some measure of ESBO provision, trends and determinants. Using data from the regular farm structure surveys based on the Upper Thames Clay Vales National Character Area Classification (of which the WILD project area represents about 25%) it is possible to discern some trends in agricultural activity (Defra 2015 and NE 2014). Two fifths of the land is used for lowland grazing livestock. As with other parts of the UK, there has been a drop in dairy as a sectors reducing the number of livestock further. All forms of cattle production have reduced in number recently, with the total number in 2013 standing at just under 120,000. The number of sheep has actually increased during this time. Such a trend is likely to be positive in terms of water quality due to challenges of posed by manure on pollution. What the data does not show is the variation in grazing land, a few farms have introduced herbal lays, which are excellent in increasing soil protection and functionality as well as providing pollination throughout the year (see Figure 4 below). However there are some challenges in terms of the growth of maize production (see Figure 4 below).

Figure 4: Picture of herbal lays and waterlogged maize field
While the area of cereals has fallen, if the area for general cropping is included the cultivated area has increased. This would generally be seen as a negative impact on the provision of ESBOs due to the risk of chemicals reading water ways and impacting water quality, soil left bare overwinter impacting on soil and flood protection. Wheat is the most common cereals crop, but it has experienced a large decline in area used for production between 2000 and 2013 whereas spring barley has more than doubled in area from 2010 to 2013. This is positive as it suggests crop stubble has been left over winter reducing the risk of soil erosion. Oilseed rape is also a significant crop for the area rising from 9,290 ha in 2000 to nearly 16,000 by 2013. This accounts for some of the rise in the General Cropping with maize accounting for the rest. As Figure 4 shows maize is a challenging crop due to the wide spacing of the planting which leaves the soil bare and the high level of nutrients it requires to get started increasing the risk of pollution unless clear steps are taken to prevent this.

Table 2: Farm types in Upper Thames Clay Vales 2000-2013 (% distribution)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2013</th>
<th>% dist. change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>24.8</td>
<td>21.3</td>
<td>-3.5</td>
</tr>
<tr>
<td>General cropping</td>
<td>0.7</td>
<td>15.8</td>
<td>15.1</td>
</tr>
<tr>
<td>Horticulture</td>
<td>2.7</td>
<td>2.0</td>
<td>-0.7</td>
</tr>
<tr>
<td>Specialist pigs</td>
<td>0.7</td>
<td>0.7</td>
<td>-0.0</td>
</tr>
<tr>
<td>Specialist poultry</td>
<td>1.5</td>
<td>0.7</td>
<td>-0.8</td>
</tr>
<tr>
<td>Dairy</td>
<td>10.4</td>
<td>5.7</td>
<td>-4.7</td>
</tr>
<tr>
<td>Grazing livestock LFA</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grazing livestock lowland</td>
<td>27.6</td>
<td>41.5</td>
<td>13.9</td>
</tr>
<tr>
<td>Mixed</td>
<td>9.4</td>
<td>9.4</td>
<td>0</td>
</tr>
<tr>
<td>Other types</td>
<td>22.1</td>
<td>2.0</td>
<td>-20.1</td>
</tr>
</tbody>
</table>

Comparing maps 10, 6 and 7 in Appendix 1 shows the changes from 1973, 2000 to 2012 respectively in terms of land use. The data in 1973 only covers the county of Gloucestershire but the map shows the dominance of pasture and arable with areas of past and present mineral extraction. Between 2000 and 2012 new gravel pits were developed in the WILD area leading to an increase in the area classified as being used for mineral exploitation. At the same time a number of gravel pits closed and filled with water leading to an increase in the number of water bodies. The amount of pasture and agricultural land with significant natural vegetation has reduced overall and the area is more fragmented, this will impact on ESBO provision. An increase in arable is likely to have a negative impact on water quality, flood protection and soil protection.

In terms of agricultural holding size, it is clear from Figure 5 that large holdings dominate the WILD project area and hence the farming systems are commercial. The greatest category of size of holding is those over 100 ha – there are over 400 holdings of this type in the Upper Thames Clay Vales. Interestingly all categories of size decreased from 2000 to 2013 but the decrease was least in the larger categories. The area covered by the larger holdings increased from 2000 to 2013 from 104986ha to 112,830ha, suggesting that this area reflects the national trend of larger farms increasing in size. The overall number of holdings has decreased by over 300 since the year 2000.
The first decade of the 21st century saw substantial decline in the agricultural workforce, falling from 3,986 to 3,469 between 2000 and 2013. A drop of 517 workers, 13%. The decline was almost entirely restricted to full time workers, the number of principal farmers remaining static. There is no forestry employment in this area and the small areas of woodland are largely managed as part of the overall farming practice.

So in terms of the impact of agriculture on ESBOs the trends of fewer larger commercial farms with a decreasing workforce is likely to increase the risk of harm to ESBO provision. Increases in arable will impact water quality, soil protection and flood protection. The reduction in livestock would be a benefit to water quality. Utilising European data from WP2 concerned with mapping of ESBO (Perez-Soba et al 2016) combined with some national data it is possible to locate key data relating to the main ESBOs for WILD (water quality, flood protection, rural vitality and soil protection) with reference to species and habitats and landscape character.

**Water Quality:**

The WILD project area is characterized by a high density of watercourses, ditches, ponds and lakes. It is worth noting that there are over 150 former gravel pits that have filled with water and now form lakes within the hundred square kilometres of the Cotswold Water Park. The main part of the area is classified as an NVZ, which requires specific management to reduce nitrates pollution.

Water quality is regularly monitored across the catchment by the EA, focusing on ecological and chemical aspects. Detailed water quality data series are available for all of the major water bodies in the study area dating back to 2009 as summarised in Table 3. It should be noted that quality status of a water body may change either because of an actual change in the river or because data is received from either new monitoring points or filling knowledge gaps and both can affect the overall status of the water body.
Table 3: Water Body quality progress from 2009 to 2015 in WILD area

<table>
<thead>
<tr>
<th>Water body name</th>
<th>Overall</th>
<th>2009</th>
<th>2012</th>
<th>2015</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Priority WB in term of ecological action</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampney and Poulton Brooks</td>
<td>Bad</td>
<td>Bad</td>
<td>Moderate</td>
<td>Good by 2027</td>
<td></td>
</tr>
<tr>
<td>Thames (Waterhaybridge to Cricklade) and Chelworth Brook</td>
<td>Moderate</td>
<td>Poor</td>
<td>Moderate</td>
<td>Good by 2027</td>
<td></td>
</tr>
<tr>
<td>Churn (Baunton to Cricklade)</td>
<td>Bad</td>
<td>Moderate</td>
<td>Bad</td>
<td>Good by 2027</td>
<td></td>
</tr>
<tr>
<td>Swill Brook (source to Ashton Keynes)</td>
<td>Moderate</td>
<td>Poor</td>
<td>Moderate</td>
<td>Good by 2027</td>
<td></td>
</tr>
<tr>
<td>Thames (Kemble to Waterhay Bridge)</td>
<td>Poor</td>
<td>Poor</td>
<td>Good</td>
<td>Good by 2015</td>
<td></td>
</tr>
<tr>
<td><strong>Other Water Bodies in the project</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marston Meysey Brook</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good by 2015</td>
<td></td>
</tr>
<tr>
<td>Thornhill Ditch and tributaries at Cotswolds Water Park</td>
<td>Good</td>
<td>Good</td>
<td>Moderate</td>
<td>Good by 2027</td>
<td></td>
</tr>
<tr>
<td>Dudgrove Brook</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Good by 2015</td>
<td></td>
</tr>
<tr>
<td>Cerney Wick Brook (source to Thames)</td>
<td>Poor</td>
<td>Poor</td>
<td>Poor</td>
<td>Moderate by 2027</td>
<td></td>
</tr>
<tr>
<td>Thames (Coln to Leach)</td>
<td>Poor</td>
<td>Poor</td>
<td>Moderate</td>
<td>Moderate by 2027</td>
<td></td>
</tr>
<tr>
<td>Thames (Churn to Leach)</td>
<td></td>
<td></td>
<td>Good (2013)</td>
<td>Poor</td>
<td>Moderate by 2027</td>
</tr>
<tr>
<td>Share ditch</td>
<td>Poor</td>
<td>Poor</td>
<td>Moderate</td>
<td>Moderate by 2015</td>
<td></td>
</tr>
<tr>
<td>Derry Brook (and Leighfield Brook)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Poor</td>
<td>Moderate by 2027</td>
<td></td>
</tr>
<tr>
<td>Ray (Wiltshire): Lydiard Brook to Thames</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate by 2015</td>
<td></td>
</tr>
<tr>
<td>Key (Source to Thames)</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate by 2015</td>
<td></td>
</tr>
<tr>
<td>Swill Brook and Thames (High Bridge to Waterhay Bridge)</td>
<td>Moderate</td>
<td>Poor</td>
<td>Moderate</td>
<td>Good by 2027</td>
<td></td>
</tr>
</tbody>
</table>

Source: [http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3504](http://environment.data.gov.uk/catchment-planning/OperationalCatchment/3504)

Ecological quality is the most important factor determining the overall WFD status of water bodies. In 2015, three out of five of the priority waterbodies had moderate quality with the objective being to achieve ‘good’ quality by 2027. Comparing 2015 and 2012 the quality status of three priority water bodies was unchanged while two had improved. The main impediments to achievement of good ecological status are poor urban infrastructure, discharge from treatment works and agricultural land management. The picture for other water bodies was mixed; two had improved, two had deteriorated and the status of the remainder was unchanged. In ‘moderate’ status to be achieved some major works need to be undertaken in the urban area around Swindon and in sewage infrastructure and planned development. These were not selected for WILD as they require significant engineering solutions.

**Flood protection:**

Flood protection, and the management that this entails, is one of the main issues in the WILD area. Climate change and wetter winters will affect the level and flow of water in the watercourses. Map 5 in Appendix 1 shows that flood risk is a likely scenario for many communities and land managers in the WILD project area. Flash flooding is increasingly likely and is exacerbated by the underlying clay geology. Particularly in flat areas, land may be underwater for long periods. Many parishes have a high risk of flooding and this was a key reason for them becoming involved in the WILD project. The Cotswold Flood Action Group was set up in February 2014 to help coordinate the work of the organisations responsible for managing flood risk in the area.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

Figure 6: Water courses issues and concern in the Community of Fairford

Figure 6 above shows the water course issues and opportunities map that was developed for one of the communities in the WILD project area. This followed an initial community assessment on flood risk and shows a lack of capacity in terms of infrastructure and the impact of poor maintenance of existing features. Each red dot represents an area of concern regarding the water environment. This may be a blocked culvert, broken drain or poor road repairs that encourage water to flow in the wrong direction. Appendix 2 contains details of improvements made to 6 parishes since 2012.

**Rural vitality**

Under the WILD project, communities and parishes are encouraged to lead actions in their locality to improve community awareness of appropriate water management practices, such as survey mapping recording local actions and incorporating local knowledge. Such activity also helps to bring people together. Throughout the first phase of the project actions were arranged in various areas, targeting different people. For example, work has been done by voluntary actions (volunteer hours committed = 21,600 hrs average 2,880 days over 3 years @£75/ day = £216,000). In addition, 20 local schools were engaged in a photographic competition on water and the production of a 2016 calendar with winning photos exhibited across Gloucestershire.

The specialist facilitator seconded by GRCC to work with local communities has enabled the WILD project to highlight over 1,500 issues and opportunities concerning water flow (See Figure 6). Table 4 shows the progress over the 3 years of the Phase 1 project, with all but one parish in the final stages of the project development. All of the parishes started in the left-hand column. All of the parishes started in the left-hand column. Three are now linked to Neighbourhood Planning (see footnote 3) and work has also included four parishes and a town...
outside of the WILD 1 project area, showing the demand for a second phase of the WILD project.

Table 4: Status of WILD Phase 1 community engagement work with 19 parishes

<table>
<thead>
<tr>
<th>Early stages</th>
<th>Introductory meeting/conversation</th>
<th>Mapping meeting being arranged/held</th>
<th>Annotated maps completed</th>
<th>Project development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latton</td>
<td>Lechlade</td>
<td>Somerford Keynes</td>
<td></td>
<td>Ready for</td>
</tr>
<tr>
<td></td>
<td>Pocle Keynes</td>
<td>Siddingdon</td>
<td></td>
<td>Ongoing/completed</td>
</tr>
<tr>
<td></td>
<td>Minety</td>
<td>South Cerney</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oaksey</td>
<td>Poulton</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Castle Eaton *</td>
<td>Cricklade</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marston Meysey **</td>
<td>Ashton Keynes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meysey Hampton</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Down Ampney</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fairford</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kempsford</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Duffield (IP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leigh</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Species and habitats:
Parts of the WILD project areas are designated as Sites of Special Scientific Interest (SSSI), and others are under the Habitat Directive Sites (Natura 2000) (see Map 9 in Appendix 1). Some river valley meadows and pastures play a key role in breeding and overwintering birds (including lapwing, snipe, curlew, redshank and golden plover). In terms of water biodiversity, the water quality data provided by the EA provides further indicators about fish and invertebrate populations in the studied watercourses. It is notable that in 2015, 65% (11/17 waterbodies measured) of the evaluated waterbodies had a good or high invertebrate quality and 55% (5/9 waterbodies measured) had a moderate, good or high fish quality. However, it is hard to evaluate precisely the evolution of biodiversity in each watercourse because it also depends on the quantity on water in the waterbody at the sample period; the water level (a lack of water in summer means that the river is unlikely to ever reach good ecological status for fish), the seasons (river fauna doesn’t stay in the same area etc.). However, the EA accept that restoring habitats such as wet meadows, increasing areas of arable reversion, introducing herbal lays and restoring historic water storage features will benefit species and habitats.

In order to improve biodiversity, parishes led practical interventions including the removal of barriers which impede fish migration, or efforts to tackle non-native invasive species (American crayfish, Himalayan balsam etc.). For example, 2.7 km of river have been treated for Himalayan balsam infestation, 1,500ha of land into AES in 2016 with a further 3,000ha planned for 2016. Across the WILD project area. The accepted conclusion is that such coordinated action is expected to lead to improvement:

“Work to survey and control Himalayan balsam has also been conducted at Ampney Crucis and Ampney St Peter using volunteers to pull the weed before it spreads downstream. We have aspirations to totally eradicate it from the watercourse as it is only found in a relatively small area so is of a manageable size.” Ampney Brook Progress Report
Actions initiated through the WILD project also indirectly improve the quality of biodiversity. For example, on the Ampney Brook, shade reduction work has led to increased levels of invertebrates. More than 60km of potential river enhancements have been identified and shared with partners in order for them to be prioritised over the short to medium term. All these actions aimed to improve the rivers, riverbanks and biodiversity.

**Soil protection:**
Soil protection is a priority concern in the WILD project, because soil issues such as compaction and degradation are related to water management. Degraded soils can’t store as much water as healthy soils, which can lead to flooding. Bare soils are susceptible to water erosion, which can lead to soil nutrients being washed directly into water courses. Soil management practices such as permanent cropping, livestock management on delicate soils, or organic matter cover can protect soils from erosion. Map 8 in Appendix 1 showing soil erosion reveals that this is not a key issue for the WILD project area, however the quality of water within the project area can clearly be affected by soil erosion further upstream.

**Landscape character:**
The Upper Thames Clay Vales is a National Character Area (NCA), and the WILD project covers the western end of the NCA. Natural England is improving access to environmental evidence and information through NCA profiles. A report from September 2014 gives some details about the environmental status, landscape provision and biodiversity in the area. The statements of environmental opportunity for this NCA report help to assess the impact of some actions and offer further suggestions for how action can be best targeted to conserve and improve the natural environment, which can have positive impacts on landscape conservation. For example “Between 2003 and 2011 the length of boundary features maintained under stewardship agreements increased from 542 km (4 per cent) to 2,177 km (16 per cent), suggesting that the condition of boundaries will be improving in some areas.”

The network of hedgerows and associated hedgerow trees within the Cotswold Water Park (CWP) are important landscape features but also contribute to biodiversity, flood protection and water quality. In the south-west of the area, in the vicinity of Leigh and extending to the study area perimeter near Minety, a more intact hedgerow network with smaller field sizes is evident. The most open area occurs in the central section of the CWP particularly within the area between Marston Meysey and Latton. Here, larger scale fields and low hedgerows impart a more open scale to the landscape (CWPT 2009).

**Key drivers:**
The changes in agricultural practices and within urban developments are key drivers in the long-term health of the water environment as shown by the data collected by the EA. WILD as a project works to reduce the impacts of agricultural and related activities on the key ESBOs by ensuring cross compliance regulations are implemented and, where land managers are willing, introducing agri-environment options to enhance ESBO provision. At a national and EU level these two factors are driven by the Common Agricultural Policy (CAP) (agriculture) and the economic agenda of ‘jobs, growth and investment’ agenda (EC 2014). The drive of the

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2 NCAs divide England into 159 distinct natural areas. Each is defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity.
WFD to increase water quality to meet WFD objectives, whilst not as rigorous as the drinking water standards is a strong regulatory factor in driving changes in farming practices (e.g. Water Resources Act 1991). The WILD project is a stronger and more inclusive approach to water management through knowledge exchange and greater awareness of the impacts of certainty land management activity. For example, the increase in oilseed rape cultivation is of particular concern to Thames Water because it increases the use of slug pellets which, once in the water course, prove to be a difficult pollutant to extract.

As the WP3 (Mantino et al 2016) report notes there are ‘different types of market-based mechanisms and in particular the use of payments for ecosystem services (PES) (DEFRA 2013; Wunder 2005). Nevertheless, PES are part of the broader category of market-based mechanisms.’ Using the classification proposed by Wunder (2005), WILD would count as an ‘Integrated conservation and development project (ICDP).’ Wunder (2005) presupposes two fundamental conditions: a) a vision more strategically-oriented than agri-environmental schemes, which is able to combine a more sustainable and simultaneously profitable private production through structural interventions; b) pro-active participation of private investors, either firms or civil society. WILD partly meets the remit for a) and the involvement of Thames Water, in combination with CSF and FWAGSW fulfils point b) as both private and public money is involved. According to Wunder (2005), in ICDPs the success of long term sustainable strategies is pursued through policy tools typical of structural policy: investment in environmental infrastructure and facilities, training, advice to farmers, etc.’ (p.25). Therefore WILD might also be described as a collective action-public/private partnership where the role of Agency is taken by a set of institutions/organisations, cooperation is more structured in a partnership of private-public nature. This is particularly true of the early PES project that was based on a catchment in the Upper Thames. The WILD project requires time to be focused less on regulation and more on dialogue, skills in facilitation rather than fish management or engineering and a heightened need for reputation amongst land managers.

The other key driver is the wider move across England to increase the communication and facilitation at the local catchment level, namely through the Catchment-Based Approach (CaBA), which has been introduced by Defra across all English catchments as the main approach to improving the quality of the water environment (Defra 2012). The key principles of CaBA are:

- Environmentally focused planning and management process for every catchment.
- Opportunity for local engagement for every waterbody, irrespective of presence of catchment partnerships.
- Catchment partnerships look at all ecosystem services connected to a healthy catchment, supporting WFD delivery.
- Catchment partnerships become integral to way WFD objectives are delivered.
- Other groups in catchments continue to operate at community scale or on a specific issue.

The WILD project has met the key principles of CaBA, for example:
- Through the appointment of 24 Farmer Guardians (covering over 12,638 ha (49%) of the WILD Project area) to act as key contacts in the discussions between farmers, the EA, NE and Thames Water.
- Over 450 farmers engaged in sustainable pesticide management across the Upper Thames catchment in collaboration with Thames Water and covering 23,705 Ha.
- Over 1,500 ha of land entered into AES in 2016 with a further 3,000 ha planned for 2016. Across the WILD project area.

**Social Return on Investment exercise**

Given the extensive list of delivery partners and stakeholders (see Figure 2) one aspect of the in-depth CS analysis of ancillary economic and social benefits was to focus efforts on involving the main stakeholder groups in a Social Return On Investment (SROI) analysis through the following activities:

- Delivery partners took part in a half day SROI workshop to identify and prioritise project outcomes and to consider the other drivers affecting these outcomes.
- The Farmer Guardians group completed a short survey on WILD outcomes during an evening social event. Other farmers were contacted via a short on-line survey.
- Local government, parish council and agency staff were briefed about the SROI exercise at flood action meeting in Cirencester. They were then asked to complete a short survey on line or hardcopy.
- In depth interviews were held with key informants from the EA and Natural England.

The people selected to take part in the research were central to the delivery and development of WILD and therefore knowledge about the issues involved. The SROI approach draws on resources developed by Social Value UK (2015), who note that SROI is “built on well-established evaluation approaches and on health and environmental economics... and focuses on answering five key questions”:

1. Who/what changes? – with particular reference to the ESBOs
2. How do they change?
3. How do you know they have changed?
4. How much is down to the WILD project?
5. How important are the changes?

Through the SROI process this evaluation was able to assess further the physical benefits from the WILD project, the first aspect considered the specific environmental outcomes of the WILD project, which largely centred on the delivery of good ecological status as defined by WFD. Because WILD is a 3-year project, it is unsurprising that there has been only limited progress toward the overall goal of good ecological status in priority water bodies. In this situation, it is useful to assess progress towards achieving intermediate outcomes that should assist in achieving good ecological status and secondary outcomes (other benefits of the project). These expected physical and environmental outcomes were codified into a set of ‘outcome statements’ during the course of a SROI exercise with the WILD Delivery Partners.
In total eight aspects were considered:

- Improved (wildlife) habitat (in & around rivers/streams).
- Improved habitat (overall).
- Less pollution from sewage overflow (foul infrastructure).
- Less pollution from residential cess pits.
- Less pollution from farmland (diffuse).
- Less pollution from farm structures e.g. slurry pits etc.
- Reduced flood risk/impact.
- Better soil ecology and structure.

The project’s success in achieving these outcomes was assessed, based on results from discussions and reported in surveys and interviews with a number of farmers and landowners (12), as well as local government and agency staff and the delivery partners (10) (See Appendix 3 for full list). Reported environmental outcomes are summarised in Table 5 below. Responses are reported separately for the farmer/landowner respondents (farm) and for local government/agency respondents (LG/A). Responses are reported as a percentage of all respondents who answered that question, by row.

Table 3: Reported Physical and Environmental Outcomes from WILD

<table>
<thead>
<tr>
<th></th>
<th>Don’t Know</th>
<th>No significant effect</th>
<th>Some improvement</th>
<th>Major improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved (wildlife) habitat (in &amp; around rivers/streams)</td>
<td>11%</td>
<td>11%</td>
<td>67%</td>
<td>11%</td>
</tr>
<tr>
<td>Improved habitat (overall)</td>
<td>11%</td>
<td>11%</td>
<td>67%</td>
<td>11%</td>
</tr>
<tr>
<td>Less pollution from sewage overflow (foul infrastructure)</td>
<td>57%</td>
<td>29%</td>
<td>14%</td>
<td>0%</td>
</tr>
<tr>
<td>Less pollution from residential cess pits</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Less pollution from farmland (diffuse)</td>
<td>14%</td>
<td>0%</td>
<td>57%</td>
<td>29%</td>
</tr>
<tr>
<td>Less pollution from farm structures e.g. slurry pits etc.</td>
<td>29%</td>
<td>0%</td>
<td>57%</td>
<td>14%</td>
</tr>
<tr>
<td>Reduced flood risk/impact</td>
<td>29%</td>
<td>0%</td>
<td>71%</td>
<td>13%</td>
</tr>
<tr>
<td>Better soil ecology and structure</td>
<td>14%</td>
<td>14%</td>
<td>29%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Note: “Farm” denotes responses by farmers and landowners, “LG/A” – responses by local government and agency staff.
The main findings from the SROI Table 5 are summarised as follows:

- The majority of farmer/landowner respondents were positive about the impact of WILD on most physical and environmental outcomes. 67% of farmers and 88% of local government/agency staff reported that there had been “some improvement” in (wildlife) habitat in and around rivers/streams.
- Farmer respondents also reported “some improvement” for less diffuse pollution from farmland (57%), less pollution from farm structures e.g. slurry pits (57%), reduced flood risk/impact (71%) and better soil ecology and structure (57%).
- Many respondents “don’t know” whether some outcomes have occurred. For example, all farmer respondents stated that they did not know whether there was less pollution from residential cess pits and 57% did not know whether there was less pollution from sewage overflow. Many local government/agency representatives responded that they did not know whether there was less pollution from farm structures or other sources or better soil ecology and structure.
- The high proportion of respondents selecting “don’t know” is unsurprising and may lend more confidence to the other reported results since it suggests that respondents who did not know, selected this option rather than guessing.

2.4 Ancillary economic and social benefits provided ‘on the back’ of ESBOs

The ILD framework used in the WILD project is expected to provide social and networking benefits to communities through improved connection with and understanding of the local environment and communities enabled, inspired and more proactive in taking action. WILD’s expected/intended social outcomes were codified into the following set of outcome statements during the course of a SROI exercise with the WILD Delivery Partners as follows:

1. Communities value local knowledge more highly than before.
2. Communities value expert knowledge more highly.
3. Communities have a better understanding of the local environment.
4. Communities are better connected with the local environment.
5. Communities have a wider range of useful connections with other organisations and agencies.
6. Community groups, agencies and organisations trust each other more than before.
7. Communities are enabled and inspired and more likely to take action.
8. Communities have taken more action to improve the local environment.

Reported social outcomes are summarised in Table 6. Responses are reported separately for the 12 farmer/landowner respondents (farm) and for 10 local government/agency respondents (LG/A). Responses are reported as a percentage of all respondents who answered that question, by row.

The main findings arising from Table 6 are:

- The majority of respondents reported some increase or a large increase for all social outcomes. All respondents reported that communities value local and expert
knowledge more and that they were enabled and inspired and more likely to take action. Around 90% of respondents reported that communities have a better understanding of the local environment, are better connected with the local environment, have a wider range of useful connections and stakeholders trust each other more (excluding ‘don’t knows’);

- 75% of farmer/landowner respondents and 43% of local government/agency respondents, reported that there had been some increase in communities taking action to improve the environment. Most respondents would agree that there has not been a large increase in social action.

- There are some clear differences of opinions on whether some social outcomes have occurred – for example 56% of farmers suggest there has been a large increase in the extent to which communities value expert knowledge. Only 25% of local government/agency respondents shared this view and 38% did not know.

- Few respondents reported “no change” although it should be noted that some of the “no change” responses were from a key informant with a good knowledge of project outcomes; they observed that “there was no change in the number of connections with other organisations and that it was too early to say whether “community groups agencies and organisations trust each other more than before”.

Table 4: Reported Social Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Don’t Know</th>
<th>No Change</th>
<th>Some Increase</th>
<th>Large Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Farm</td>
<td>LG/A</td>
<td>Farm</td>
<td>LG/A</td>
</tr>
<tr>
<td>Communities value local knowledge more</td>
<td>11%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Communities value expert knowledge more</td>
<td>11%</td>
<td>38%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Communities have a better understanding of the local environment</td>
<td>25%</td>
<td>29%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Communities are better connected with the local environment</td>
<td>13%</td>
<td>25%</td>
<td>0%</td>
<td>13%</td>
</tr>
<tr>
<td>Communities have a wider range of useful connections with other organisations and agencies</td>
<td>25%</td>
<td>14%</td>
<td>0%</td>
<td>14%</td>
</tr>
<tr>
<td>Community groups agencies and organisations trust each other more than before</td>
<td>11%</td>
<td>25%</td>
<td>0%</td>
<td>13%</td>
</tr>
<tr>
<td>Communities are enabled and inspired and more likely to take action</td>
<td>11%</td>
<td>25%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Communities have taken more action to improve the local environment</td>
<td>25%</td>
<td>29%</td>
<td>0%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Note: “Farm” denotes responses by farmers and landowners, “LG/A” – responses by local government and agency staff. Green colour scale highlights cell values from 0% (no colour) through to 75% (dark green).
Based on the survey responses and detailed discussions with some key informants, it is suggested that WILD has been successful at building foundations that can enable an increase in community action. It is probably too early to be able to judge the extent to which increased community action has occurred and the degree to which any increase is sustainable.

Phelps et al. (2016) identified several key areas of development within the Upper Thames Catchment Partnership (UTCP), which includes the WILD project and the PES Pilot, which are relevant to issues of sustainable growth. The report states:

- Communication is critical within a catchment project so that every parish/ward is able to take local action at the same time to benefit up and down stream.
- Essential water body/water flow and issue mapping linked to Neighbourhood Development Planning has been encouraged through the River Management Plans, which draw up the detail of local issues. These can then be linked with the significant investment associated with flood defence structures.
- Infrastructure management, such as highway verges, is of high importance to divert flow away from town centres to help underpin sustainable growth and contribute to better flood resilience. This is highlighted in the River Management Plans.
- The private sector, such as Water companies, using local advisors and facilitators, can work directly with farmers to protect water quality. This could be extended to other sectors such as gravel extraction.

WILD and its partners recognize that development growth needs to be built on a sustainable environmental platform, to reduce the risk of future economic impacts of issues such as flooding and the potential loss or contamination of essential resources of water and soil. Funding for communities to develop Neighbourhood Development Plans\(^3\) enables the integration of sustainable growth, environmental delivery, health and wellbeing at a local level while delivering multiple strategies for public benefit. WILD has helped show how this is possible through the River Management Plans and by using GRCC to work with communities. Local Enterprise Partnerships\(^4\) should be more closely assisted by Local Nature Partnerships\(^5\), (supported by the Catchment Partnerships, Nature Improvement Areas and Protected Landscapes) to underpin long term economic growth by coordinating the restoration of the built infrastructure and natural environment.

Cases studies in the UTCP show that growth is currently being slowed or halted in some communities due to lack of capacity in sewage infrastructure. Water company asset management teams are working hard to identify issues affecting capacity but it can be difficult for them to keep pace with development. Our findings support the view that strategies for sustainable economic growth are more likely to be successful if they include plans for restoring the natural environment.

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\(^3\) Neighbourhood Development Plans can be prepared by parish and town councils (the smallest local government institution) that set out policies and plans for that area. These feed into the Local Plan for the District.

\(^4\) Local Enterprise Partnerships are voluntary partnerships between local authorities and businesses set up in 2011 by the Department for Business, Innovation and Skills to help determine local economic priorities and lead economic growth and job creation within the local area.

\(^5\) Local Nature Partnerships are partnerships of a broad range of influential organisations, businesses and people, and from a range of sectors, charged by government with the task of bring about improvements in their local natural environment in England.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

environment. This integration of economic and environmental objectives is a characteristic of the local delivery framework.

3 Shifting societal norms, collective learning and voluntary actions

From 2014 to 2016, surveys have been undertaken to evaluate the effect of the WILD project, its outcomes, the key issues and the perspectives. Partners, farmers, land managers and parish representatives participated in workshops and interviews, providing some evidence of shifting the societal ‘norms’ and improved community engagement over the course of the project. The respondents of the first survey\(^6\) (2015) felt the project was well coordinated, with good information sharing and communication, leading to stronger relationships and dialogue. The topics of concerns were quite similar for farmers and for parish representatives (flooding, development and diffuse pollution, wildlife) and both groups felt that they had improved their knowledge and awareness. Parish representatives agreed that they had gained a better understanding of their local water environment and that good ditch vegetation management can benefit water quality.

One priority of the project from the start has been to visit farmers to help them improve their management practices. One of the project targets was for 100% of land managers to be contacted during the course of the project. This required about 50 new farm visits each year over 3 years to discuss crops and soil management, compliance and regulations. WILD project activities were based around practical delivery of WFD through activities based around cross compliance, greening and agri-environment scheme (AES) priorities. The emphasis was on helping farmers fully understand and implement these measures on their farms.

Farmer interviews were conducted in 2014-2015 (11 interviews) and in 2016 (10 interviews), some were interviewed twice but overall 16 farmers were interviewed out of a population of about 140. Analysis of these interviews suggests that the WILD project has improved environmental knowledge and awareness within the farming community and among land managers, or has broadened and expanded areas of existing knowledge (All but one % of interviewees in 2016 felt the project increased their environmental knowledge).

“I am more aware about what is in the river... Lots of farmers are not interested in this side, only in what directly affects them. Hearing people talk about the ecology, fish, gravel etc. has had the greatest impact.” – Interviewee 1 (2015)

“I like to think I have a good environmental awareness anyway, but I suppose it has helped improve my awareness of black poplar particularly.” – Interviewee 8 (2015)

The ILD approach has been preferred to traditional regulatory and compliance-based approaches. This is due to a perceived reduction in paperwork, and the flexible approach taken by the WILD project was clearly seen as a favourable outcome for engaged farmers that would help them to take positive environmental actions. Farmers appreciate being involved with the

\(^6\) A total of 20 respondents replied to the survey, break down for each survey.
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814

project from the start and most of them think the tasks implemented through WILD are realistic and appropriate. Discussions between WILD project staff and farmers suggests that the main areas where improvements and new practices can emerge, are in ditch management, AES, biodiversity and wildlife enhancement. Overall there was evidence of behaviour change and farmers were found to have embraced a number of different techniques and approaches that can lead to improved environmental outcomes. This suggests that for some environmental behaviour is now embedded in their farming practice.

As well as the improved environmental practices detailed above, social improvement can be attributed to WILD. The social value change resulting from the project was investigated in the third survey (2016). Survey findings suggest that the project helped to develop local network, accountability and responsibility. Local small scale works have been undertaken with participation of parishes, private landowners and volunteers together. Communication between different local stakeholders was also reported to have improved in the last three years. There was a wide acceptance that through WILD the farmers felt a wider collective connection to the farming community and to some extent the local community.

“Yes, it has brought farmers together in the area. Farmers are very willing to become involved, now that the project exists and the word is being spread by farmers/land managers already involved.” Interviewee 10 – 2016

Positive feedback from communities and from farmers suggests that the project enabled communities to take positive environmental action, increased the awareness of stakeholders and improved the communication between them.

The WILD project enabled a higher level of facilitation and advice to occur across the project area and beyond. In total 298 farm visits were made over 3 years covering 118 farms/estates with a land area of 22,692ha, 87% of the project area. This represents nearly all productive agricultural land within the project area (and includes the holding areas where they extended out of the project area). The type of advice is shown in Table 7 below.

Table 7: Farm Visits conducted during WILD project.

<table>
<thead>
<tr>
<th>Holding</th>
<th>Ha</th>
<th>WILD Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essex 2 Farms 216</td>
<td>3750</td>
<td>298</td>
</tr>
<tr>
<td>Total 118</td>
<td>22492</td>
<td>969</td>
</tr>
</tbody>
</table>

(Source: FWAGSW)

Other related initiatives include the appointment of 24 Farmer Guardians, volunteer farmers each representing a different geographical area and responsible for communication with other farmers and landowners in that area, covering over 12,638ha of Upper Thames in wider WILD Project area. Farmer Guardians are key contacts in the discussions between farmers and the EA with a responsibility to cascade information concerning CSF and other aspects as well as translating the latest data on water quality. They are also used by Natural England and Thames Water. Through work with Thames Water 461 farmers are engaged in sustainable
pesticide management in the Cole, Ampney Brook, Meysey Brook, Lydiard Brook and Ray and lower Churn covering 23,705ha.

The closer working relationship with farmers and landowners has enabled a high uptake of agri-environment schemes but additional work, such as river clearance and fencing, has also been undertaken. There is also the benefit of increased awareness of the role and remit of all the organisations involved in managing the water environment as shown by the outstanding and growing volunteer contribution. Bringing multiple stakeholders together has developed a greater understanding amongst NGOs and agencies of the benefits of an integrated approach to deliver at the catchment scale.

The involvement of communities, alongside the agricultural advice and the focus on biodiversity, had a clear impact as shown in Figure 3 (p11) because all communities except one engaged as part of parish planning process. The level of volunteer activity has also been noted as being significant. Three parishes are now linking the River Management Plan they received to their Neighbourhood Plans.

4 Mechanisms, (collective) actions and governance arrangements to enhance the level of ESBO provision

4.1 Organisational capacities, leadership, networking and communication

Using the approach outlined in the WP3 report ‘the criteria ... have been reviewed and expanded to better explain the different forms that collective action can take. Four types of actions are identified, as follows: a) individual action; b) collective action-public policy driven; c) collective action-private actors driven; d) collective action-public/private partnership driven.’ In this case WILD is type d) collective action-public/private partnership driven with the involvement of public bodies (the EA, Natural England, public-orientated NGOs (FWAGSW, GRCC and CWPT) and private partnership (Thames Water and local farming businesses).

As outlined in Section 2, the WILD Project has three main delivery partners (FWAGSW, GRCC and the CWPT) and one key funding partner EA. EA is an executive non-departmental public body, sponsored by the Department for Environment, Food & Rural Affairs. Within England EA is responsible for: regulating major industry and waste; treatment of contaminated land; water quality and resources; fisheries; inland river, estuary and harbour navigations; and conservation and ecology. The EA is also responsible for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea. NE is an executive non-departmental public body, by the Department for Environment, Food & Rural Affairs. FWAGSW is a registered charity representing the region's farmers and landowners in the delivery of wildlife conservation. FWAG was first established as a charity in the 1960s by a group of forward thinking farmers who saw that the environment was an important part of a successful farming business. GRCC is a Charitable Company Limited by Guarantee, established in 1923. GRCC is part of a network of 38 Rural Community Councils across England and is a member of ACRE (the national umbrella for RCCs). The Cotswold Water Park is an area of 40 square miles, with more than 150 lakes, set across the countryside of Wiltshire, Gloucestershire and West Oxfordshire. Formed in 1996 as
the Cotswold Water Park Society, and now known as the CWPT, have been a fully registered charity since April 2011.

Each delivery partner takes responsibility for different aspects of the project but no partner works on their own. The high-level leadership is provided by the EA in terms of meeting WFD objectives and encouraging the wider scope of WILD. The senior facilitator in FWAGSW provides the project leadership and uses the ILD approach to promote a strong collective action and social network approach. All of the delivery and funding partners contribute to the running of the project. There are quarterly meetings where progress and work plans are discussed. An integrated reporting framework was devised halfway through the project to prevent the work-streams being presented in parallel and to encourage integration of task preparation as well as delivery (See Appendix 3).

All delivery partners in WILD work with existing administrative arrangements bringing opportunities to develop projects of multiple benefit together at a local level. GRCC and FWAGSW have worked in combination with local communities to enable them take steps to mitigate against flooding whilst at the same time improving water quality, bringing benefits to the environment and increasing the health and the wellbeing of the diverse range of volunteers. A key part of this approach is the preparation of River Management Plans for each community. These were delivered at the end of Phase 1 and brought together the various activities and discussions into one plan, how the plan is implemented will be a key area of examination in the second phase of the WILD project (See Appendix 4).

Through a series of meetings the WILD project delivery partners highlighted a clear need for more joined up thinking at the local level in order to reduce overlap, duplication and single issue delivery by different institutions and agencies. This was supported by the which had identified a key issue concerning ‘multiple voices’ sending mixed messages concerning the water environment and how to tackle issues such as ditch clearance and improving habitats. As a result of this the UTCP, WILD delivery partners and the CSF initiative worked closely together and used the UTCP as the collective steering group. Critical to this process is the presence of a specialist facilitator, provided by FWAGSW who is the lead partner in the WILD project and coordinates the UTCP. This has enabled the application of a similar process of local integrated delivery to each water body linked to WFD failures. Through individual catchment and local meetings there is a process by which farm businesses and communities can reconnect and engage with national organisations like the EA, NE and the Highways England, who are plan and maintain the major road network, regarding common issues. The involvement of local communities involves the specialist local rural development agency, the GRCC who help rural communities in developing and delivering cross cutting environmentally sustainable parish and local plans. In this sense the project connects up the policy landscape through contact with local authorities, those with statutory responsibilities and farmers and communities across the catchment (see Figure 2).

The presence of the CCRI, a research centre based in the local university, within the core project team was a deliberate move to help the delivery of a complex project. The remit for CCRI related to a rolling evaluation and the implementation of the ILD framework. The lead for CCRI attended the quarterly board meeting and met with delivery staff at other ad hoc meetings.
During these meetings various challenges and issues relating to the project were discussed. At agreed stages the CCRI undertook a selection of interviews with the various participants (farmers, local communities and key stakeholders) and an early finding concerned communication and the need for a coherent approach to emails and managing expectations. Overall the input from the CCRI was able to help develop the approach to networking, communication and leadership within the project team and for them to share knowledge with each other.

4.2 Innovative governance arrangements and mechanisms supporting ESBO provision

WILD is replicating the shift from a sectoral based approach covering flooding, drinking water, abstraction and irrigation quality towards one that is taking ‘an integrated approach that covers many disciplines’ such as spatial planning, ecology, hydrology and water management (Rijke et al., 2012, p.369). Increased integration around the governance of water resources has coincided with a heightened awareness of the various goods and services that ecosystems provide to society (Fish 2011). Key elements include the provision of clean water and the regulation of water flow and these were identified in the Millennium Ecosystem Assessment (MEA 2005) and the UK by the National Ecosystem Assessment (NEA) (NEA 2012 and 2014). The UK NEA also highlighted the need for a systems approach, which has in turn influenced the development of the Catchment-Based Approach (CaBA) (Defra 2012). Both are frameworks that reveal the shift towards a territorial or place-based approach, which seeks to recognise the links between the ecosystems and society (MEA, 2005).

Blackstock et al (2014) sought to identify good practice in collaborative catchment management and concluded that relationships and procedural aspects were key. Within WILD the relationships across the partners is strong but because the delivery partners are NGOs rather than agencies the procedural processes are less well developed. However, there is a preference for using existing processes and procedures in order to reduce duplication and to embed a wider acceptance of integrated local delivery. Bissett et al (2009), go on to identify three overarching principles for good practice in catchment management:

- Integration – where common issues, objectives, types of information or stakeholders in a catchment are identified and involved so multiple goals can be achieved.
- Collaboration – where different stakeholders work together to agree actions and achieve goals.
- Adaptation – where the planning process can anticipate, accommodate and respond to change.

The table below shows the areas within WILD that link to these three areas.
Table 5: WILD project activities by key integrated catchment management principles

<table>
<thead>
<tr>
<th>Principle</th>
<th>Activities and actions in WILD project</th>
</tr>
</thead>
</table>
| Integration | • Sharing partnership across government programmes.  
              • Integrated reporting approach within project.  
              • Tasks shared across all partners.  
              • Public, private and ‘in-kind’ funding integrated on the same mini-projects.                                                                                                                                               |
| Collaboration| • Mix of public and private partners working together.  
              • Actions agreed through stakeholder engagement and subsequent review.  
              • Strategic programmes linked by project delivery partners.                                                                                                                                                                |
| Adaptation  | • Problem-solving approach to challenges involving partners and stakeholders.  
              • Using existing structures where appropriate and making links between them.  
              • Disseminating latest data and making it relevant to local priorities.                                                                                                                                                       |

While the ILD approach and framework has been used since 2010 in a number of projects, the UTCP has been using it within a water catchment since 2011. The presence of a tried and tested framework is important in terms of transferability. ILD follows the same lines as co-management or adaptive governance. It is the delivery partners and the work practices related to the natural assets that change in ILD and it appears that the type of approach taken by the WILD project is well suited to catchment management and the type of ESBOs that are involved.

This recognises a different way of working when compared to conventional catchment management:

- Shared strategic vision, focused on outcomes integrating national and local drivers for improving the water environment.
- Sharing of information to understand the evidence in order to determine environmental priorities.
- Understanding the activities and partnerships concerned with sustainable management of the natural environment.
- Having regard for activities in adjacent catchments in the basin district.
- Ensuring comprehensive representation of issues by working collaboratively with appropriate stakeholders.

The WILD project fulfils all of these principles but goes further by combining the agricultural, biodiversity and local community aspects into a single project and process. The ILD approach has been seen as a positive measure to improving water quality, flood risk and community engagement. One respondent in particular summarised the value of the ILD approach well:

“I am generally of the view that it is the individuals involved in the delivery, as much as the delivery model itself, which is crucial to a partnership project’s success.”
(WILD survey 2015)
“It’s a better approach as long as the right guidance and contacts are being given.” Indeed, “it has created a positive response from farmers, rather than a regulatory approach, which tends to make people keep quiet and worry that they may be in breach [of regulations].” (WILD survey 2015)

The CCRI was a partner in the development of the ILD approach (Short et al 2010) as this met the institute’s mission of developing robust research and implementing it in practice. As described in the previous section the CCRI had a defined role within the WILD project as a ‘constructive friend’ who helped the delivery partners meet the objectives of the WILD project. In terms of governance the CCRI fulfilled an enabling role for the project and attempted to evaluate the impact of this innovative project. There were 2 key areas of activity, the first was to ensure that the delivery partners acted in an integrated way and this was helped through the development of an integrated reporting strategy (see Appendix 3) so activity was recorded on a place-basis rather than by issue. The second was to record the benefits of the ILD approach and project as a whole in meeting multiple objectives. The later proved particularly difficult as it was challenging to make a specific causal link that WILD was responsible for changes that occurred. However, the use of the SROI approach has helped indicate the direction of change and to highlight indicators which can be used in the follow-on project to record change.

The extension of the WILD project with a Phase 2 project confirms that the EA is satisfied with key ecological outputs achieved under WILD and signifies that further enhancement of ESBO provision is valuable and regarded by the EA as important. Nevertheless there remains an important aspect to consider, how can time limited projects like WILD make a measurable difference to long-term challenges such as those set out in WFD and the key ESBOs considered. Here it is important to note the social and behavioural changes highlighted by the SROI and the governance and institutional changes in the project area. The role of the UTCP is important and for this there needs to be some institutional stability as the partnership is relatively. With the partnerships established and the support given to local communities through the River Management Plans the EA seems to be confident that significant improvements in the water environment would be expected by 2021 and 2027, the next deadlines for WFD assessment.

4.3 The role and impact of policy in ESBO provision

The six ESBOs considered here include the four listed in the SES diagram plus two further ones that were considered important in the broad and shallow report (Short et al 2016), namely species and habitats and landscape character. The initial table shows the full range of policies operating at a variety of spatial scales; local, national and EU that impact on them. These are summarised in the table below with specific detail contained in Appendix 5.
Table 6: The different policies which influence the ESBO provision

<table>
<thead>
<tr>
<th>ESBOs Policies</th>
<th>Water Quality</th>
<th>Flood Protection</th>
<th>Rural Vitality</th>
<th>Species and habitats</th>
<th>Soil quality</th>
<th>Landscape character</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAP – Cross Compliance (GAEC &amp; SMR)</td>
<td>Good Agricultural &amp; Environmental Condition (GAEC) 1,2,3 SMR 1,10</td>
<td>Indirect benefit</td>
<td>Statutory Management Requirements (SMR) 2,SMR3</td>
<td>GAEC 4,5,6</td>
<td>GAEC 7</td>
<td></td>
</tr>
<tr>
<td>CAP Pillar 2 - Rural Development Programme England</td>
<td>Countryside Stewardship (AES)</td>
<td>Countryside Stewardship (AES)</td>
<td>Leader programme</td>
<td>Countryside Stewardship (AES)</td>
<td>Limited benefit from CS</td>
<td></td>
</tr>
<tr>
<td>Catchment Sensitive Farmers</td>
<td>Advice to farmers to reduce water pollution and receive CS grant</td>
<td>Indirect benefit</td>
<td>Advices and incentives to farmers to consider soil health issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water framework Directive (European Programme), European Structural Investment Funds and European Regional Development Funds</td>
<td>Set objectives for ecological and chemical quality in water bodies</td>
<td>Indirect benefit</td>
<td>Protection of native water species, management of invasive species</td>
<td>Regulation and inspection to reduce risk from sediment in rivers and other pollutants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National policies (e.g. Economic, Social and Environmental)</td>
<td>Heavily linked to WFD &amp; River Basin Management Plans.</td>
<td>National flood policy.</td>
<td>National conservation strategy</td>
<td>No national policy</td>
<td>National guidance through National Character Areas</td>
<td></td>
</tr>
<tr>
<td>Local policies</td>
<td>Water company strategy, local catchment partnership</td>
<td>Local Flood Risk Management Strategy, local catchment partnership, Local Flood Forums</td>
<td>Neighbourhood planning and Parish Plans, LEP support possible</td>
<td>No local policies, some local projects</td>
<td>No local policies, some local projects</td>
<td></td>
</tr>
</tbody>
</table>

The overall picture shows a complex policy landscape for the partners and stakeholders in the WILD project area. The key policy areas have a direct impact on water quality and species and habitats but a more indirect one on other areas. Both landscape character and rural vitality are more dependent on national and local policies. The next sections look at the ESBOs in more detail with supporting information in Appendix 5.
**Water Quality:**
There are many policies which can influence this ESBO (more details available in Appendix 5). The EU WFD, adopted in 2000, aims to protect water based on natural geographical formations such as river basins. It set out a precise timetable, with 2027 the final date for compliance. Under the WFD, Member States have to hold extensive consultations with the public and interested parties to identify the problems, appropriate solutions and their costs. These River Basin Management Plans which are revised on 4 yearly cycle.

Some regulations, such as the cross-compliance aspects of the CAP, are mandatory where the recipient is receiving the subsidy payments. Several cross-compliance requirements target water quality:

- GAEC 1: establishment of buffer strip along watercourses to protect them against pollution and run-off from agriculture;
- GAEC 2: water abstraction = need for a licence from the Environment Agency (EA) to take more than 20 cubic metres of water in a single day;
- GAEC 3: ground water = need for a permit from EA to be allowed to release substances which could harm* groundwater. Example of substance requiring a permit: pesticide washings, solvents, mineral oil, diesel, sewage, trade effluent and certain biocides;
- SMR1: is related with Nitrate Vulnerable Zone (NVZ) management under the Nitrates Directive; and
- SMR10: limits plant protection products to control the pesticide use, so indirectly avoid water pollution by chemicals.

The Rural Development Programme for England (RDPE) includes the protection of water and the environment, notably through the Countryside Stewardship (CS) agri-environment scheme. There are three main areas of activity under CS:

- Management of an existing feature (e.g. hedge, woodland, pond)
- Taking land out of production (arable reversion to grassland or heath, ground nesting bird plots)
- Adjusting land management (reducing chemical inputs, stopping inputs)

Under CS the priorities targeted by the scheme are publicly available. Within the WILD project area the local targets defined for the CS scheme (categorised as high, medium or low priority) are:

- High priority: water quality
- Medium priority: pesticides in surface water
- High priority: phosphates
- High or lower spatial priority: flood risk in woodlands (depending on the area)
The CS agri-environment programme includes some options that help meet the planned outcomes of the Catchment Sensitive Farming (CSF) programme, a policy initiative to help to improve water quality. Under the CSF programme, the Cotswold catchment was designated as a priority catchment between 2011 and 2015.

Where cross-compliance is adhered to closely there will be benefits to water quality, however the regulations do not cover extreme events. Voluntary schemes such as CS will make more difference as the actions are more specific. Most of the WILD project area is covered by AES schemes but much is under the previous scheme Environmental Stewardship and the basic ‘entry-level’ scheme where the benefits to ESBOs are less.

What is clear from this analysis is that there is potential for the protection and enhancement of these ESBOs through current policies. Given the poor status of some water bodies in the WILD study area there would be a question of compliance and enforcement. There are a number of other policies which might also be used to strengthen water quality.

**Flood protection**

In terms of land management, cross-compliance offers the potential to deliver baseline and best practice land management measures of the kind that can reduce flood run-off across catchments as a whole. Countryside Stewardship also supports flood protection and water management through grants and advice for farmers and land managers who wish to adopt a variety of natural flood management techniques, such as soil protection measures to reduce soil erosion and in-channels interventions to ‘slow the flow’.

At the national level, The Flood and Water Management Act, set up in 2010, provides for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges, and protects water supplies to the consumer. The powers for this as with Gloucestershire City Council (GCC) as the designated as the Lead Local Flood authority in WILD area and has to ensure the:

- investigation and report of flooding incidents
- management of flood risk from surface water, groundwater and ordinary watercourses (i.e. non main rivers). The mechanisms are decided locally but manly focus on engineering solutions.
- production of a local flood risk management strategy.
- works on ordinary water courses, largely ditch clearing but scope for more.
- works to maintain the flow on ordinary water courses. There is a duty to keep ordinary water courses clear so the water can drain downstream.

In addition, GCC has a responsibility for managing flood risk from the highway network and planning for emergencies. Under the same legislation GCC has produced and published Gloucestershire’s Local Flood Risk Management Strategy (LFRMS).
There is concern about the impact of development on flood protection and for this other EU and national legislation will need to be stronger. For example the Urban Waste Water Directive. There are examples in WILD where the good work of the project is being undermined by pollution from urban development. An integrated approach to local plans and a clear and transparent monitoring system is important.

**Rural vitality:**

In European terms the LEADER programme provides the strongest link to rural vitality with its emphasis on rural competitiveness and enterprise. LEADER is part of the Rural Development Programme for England (RDPE) and promotes project which boost the rural economy. Approximately £138m was available in England between 2015 and 2020 across England, however until recently there was no LEADER activity in the WILD project area.

A new LEADER group has been set up recently in the Cotswolds AONB covering a part of the WILD area but there has not been active collaboration between the partnerships yet, to consider how LEADER funding might support WILD.

Other areas of development would be national opportunities through the national economic strategy for economic growth and funds for local projects through the Local Enterprise Partnership. However these tend to avoid rural areas due to issues of double funding. The use of the River Management Plans in helping shape the Neighbourhood and Paich Plans is the most likely route that WILD can influence.

**Species and habitats**

The WILD project area is a key region for species and habitats protection, so many programmes for biodiversity are applied here. Biodiversity 2020 is the strategy for England aimed at tackling the decrease in native English species and provides a comprehensive picture of how international and EU commitments are implemented. Several granted European Protected Species are present in the area, especially bats and amphibians and many bird species (turtle dove, curlew, grey partridge, lapwing, redshank, snipe, and tree sparrow). Several grasslands in the area are registered as Priority Habitat Inventory, which means they have been identified as being the most threatened and requiring conservation action, as well as most of the parishes are classified as SSSIs (Minety, Cricklade, South Cerney, Lechlade on Tames etc.). Indirectly, the Water Framework Directive plays a role in protecting biodiversity in watercourses, ponds, rivers etc., by requiring the EA to take actions to protect the native water species and manage the invasive species. WFD also plays a role in biodiversity in watercourses, ponds, rivers and lakes by protecting the native water species and managing the invasive species.

The CAP cross compliance rules do impact on biodiversity through the statutory management requirements, ensuring that farmers uphold regulations targeting wildlife protection:

- **SMR 2:** Wild Birds: protect wild birds, their eggs, nests and habitat.
- **SMR 3:** Habitats and species: prohibit picking, collecting or destroying wild protected plants; destroying or damaging the special interest features of the area or disturbing any protected flora or fauna that are a special interest feature.
There are also a number of NGOs who monitor ‘key wildlife sites’ across the country and a number are found in the IWLD project area.

**Soil Quality**

Advice to farmers is available on soil protection although this is predominantly offered to farmers under cross compliance regulations. Many regulations aim to reduce the contamination of soil and water by nitrates and other pollutants, but also at monitoring the input use efficiency in the sector. These are translated into advice for farmers:

- **GAEC 4**: providing minimum soil cover by vegetative cover, cover crops like leguminous, stubble or crop residues etc., in order to minimize soil erosion.
- **GAEC 5**: Minimizing soil erosion by putting measures in place to limit soil and bankside erosion caused like cropping methods, livestock management and use of vehicles.
- **GAEC 6**: maintaining the level of organic matter in soils

In relation to soil protection, the CSF advice and grants policy aims to build relations with farmers and support them to consider soil health issues; encouraging farmers to implement measures relating to improving and retaining good soil structure, soil organic matter and soil biology; and working with industry and research organisations to develop new measures. It helps them to comply with cross-compliance conditions mentioned above and receive grants.

WILD has worked very hard to increase the knowledge and appreciation of soils because it is seen as a strong indicator of the health of the project area and healthier soils has an impact on flood protection, water quality and species and habitats. As a result a good deal of one-to-one advice and events have been offered to increase the knowledge base and the knowledge exchange of this area.

**Landscape character:**

Some cross-compliance rules are related to landscape protection and these are likely to be the most widespread across the WILD project area. The key ones are in GAEC 7:

- **7.a**: Boundaries (protection of boundaries features)
- **7.b**: Public Rights of Way (keep footpaths and other public paths open and accessible)
- **7.c**: Trees (rules about trimming or cutting trees)
- **7.d**: Sites of Special Scientific Interest (protection of sites with special flora, fauna, geological features)
- **7.e**: Ancient Monuments (protection of ancient monuments due to their archaeological or historic interest)
The AES scheme Countryside Stewardship focuses to a lesser extent on landscape provision as well, by providing financial incentives to keep the character of the countryside and preserving important features. Under the European Landscape Convention: Council of Europe, the UK is specifically bound to pursue its targets/goals as a signatory. The AES programme has funded some targeted facilitation and the Upper Thames Farmer Guardians initiative is funded through the CS Facilitation Fund. There is a link between key features of the landscape such as hedges and walls and ESBOs such as water quality and species and habitats. They provide variety in the wider countryside and offer a barrier for both flood protection and improving water quality.

This overview of the policy framework shows the complexity and interconnectedness of the WILD project. As has been made clear in other sections, the role of facilitation within WILD is central to the project. There are four key aspects that have determined its delivery; WILD:

1. is a key factor within the project, 'binding' element, and played a crucial role regarding communication, building networks and working relationships among partners, learning & knowledge transfer.
2. acted as enabler in the project implementation, bringing partners from different sectors and parts of society together.
3. has kept up the project momentum and ensured targets have been met.
4. is an innovative way to deliver WFD, trying to 'break' barriers between sectoral delivery and introduce an integrated (territorial) model to deliver the aims and objectives of strategic policy programmes relevant to the project area.

The quotations from the delivery partners reinforce these points:

'we all tried to build the trust and put in place mechanisms for delivery and the government policies are not fit for purpose in respect of these mechanisms; lots of things were not delivered because of the mechanisms that have not enabled us to do so. We ended up with people having a really good understanding of what they wanted to do (e.g. farmers, parishes, etc.) Now there is a need to create mechanism in policy to enable them to be delivered rather than constrained. There is need to change the policy. ' (PEGASUS/WILD workshop 2016)

'WILD is delivering multiple benefits- social, environmental and health, but delivering an integrated approach is difficult. (PEGASUS/WILD workshop 2016)

The collaborative working structure of the project was viewed as being very beneficial; it has opened up opportunities and shared experiences for all of those involved as these quotations reveal:

“There are different skills and knowledge amongst the partners and there are always issues with ensuring that the right, or best, person, is dealing with the most appropriate issues for their strengths.” (WILD surveys 2015)
“Strong joint knowledge base amongst the participating members with willingness to make decisions and carry them forward.”

The next section looks at the role of the private sector in ESBOP provision and related enabling factors.

4.4 The role of the private sector in ESBOP provision and enabling factors

The role of the private sector in WILD is mixed. On the positive side Thames Water (TW), the water company, is involved and has helped develop a PES type arrangement on some of the water bodies in the Upper Thames. On the negative side there has been very limited success in engaging the gravel extraction companies, largely because these are large multi-national companies with little in any connection to the local community and have a long-term approach agreed through the planning system. However, there is some dialogue between these companies and local communities. There is a far clear link and reasoning for Thames Water to become involved as water quality is a central concern for their business.

Since 2014 TW was embarked on a range of ambitious and innovative initiatives across the Thames River Basin, including the Upper Thames, in order to improve water quality through land management. This represents a significant expansion of work undertaken before 2014 and suggests that TW itself have an increased confidence that land management changes within river basin are able to deliver improvements to water quality that would negate the need for new or improved water treatment facilities.

Of particular interest in the Upper Thames catchment is the range of approaches used by TW in its workings with farmers and landowners on different water bodies. These include:

- Product substitution (replacing metaldehyde with Ferric Phosphate): Ampney Brook
- PES-type outcome payment to farmers for providing ‘clean-water’ catchments: Cole
- Funding for advice to and training for farmers: other areas of the Upper Thames.

The effectiveness of these different arrangements needs to be assessed from both a TW perspective and the levels of acceptance amongst the farming community and any wider impacts. It is not yet clear whether the economic mechanisms have worked but figures from 2016 suggest a mixed picture with significant levels of metaldehyde in one catchment but much lower levels in others. The most frequent justification for the initiatives with farmers and landowners concerns the requirement to reduce metaldehyde levels to acceptable levels enabling water to be abstracted for drinking in households across the river basin but at the same time controlling the impact of slugs on crop emergence.

The presence of different approaches represents an interesting blend of incentive and collaborative action on the part of the farming community, set within a national framework of regulation. Feedback from early discussions suggests these approaches have not eradicated the presence of metaldehyde from the rivers but levels have reduced and it is possible that residual amounts are being picked up from ditches and ponds.
TW recognise that there is significant interest in ‘nudging’ land managers towards environmentally friendly actions, and the role of outcome payments, advice or revised farming practices would all be able to assist here. The effectiveness of these approaches are likely to depend heavily on a good understanding of farmers’ willingness and ability to take up environmental activities and the influences on farmer behavioural change.

5 Potential pathways towards an enhanced provision of ESBOs

The first part of this sections looks at the impact of the WILD project on the ESBOs. Previous sections have noted that the environmental benefits have been difficult to determine due to the short time period and the difficulty in determining causality to any changes in the project area. In terms of social changes there is more evidence regarding the positive impact of WILD, notably around the area of behaviour change. The SROI exercise was also used to consider the impact of the WILD project but this time asking participants to consider the following questions:

- What would have happened without WILD project?
- Were the WILD project staff additional to or instead of existing levels of staffing?
- Or did EA funding allow FWAGSW, GRCC and CWTP to spend money on other things?

This exercise is looking to assess the impact of the WILD project in the context of the counterfactual e.g. “what would have happened without WILD?” WILD has been associated with increased funding for delivery partners and a set of inputs and outputs as detailed above. However, some of these things may have happened without WILD under a “business as usual” scenario. It should also be noted that a variety of approaches to improved catchment based management have been implemented in recent years. We are not aware of any empirical study that would allow assessment of the SROI WILD as compared to some of the other approaches and initiatives in other parts of the country. Respondents were asked for their personal assessment of the extent to which different groups of outcomes were attributable to WILD. It is unsurprising that respondents found this a hard question to answer and that the results are somewhat varied.

**Table 7: To what extent are outcomes attributable to WILD?**

<table>
<thead>
<tr>
<th></th>
<th>To some extent (some but not all outcomes would have happened anyway)</th>
<th>These outcomes would not have happened without WILD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community and parish outcomes</td>
<td>45%</td>
<td>55%</td>
</tr>
<tr>
<td>River works, biodiversity and habitat improvements</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>Farmer engagement</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Farm</th>
<th>LG/A</th>
<th>Farm</th>
<th>LG/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community and parish outcomes</td>
<td>75%</td>
<td>29%</td>
<td>25%</td>
<td>71%</td>
</tr>
<tr>
<td>River works, biodiversity and habitat improvements</td>
<td>33%</td>
<td>67%</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>Farmer engagement</td>
<td>50%</td>
<td>83%</td>
<td>50%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Note: One respondent who selected “don’t know” excluded
Overall, respondents were more or less evenly split as to whether community and parish outcomes and river works and habitat improvements were entirely attributable to WILD or “to some extent” attributable to WILD. No respondents selected “these outcomes would have happened anyway”. Respondents were less inclined to attribute all farmer engagement outcomes to WILD with 70% selecting “some but not all outcomes would have happened anyway”. However the more detailed breakdown shows an interesting variation with those directly involved more likely to say that it would not have happened without WILD. For example 71% of the local government and agency officers (LG/A) thought that the outcomes were down to WILD compared to 15% of farmers compared to 67% of farmers thinking the river works were down to WILD compared to 33% of LG/A. This suggests that those closest to the decision are more able to see the benefit of the project.

Some context for these results is provided by the in-depth interview of a key informant. This individual suggested that the majority of community and parish outcomes would not have happened without WILD. They based this conclusion on the fact that the WILD community and parish activities are largely unique to WILD. By contrast, a variety of approaches to river works, habitat improvements and farmer engagement are being implemented through nationwide policies; so some but not all of these activities may have happened anyway. However what the WILD provide was able to provide was a coordinated approach to the delivery of these national programmes using facilitation and knowledge exchange.

It should also be noted that the sampling and survey method adopted for this SROI exercise, may have led to some upward bias in the reported outcomes of WILD. The surveys were targeted at people who were known to be active participants in WILD. Amongst these, people with a very positive attitude to WILD may have been more likely to complete the survey. It has not been possible to assess all outputs that have been included in WILD project documents WILD. For example, 461 farmers are reported to be engaged in sustainable pesticide management under a Thames Water initiative. The extent to which this is attributable to WILD has not been assessed.

Overall preliminary findings in terms of impact:

- WILD has been successful at building foundations that can enable an increase in community action. It is probably too early to be able to judge the extent to which increased community action has occurred and the degree to which any increase is sustainable.
- WILD has been at least partly responsible for a range of positive environmental outcomes. In particular, there was widespread agreement amongst respondents that there has been some improvement in wildlife habitat in & around rivers/streams and overall. Also that there has been some reduction in diffuse pollution from farmland and that there has been some improvement in soil ecology and structure on farmland in the project area.
- These outputs and intermediate outcomes should eventually contribute towards achievement of the overall project aim of achieving Good Ecological Status in priority water bodies in the project area and in the enhanced provision of a range of ESBOs.
The second phase of funding secured for the period October 2016 to September 2019 covers the following objectives:

- Deliver Good Ecological Status (GES) by carrying out direct actions in water bodies in the WILD project area in line with the (draft) Upper Thames Catchment Management Plan using the ILD framework, achieving GES in top priority water bodies.
- Assist in creating a framework to address other negative drivers impacting on water quality in the medium (2021) and long term (2027) to achieve Good Ecological Status in all surface and ground water bodies in line with EU Directives.
- To embed and enable local delivery so that the protection of water quality becomes self-sustaining.
- To integrate and deliver the aims and objectives of partner’s strategic programmes relevant to the project area (selected waterbodies as set out in Appendix 6) using the ILD approach.
- To assess the effectiveness of the project to inform future funding programmes and decision making.

The revised objectives in Phase 2 recognise the focus on WFD and good ecological status but also the wider impact of WILD. The specific activities will remain targeted advice, catchment walkovers and knowledge exchange through facilitation and partnership working. The issue of transferability is specifically mentioned as an output for Phase 2. The diversity of funding sources will also spread the outputs but the richness of mixing both public funds from the EA and private sources (Thames Water) is itself an innovative approach. The community aspect of the project will aim to engage residents in improving the natural water environment; reducing flood risk; and helping to raise awareness of the water environment. Some of the effort will be assisting those communities involved in Phase 1 to embed the River Management Plans they received in 2016. A part of the CCRI’s revised role regarding monitoring and evaluation will be in the development of a set of indicators against which data will be collected to aid the development of a more robust approach to testing the impact of WILD project, both phase 1 and 2.

6 Suitability of the SES framework and ‘action-orientated approach’ in the analysis of ESBO provision

The SES framework is well suited to ‘action-orientated’ research as it allows an understanding to develop in an iterative way. It is essentially a way of seeing things and allows the analysis of inter- and intra-relationships between different stakeholders. As a result it helps in determining the quantity and quality of ESBO provision.

In a project such as WILD, where the ecological and social aspects are central to the aims of the project and closely linked the SES works well, but there is no need to bring them together as they are already joined. There was no need for adaptation of the basic template as the projects fits well. It is possible to see how the SES framework enables the integration of ecological and social aspects and thus provides a holistic viewpoint.
The issue of change over time is possible to include in the discussion and in the recognition that the WILD project is a placed-based project with a wide range on stakeholder interactions. It is for the WILD project team to determine the role of the SES framework in future decision making, but there is potential there. The SES terminology worked well and the diagram was well received. However the action situations needed to be more detailed and the diagram lacked the dynamic element of showing change and the benefits of the innovative approach implemented by WILD.

The ‘action-oriented’ approach is essentially a transdisciplinary approach as the different skills of the research team are matched by the range of knowledge held by the stakeholder partner. The research was co-designed and fulfilled a need within the WILD project team for the development of social benefit indicators, which were drafted in the SROI-style workshops. The behaviour change aspects need more refinement and this will be explored with the delivery partners and key stakeholders.

One key weakness of the SES framework was the inability of the diagram to record an area that the stakeholders didn’t or weren’t able to talk about. In the case of WILD this was the role of forestry. It was noted that forestry was not a key factor in terms of land area or in the provision of any of the key ESBOs. However, the potential of forestry was not able to be explored except in general terms.

7 Main conclusions derived from the Steps 3-4 analysis

7.1 Key findings on the particular SES and the provision of ESBOs

- Agriculture is integral to the provision of the ESBOs identified here, namely water quality, flood protection, soil protection, biodiversity and landscape character. It will be variable for rural vitality given the other social and economic ties in the project area, but the WILD project has helped raise the profile of rural vitality and the connection between the different ESBOs.

- Forestry is not a large component in this area, but there is scope for growth in terms of overall area and the management of existing areas. An increase in the forestry area and in the active management has the potential to increase water quality, flood protection and soil protection. There could also be benefits for species and habitats and landscape character in terms of greater diversity within the habitats and landscape mosaic.

- From a policy perspective the delivery of WFD is key but a wider range of policy has been included through the WILD project. The reason for this is specialist facilitation enabling biodiversity, drinking water, agricultural policy, landscape character and flood management priorities to be met at the same time as helping met WFD objectives.

- From an innovation perspective, the involvement of a water company (Thames Water) is positive and they see the benefit of joining a project with strong stakeholder engagement. This approach to catchment management is a new initiative for them and they are investing in Phase 2 of WILD, through with relatively modest levels of funding.
• There is greater appreciation of the ESBOs as a result of WILD amongst farmers, local communities and local authority staff. However, perhaps more important is the acceptance of the synergies between different ESBOs and how a co-management approach can help meet multiple objectives. Both delivery partners and the stakeholders involved see the social benefits of the project and recognise that the biodiversity benefits will take longer to materialise but they are confident that they will appear.

• The successful funding for Phase 2 of WILD will enable a greater area to be covered. The River Management Plans need to be embedded into community strategies and wider policy making. Within the next 3 years the local partnerships will need to be self-sustaining so that facilitation can occur on other parts of the catchment with a ‘lighter touch’ being required by the original WILD communities.

7.2 Key findings on governance arrangements and institutional frameworks

European policies in particular play a key role in water quality and other environmental issues in the WILD project areas. Regulations associated with cross-compliance and options available under the AES scheme Countryside Stewardship stimulate actions with goals that meet the objectives of the WILD project. For example, enhancing water quality, soil quality and flood protection. At a national scale, the Catchment Sensitive Farming helps farmers to comply with water management rules and directives through advice, knowledge exchange and capital grants. From a local community perspective a great deal of the focus is on flooding protection and a key task here is to ensure that a wider perspective covering both up and down stream so the wider impact of actions can be assessed. This would include the need to enhance areas of value to biodiversity and increase rural vitality.

Even if WILD project has the similar aims to international and national policies, it seems that farmers prefer the Integrated Local Delivery approach to the traditional regulations and compliance approaches. Farmers appreciate being involved with a project from the start and most of them think the tasks implemented through WILD are realistic and appropriate, and more tangible than European rules and directives. In this sense WILD appears to have translated the regulations into something tangible at the local level and as a result there is greater buy-in from the local stakeholders and participants. Where this has led to behaviour change this is likely to be longer lasting that compliance with regulations.

From an institutional perspective no new institutions structures were formed, all of the delivery partners were already active in the area and had strong local knowledge. The coordination is a key element as is the use of facilitation to enable local participants to make a more direct and active contributions to the provision and enhancement of key ESBOs. Figure 2 is the closest that the project comes to having an organisational chart. In order to roll out the ILD approach it would require the implementation and enforcement budgets of appropriate regulations to be devolved to the local level and shared amongst local delivery partners. Which regulations would depend on the local ESBOs and the priorities that would be best determined at a combination of the national and local level.

The involvement of the CCRI is another innovative aspect, its presence was to assist in enabling the delivery of the project not to lead or act as a knowledge source. The need for local
knowledge to be central meant that a low-key approach was taken and the role of ‘constructive friend’ in the rolling evaluation also meant that the project was able to respond quickly to the feedback from the participants and stakeholders. In part the presence of the local university gave confidence to both the local delivery partners and to the public agencies that were essentially less active in the area.

A key aspect to consider here is how time limited projects such as WILD make a measurable difference to long-term challenges such as those set out in WFD and the provision of ESBOs (water quality, soil protection and flood protection). In terms of flood protection an initiative would essentially be measured against the absence of flooding over a period long beyond the end of the project. Conversely water quality and soil protection would be expected to improve over a similar timescale. The only option is to use accepted measures of social and behavioural changes in order to provide security that over time the project will deliver. This requires further thought and deliberation although the WILD project would be able to suggest which indicators might be acceptable.

7.3 Other enabling or limiting factors

No other limiting factors were identified. The dynamic of ESBOs is complex but the key interactions has been examined in this report.

Of the 6 ESBOs considered here, most remain supported by public and sometimes private drivers. This is certainly true of flood protection, soil protection, biodiversity, rural vitality and landscape character. Only in the water quality ESBO where the water company involvement results in a dynamic between public and private. However there are acknowledged links between these ESBOs and TW are aware of this. They see this as a benefit as it will mean that they are not financially bound as the main other source of investment on water quality. Greater flood protection would also benefit private sector interest in terms of a reduction in days lost as a result of flooding and reduced impact on insurance premiums.

7.4 Contributions to EU strategic objectives

One of the challenges for WILD is providing concrete evidence of the positive changes. One area that the PEGASUS project is helping in is the development of indicators so that the Phase 2 of the project can collect the right information to develop the case that projects such as WILD have a wider and significant positive impact that can be clear seen from a range of perspectives rather than just relying on the social and behavioural benefits.

The Phelps et al (2016) paper does cover the issue of creating employment with a focus on the green economy and sustainable growth. However direct figures and firm evidence are extremely difficult to obtain as apportion causality in such situations to a project such as WILD would be almost impossible. The benefit to WILD to adjusting agricultural activity to benefit the water environment is clear and well made through the WILD project and national initiatives such as CSF. In order to reduce soil erosion more adjustment to land management might be required including an increase in woodland management and/or created. Also by increasing the species richness there is a wider benefit to pollinating insects and the ability of land to increase rainfall infiltration, which can reduce surface run off in high rainfall events.
7.5 Transferability of the approach/mechanism used

The transferability of the WILD project lies in the ILD framework which can be used on any area-orientated project. The approach is very similar to that used in other landscape-scale programmes and closely mirrors other approaches such as ‘community-based conservation’ (Berkes 2003), ‘co-management’ (Carlsson and Berkes 2005) and ‘adaptive management’ (Jacobson et al 2009). These start from the premise that conservation and community development can be simultaneously achieved. However, this requires shift in ecological thinking that recognises the social as part of the ecosystem and the need for participatory approaches to identify and integrate ‘traditional’ human activities into conservation management. The type of approach implement by WILD reflects the principles and process of co-management, as outlined by Carlsson and Berkes (2005), who outline this as ‘the result of extensive deliberation and negotiation’ - meaning it is very much a process rather than a pre-determined destination. The presences of the local university is an additional element that is easily replicated in other contexts and places provided the right approach is taken, that of a constructive and enabling ‘friend’ who assists with rather than leads the engagement and knowledge exchange.

The WILD project has taken a co-management approach and used a policy instrument like WFD to shift and embed changes in behaviour at the local level. In that sense the ILD framework is directly transferable, although well suit to projects based on natural systems such as catchments or easily defined landscapes it could work in a non-geographical context. The role of facilitation is central to the approach, with less time devoted to specific policy tasks and more on developing cross cutting solutions to a range of locally-identified issues.
8 References (including projects docs, evidence reports etc.)


Social Value UK (undated) Starting Out on Social Return on Investment www.socialvalueuk.org

9 ANNEX: Reflections on the case study methodology used

This section focusses on the action mandate and its implementation by the research teams. It provides an overview of the participatory process, and its outcomes. It has to be discussed with the actors whether and in which format this section can become published. It has to be available internally for the comparative analysis but could be removed before publication.

9.1 Objectives and activities undertaken with initiative/stakeholders

There are 6 cross cutting issues that are being taken forward in Steps 3&4, and will need discussing in relation to the research with the WILD project.

Table 8: Overview

<table>
<thead>
<tr>
<th>Cross cutting issue</th>
<th>Outline link to WILD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovative governance arrangements and mechanisms in support of Environmental and Social Beneficial Outcomes (ESBO) provision</td>
<td>High priority in WILD: a different approach was taken and a legacy is being determined. Need to consider the role of the EA in underpinning this and how the tasks and priorities are divided up of the tasks across the partnership. There are a number of interesting elements to explore further as it might be a transferable approach.</td>
</tr>
<tr>
<td>Organisational capacities, leadership, networking and communication</td>
<td>High priority in WILD: The networks are key as is the issue of communication. How much depends on the lead partner(s)? What are the roles and responsibilities across the wider partnership. There is a complex policy landscape in the WILD area and it would be good to see if the facilitation involved helped ease this complexity (or add to it).</td>
</tr>
<tr>
<td>Shifting societal norms, collective learning and voluntary actions</td>
<td>Medium priority in WILD: Some evidence for this from farmer and communities’ perspective. What role have they played and how far has the influence generated spread in to other areas of local governance and issues like rural vitality. The social aspects of WILD might be well explored here as well in terms of the volunteers and the links to health &amp; wellbeing. Could use Social Return on Investment for this.</td>
</tr>
<tr>
<td>The role and impact of policy in ESBO provision</td>
<td>High priority in WILD: Undertake a detailed analysis of the policies and strategies that WILD has engaged with, and to what extent the activities have helped meet these strategic objectives. The key ones are CAP pillar 1 &amp; 2, WFD, planning, drinking water regulations, flooding and biodiversity.</td>
</tr>
<tr>
<td>The role of the private sector in ESBO provision and enabling factors</td>
<td>Medium priority in WILD: The main one is Thames Water but there might be others too. The role of communities is key, potentially also the gravel companies.</td>
</tr>
<tr>
<td>Strengths and weaknesses of the SES framework in the analysis of the functional inter- and intra-relationships between farming and forestry and the provision of ESBOs</td>
<td>Low priority in WILD: WILD is a multi-objective project so if the SES framework works anywhere it should be here. Does it add anything to our understanding? Need to ensure forestry is clearly covered. Will it add anything to the current partnership is questionable</td>
</tr>
</tbody>
</table>

Social Return on Investment:

The challenges of the SROI approach were to overcome the difficulties in relation to the more traditional Cost Benefit Analysis (CBA) approach. The main benefits of the CBA that WILD were wanting to pick up would not be there. For example:
• It is too early to expect changes in water quality to be determined
• The reduced risk of flooding would also fall into this category.

There are also issues of what would have happened without the scheme in terms of activity and costs. What would the difference be in terms of outcome?

Despite collecting a great deal of information, which has been used in the evaluation thus far and could be quarried further we won't answer these. What might be more useful is looking at the Social Return on Investment — example from Social Value UK to determine the wider impacts and the types of indicators and associated information that can provide a robust evaluation framework.

Process
Further data collection and some interviews with key partners during October and November. A workshop with the delivery partners was held in November followed up by further engagement with stakeholders through a range of avenues related to their activity at the time. Responses are reported separately for the 12 farmer/landowner respondents and 10 local government/agency respondents.

The report was written during January.

9.2 Outcomes and further steps
The outcomes will feed into WILD 2, especially the development of the indicators of impact and the information collected will benefit the WILD project delivery and evaluation.

9.3 Supporting data and statistics
See Appendices.
10 Appendices

10.1 Appendix 1:
This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 633814
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10.2 Appendix 2: Changes in flood protection in 6 parishes since 2007

In 6 parishes of the project area, some improvements have been done concerning flooding protection. Here is the list of the parishes that have either work completed since 2007 or have work planned, or both:

- **Fairford**: In 2013 a flood defence scheme led by the Environment Agency was completed. The funding for the scheme was raised through a partnership between the Environment Agency Gloucestershire County Council and the Town Council. The scheme defends the residential areas at risk by using a clay bund, flow control, riverbank improvements, retaining walls and property level protection.

- **Lechlade**: Cotswold District Council (CDC) and Gloucestershire County Council (GCC) raised funding to carry out flood defence in the Downington area of Lechlade. That work commenced in 2013 and involved the construction of a flood diversion channel in the area of Green Farm, ditch maintenance along the ‘A’ road, ditch maintenance and flow diversions in the fields and ditches opposite the garden centre and highway drainage improvements. CDC plan to install flood relief culverts at the Downington roundabout area in the spring of 2016.

- **Poulton**: CDC has been in discussions with residents and Thames Water regarding persistent foul sewer flooding, surface water flooding and watercourse maintenance issues. During the winter of 2014, CDC plan to define a plan to alleviate surface water flooding. CDC will also be liaising with Thames Water to define a plan to eliminate the repeated foul sewer flooding experiences in parts of the village.
• **Siddington:** During the autumn of 2014, CDC has carried out extensive ditch clearance works on the ditches that were almost completely blocked. The ditches carry flow from the Watermoor area to Prescott Mill and also drain the area around the residential caravan park. CDC has also advised the owner of the sluices at Prescott Mill on how they should be operated during periods of high water level in the River Churn.

• **Somerford Keynes:** In 2013, CDC carried out work to remove a significant blockage on the ditch on Spratsgate Lane (Cokes Pit side) and also carried out work on an existing culvert and diversion at the junction of Spratsgate Lane and the “spine road”. During the summer of 2014, CDC worked with the DEFRA sponsored team at FWAG to carry out extensive culvert investigations and watercourse clearance at Water Lane, through Macks Farm and into the Lower Mill estate land. CDC are also liaising with local landowners to obtain consent to construct additional flood relief culverts on Spratsgate Lane and the spine road.

• **South Cerney:** In 2013, CDC carried out a repair to a collapsed culverted watercourse at Upper Up. That work was carried out with a contribution from Thames Water. In October 2014, CDC carried out work to clear obstructed culverts at the crossroads farm junction at Upper Up. The Environment Agency and Thames Water have also carried out works in the area including CCTV inspections of foul and combined sewers. Thames Water have commenced a programme of repairs and diversion works to the foul drainage system in the Station Road area. The Environment Agency plan to remove a large gravel deposit at the Fanshawe sluices. CDC are working with The Environment Agency and Thames Water to devise a plan to prevent flooding on Church Lane.
10.3 Appendix 3:

WILD Project - Upper Thames Catchment – Thames Churn to Coln - 1st January to 31st March 2016

Principle Parishes: Down Ampney; Latton; Castle Eaton, Kempsford, Inglesham, Lechlade

Parish datasets have been compiled from the raw action table; gaps filled and quality checked for **Down Ampney, Latton, Castle Eaton, Lechlade** and **Kempsford**. Parish Council representative from **Kempsford** attended the Upper Thames Catchment Partnership meeting in January. Datasets were available to be taken away to review and provide feedback. Representative from **Kempsford** hosted Cross Border Group meeting on 7th March 2016, also attended by **Castle Eaton** Parish Councillor. Discussion re gravel extraction; sharing updates, discussing current issues and possible cumulative impacts between the parishes of Kempsford, Down Ampney, Castle Eaton, Latton & Marston Meysey. Meeting attended by GRCC and FWAG to provide a project update and get feedback from parishes.

**Latton** – still no engagement from parish council with the project. Historically low engagement with Wiltshire counterpart; parish plan stalled and their main focus is on road noise issues on the A419. No parish representative at Cross Border Group meeting.

FWAG SW has focused in this quarter on the protection of 3.5 Km of the River Thames with the purchase of chestnut posts to permanently electric fence the river to protect it from bankside erosion from cattle. The Farmer Guardians of the Upper Thames Facilitation Fund Project has commenced with 13 farmers along the Thames now being part of the initiative, with three events being held in this quarter. An event for to update agents on new Cross Compliance, Greening, new Countryside Stewardship and Facilitation Fund was held at Manor Farm Down Ampney which was attended by 20 local agents. FWAG SW has also completed 871 Has of Mid-Tier application for Farmcare Ltd in this water body which has gone live in this quarter. This included 12m buffers along all main rivers and 4m on all ditches. Many other farmers are offering to enter Mid and Higher Tier agreements, but the Thames has not been prioritised as a high priority for water quality or for biodiversity so many of the farmers offering to create wetland under ‘Making Space for Water’ have been turned down as ineligible. This is a great shame and wasted opportunity.

This section of river is failing for water quality rather than ecology so was not a priority but it has had a walkover survey. Overall the river has a reasonable form still having some meandering although there were obvious lost meanders and straightened sections in some places. The river was largely quite open and the mature willow trees were largely of a same age so the river could benefit from some riverside tree planting to diversify species & age structure. The river has a large backwater so has been enhanced in the past but would still benefit from reconnecting with some of the relict channels and meanders along with wide buffers on field margins to allow the meander sequence to move freely and reconnection to the floodplain.
NFU Farmer Champions in this water body are signed up to the Facilitation Fund Farmer Guardians of the Upper Thames. This includes James Taylor of Farm Care Ltd; David Lewis Manor Farm Castle Eaton; David Sainsbury Castle Eaton; Bob Spackman Manor Farm Kempsford; James Arkel Kempsford and John Peel Dudgrove Farm. It also includes involvement from tenants Howard Ford, grazer and Charles Horton who has taken on pastoral land under HLS at Dudgrove. There is interest from the farmers on new Countryside Stewardship and restoration of habitats for Curlew. Extensive work was carried out to help make land in this waterbody eligibly for Higher Tier in 2016 converting 30Has of maize to wet grassland under option making space for water (SW12).

Support from the Upper Thames partnership has been evident in the proposal to enter Manor Farm Castle Eaton in to Higher Tier. Natural England were looking for evidence to enable the application to be progressed that will fund the conversion of arable land along the Thames to grassland. Due to high phosphate levels in soil samples the land was not eligible for grassland options for Higher Tier. FWAG SW proposed the SW12 Making Space for Water which required hydrological support from the Environment Agency, Swindon Borough Council and Wiltshire Council all of which has easily obtained through partner contacts. Wiltshire Records centre also provided species data on curlew and other protected species to help with eligibility into Higher Tier in 2016. Help was also received by local agents involved with the Upper Thames Protection Society.
Water with Integrated Local Delivery (WILD) Project

Rivers Management Plan for Down Ampney Parish

May 2016
10.4.1 Background to the Report

This report provides a brief ecological overview of the Ampney Brook for Down Ampney Parish as part of the WILD project. It sets out broad objectives for the ecological and environmental enhancement of these sections of river. The WILD project will issue similar reports to parishes covered by the project in order to provide relevant information for future works over and beyond the lifespan of the WILD project.

The Poulton Brook was not assessed extensively because at the time of survey there was no water present in the brook. Obviously while habitat enhancements could be made to improve the morphology or the brook regularly drying out each summer/autumn will always pose an overriding barrier to ecological improvement, consequently this report focuses on enhancement opportunities for the Ampney Brook.

10.4.2 Overview of the Ampney Brook

The Ampney Brook is a relatively small gravel bed river fed by a spring at Ampney Park and by the Winterwell Brook further north which is fed by a spring just west of the tiny village of Barnsely. This spring is on the edge of the Cotswold Hills so is fed by a groundwater rising from the Inferior Oolite Limestone thanks to a fault dissecting the valley.

As the name suggests the Winterwell is winterbourne and in the winter the large catchment of the Inferior Oolite supplies a very large amount of water to a relatively small channel, but in the summer a significant proportion of this water is lost due to its location on the permeable Great Oolite so the Ampney Brook is recognised from Ampney Park where it is further supplemented by another springs on its way to Ampney St Peter. From Ampney St Peter the river runs on gravel overlaying Oxford clay which can help retain some water during the summer compared to the local rivers whose gravel beds are connected to the underlying alluvial gravel.

From Ampney St Peter it runs in a generally southerly direction through the parishes of Driffield and Down Ampney where it is joined by the Poulton Brook and then on down through Latton where it meets the Thames.

10.4.3 Ampney & Poulton Brook 30300 (Source to Thames)

This waterbody from 2009 until 2012 was classified as Bad for it ecological status failing under the fish element of the assessment, but then in 2013 the status changed to good scoring good for all three elements fish, invertebrates and macrophytes although this was the first data set with macrophyte data included invertebrates have always scored high. In the new reporting cycle of 2015 the Ampney & Poulton Brooks have again achieved good ecological status.

During the year the brooks were failing this was considered to be due to barriers to fish movements and suspected to be due to seasonal lack of water and predation of fish eggs by signal crayfish.

See Appendix 4; Cycle 1 Waterbody Summary Report Ampney & Poulton Brook 30300
10.4.3.1 River Habitat Survey
The survey brooks within the parish of Down Ampney was conducted during September 2013 when water levels were relatively low. The Ampney Brook had low water levels but had some in-channel pools for fish to rest up in during these periods however the brook was very densely shaded by scrub from what was originally a field boundary hedgerow and fence. Since the land use had largely changed from dairy to arable the fence and hedgerow had not been maintained meaning the fence was falling into the river is some places and the hedgerow was now scrub casting very dense shade. As illustrated in the Photographs in Appendix 3 and the Environment Agency Riparian Shade Data which is viewable on the Rivers Trust Website.

http://maps.theriverstrust.org/

This dense shading meant there was very little aquatic and marginal vegetation in the brook and the river has been subject to extensive straightening meaning there was also limited in channel diversity but there is a small section of meandering still present next to the Folly woods. Similarly the Poulton Brook was also found to very straight and densely shaded but also lacking in any water during the survey period.

Both brooks are very straight with only the Ampney Brook having any natural river meandering form at the Folly woods, but this is 700m of meandering in a river that measures around 5km through the whole parish so only equates to about 14% of the total length of the river.

The Ampney Brook is overlarge and incised over most of its course but there was no obvious sign of dredging such as embankments. Instead it looks like a combination of the channel straightening coupled with the dense shading has facilitated the incision of the channel during spate conditions effective the river has scoured itself deeper and wider during the winter months over a period of decades if not longer. Consequently the river does suffer with low flows during the late summer and early autumn months.

10.4.3.2 Riparian land-use
Land use is largely arable for cereal crops with a small area of semi-improved pasture for sheep and cattle.

10.4.3.3 Stakeholders
The land is owned by two major land owners who employ land mangers to farm the land but there are a small number of individuals/residents who own small sections of the riparian land.

10.4.3.4 Flood management
Down Ampney village does not have significant fluvial flood risk from the Ampney and Poulton Brooks because it is slightly elevated. Although the land between the two brooks is liable to flood but there are no properties in this area apart from Charlham Farm which has no residents.

http://maps.environmentagency.gov.uk/wiby/
In terms of surface water flooding again the village is not at significant risk because the village is on slightly higher ground.

**10.4.3.5 Abstraction**

There are groundwater abstractions by Thames Water at Latton and at Meysey Hampton which is likely to affect the water levels of the brook particularly during the late summer and it is understood that the Environment Agency is frequently reviewing the terms of the abstraction permit in order to reduce the overall amount and seasonal period.

**10.4.3.6 Public access/Footpaths**

There is little public access to the brooks within the parish of Down Ampney with only one road and one public footpath crossing the Ampney Brook and one footpath crossing the Poulton Brook. Consequently the parishes has had little access to the brooks although the Cotswold Fly Fishers have recently (c18months ago) obtained the fishing rights to the brook.

**10.4.3.7 Industrial Heritage**

The land was once a huge network of water meadows which can easily be seen on historic maps and there are still the remains of weirs, hatches and additional branching channels along the Ampney Brook. Furthermore the ridge and furrow nature of the flood meadows is still apparent when looking at surface water drainage maps. It was probably this way of managing the land that lead to the extensive straightening of the channel.

**10.4.4 River Biodiversity Value**

The walkover survey was not a full ecological survey but notable species were recorded.

**10.4.4.1 Flora**

Most of the survey work was carried out during the autumn meaning it was not possible to record the full floral assemblage but species notes included

- Amphibious bistort *Polygonium amphibium*
- Banched Bur-reed *Sparganium angustifolium*
- Duckweed *Lema minor*
- Fool’s Water Cress *Apium nodiforum*
- Meadow sweet *Filipendula ulmaria*
- Reed Sweet Grass *Glyceria maxima*
- Water Crowfoot *Ranunculus spp*
- Water forget-me-not *Myosotis scorpiodes*
- Water mint *Mentha aquatica*
- Lesser water-parsnip *Berula erecta*
- Woody nightshade *Solanum dulcamara*
10.4.4.2 Fauna

Fish
Shoals of Dace from around 20 up to 50 individuals depending on the depth of the pool were noted and the odd Chub. Frequent sightings of Brown trout probably around 10 sighted through the Down Ampney Parish stretch and significant shoals of minnows or fry from around 100 to 400 with the odd Bullhead found under rocks.

Mammals
Although a detailed survey was not carried out frequent signs of Otter were recorded along this stretch of the river. There were no signs of Water Vole within the Down Ampney stretch of the Ampney Brook but that was not surprising as the dense shade inhibited marginal vegetation growth.

Birds
A number of riparian birds have been recorded on this section such as Grey Wagtail, Kingfisher, Heron but species more typical of pasture, hedgerows and woodland were more commonly noted including Robin, Chaffinch, and Wood Pigeon.

10.4.4.3 Main conclusions
Overall the Ampney Brook through Down Ampney parish is of significant ecological value and most of the river particularly suited Brown trout the gravel base forming the perfect camouflage for these fish, however it is significantly modified and would benefit from further works to restore a more natural form.

10.4.5 Future management options in order to increase biodiversity

Shade management
During the time of the survey there were significant sections (around 2.5km) with very dense willow/blackthorn/hawthorn scrub shading however since then in 2014/15 the land managers Farmcare took on the task of reducing this dense shading and the old fence which was falling in the river in places using a 360 excavator. The Cotswold Water Park Trust (CWPT) were also involved in reducing some tree shading and installing Large Woody Debris deflectors in the river. Since this extensive work was conducted the task of maintaining this is much more achievable without the requirement of large machinery and ideally the river vegetation should be maintained to cast around 70% dappled shade on the river.

Please refer to the Wild Project Ampney Brook Progress Report; Appendix 5

10.4.6 In channel enhancements
The Ampney Brook and Poulton Brook through the parish of Down Ampney is very straight with little meandering probably due to the modification of the river to create the flood meadows. The river has been enhanced in 2013/14 by installing Large Woody Debris (LWD) flow deflectors to diversify the flow of river please refer to the Wild Project Ampney Brook Progress Report; Appendix 5, for details.
While LWD can help restore a more varied and natural form to the river flow and in channel habitat but in an ideal scenario the river would be re-dug to create a fully meandering form. Obviously this level of restoration is expensive and generally not welcomed by land managers who prefer to manage straight field boundaries, however the Ampney Brook in Down Ampney is surrounded by land earmarked as a preferred site for minerals extraction in both the Gloucestershire and Wiltshire Minerals Local Plan.

The Ampney Brook actually forms the County and parish boundary between Down Ampney in Gloucestershire and Latton in Wiltshire. If the extraction of the gravel does take place in future years there would be a rare opportunity to restore the river to a meandering form as part of the restoration plan for the decommissioned quarry. This would obviously require both the relevant planning authority and the Environment Agency to ensure this is built into the final approved restoration plan.

### 10.4.7 Barriers to Fish Migration

There are 3 barriers/constraints to fish movements/migration on the Ampney Brook within the Down Ampney parish and another 2 in the form of Environment Agency gauging weirs sited at either end of the river both outside the Down Ampney parish boundary.

The three barriers to fish movements within the Down Ampney Parish are sited at Down Ampney house a large manor house in the village which has the river alongside its grounds boundary for around 500m. The first is a significant weir which looks like it was the base of a hatch that would be closed to drive water through a water wheel and into the Poulton Brook. See Photograph 6 in Appendix 3.

This poses a significant barrier and the CWPT have negotiated with the landowner and sought permission from the Environment Agency to cut a notch in this weir to allow fish passage all year and this work should go ahead in summer 2016 once water levels have receded. There are another two weirs but these have been constructed from cobble stones and concrete which has somewhat degraded so does not pose a major barrier as there are some gaps. The CWPT have permission from the Environment Agency to also modify these by removing a middle section but the landowner prefers to wait after the initial works to see if there are any adverse effects.

### 10.4.8 Connection with the Floodplain

Although the river probably did originally spill out over the flood plain before it was so incised and enlarged the gravel base of the brook and fields in the Down Ampney Parish area means that when the land floods (which is usually always does in the winter) this is more likely to be due to rising ground water rather than river flooding.

That said if sufficient resourcing was available the river would benefit greatly from being narrowed using faggots and replacing gravel that has been washed out the system, thereby increasing the frequency of it flooding and reconnecting it to the floodplain. This would retain more water and maintain flows during the summer and early autumn months improving the survival
of aquatic fauna. It could be achieved by creating a two stage channel (thereby retaining the current capacity) or by just making the river smaller so in the winter it floods more frequently according to the requirements of the surrounding land use be it the current arable or maximum biodiversity management post gravel extraction.

10.4.9 Impact of Climate Change

Over the next twenty to fifty years it is highly likely that climate change will have an impact on the Ampney Brook. In general terms it is predicted that winters will get warmer and wetter with more frequent storm events, while summers will generally get hotter and drier. This will result in more flooding events and more frequent drying up of the river during the summer.

This would suggest that future management practices should aim to allow significant parts of the river to flood out onto the surrounding land during winter where there is no risk to life or property. Management for low summer flows could be to create pools and wetland habitat in which species can survive the dry spell. The reinstatement of the original river channel would also be of benefit by increasing the winter capacity of river during high flow periods.

Management of flood waters in the headwaters of river catchments can reduce the impact upon human settlement further downstream, whilst improving the ecological value of the catchment headwaters. Careful thought and planning is required in order to achieve this.

Table 9: River Biodiversity Management Summary Table

<table>
<thead>
<tr>
<th>Issue</th>
<th>Implication</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straightening of channel</td>
<td>Reduces channel capacity and habitat diversity</td>
<td>Re-meander/restore original channel</td>
</tr>
<tr>
<td>Riverside tree planting</td>
<td>Open channels with no shading are likely to suffer from low oxygen levels</td>
<td>Plant suitable bank-side trees</td>
</tr>
<tr>
<td>Weirs</td>
<td>Barriers to fish migration</td>
<td>Remove/modify or install bypass channel to allow passage</td>
</tr>
<tr>
<td>Backwaters</td>
<td>Provides a calm refuge for fish during spate condition</td>
<td>Create new purpose built backwaters</td>
</tr>
</tbody>
</table>
10.4.10 Map Ampney Brook Recommendations, Down Ampney Parish

[Map of Ampney Brook Recommendations, Down Ampney Parish]

1/8th February 2016
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Down Ampney Parish
Recommendations for the Ampney Brook

[Map legend and details]
10.4.11 Map Down Ampney Parish Rivers
### 10.4.12 Species Recorded During Fieldwork

#### Table 10: Mammals recorded

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>Legal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Otter</td>
<td>UK &amp; CWP BAP</td>
<td>Full protection under the Wildlife &amp; Countryside Act</td>
</tr>
<tr>
<td>Water Vole</td>
<td>UK &amp; CWP BAP</td>
<td>Full protection under the Wildlife &amp; Countryside Act</td>
</tr>
</tbody>
</table>

#### Table 11: Birds Recorded

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black-headed Gull</td>
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</tr>
<tr>
<td>Blue tit,</td>
<td></td>
</tr>
<tr>
<td>Carrion Crow</td>
<td></td>
</tr>
<tr>
<td>Chaffinch</td>
<td></td>
</tr>
<tr>
<td>Dipper</td>
<td></td>
</tr>
<tr>
<td>Dunnock</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Fieldfare</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Goldfinch</td>
<td></td>
</tr>
<tr>
<td>Great tit</td>
<td></td>
</tr>
<tr>
<td>Greenfinch</td>
<td></td>
</tr>
<tr>
<td>Grey wagtail</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Heron</td>
<td></td>
</tr>
<tr>
<td>House Sparrow</td>
<td>Red listed</td>
</tr>
<tr>
<td>Kingfisher</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Long tailed tit</td>
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</tr>
<tr>
<td>Mallard</td>
<td></td>
</tr>
<tr>
<td>Moorhen</td>
<td></td>
</tr>
<tr>
<td>Pied wagtail</td>
<td></td>
</tr>
<tr>
<td>Redwing</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Snipe</td>
<td>Amber listed</td>
</tr>
<tr>
<td>Song thrush</td>
<td>Red listed</td>
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<tr>
<td>Wood Pigeon</td>
<td></td>
</tr>
<tr>
<td>Wren</td>
<td></td>
</tr>
</tbody>
</table>
For more information about species recorded locally referring to the National Biodiversity Network (NBN) gateway database available online is a useful tool. [https://data.nbn.org.uk/](https://data.nbn.org.uk/)

If more detailed data is required local records centre’s can be useful resources but there is often a charge for this data. Any proposed development will require an ecological survey to be conducted so there is often no need for communities to collate local information themselves.

**10.4.13 Photos of Ampney Brook within Down Ampney Parish taken September 2013**

Photo 1 taken in the southerly extent of the Down Ampney (to the right) and Latton Parish (to the left) parish looking upstream, the river can be seen to be suffering from seasonal low flows but the light is allowing the marginal vegetation to narrow the channel keeping some water. Also note old livestock fence about to fall into the river and field was grazed by beef cattle.
Photo 2 moving upstream this image illustrates the low water levels and dense tree shading from the eastern bank.

Photo 3 moving upstream with Bean Hay Copse to the right providing good shading with the river being very open to the left, the river is obviously straightened, incised and over-wide here.
Photo 4 moving further upstream this is the bridge south of the Grove woodland along a very well used footpath which links Down Ampney and Latton villages and provided one of the few viewing spots of the Ampney Brook for the villages. The worn bank at the bottom of the photo illustrates the popularity with people wanting to access the water.

Photo 5 taken at Down Ampney House viewing downstream the eastern bank is very manicured with little marginal vegetation while the other is more natural and one of the old cobble weirs can be seen in the channel.
Photo 6 still within the grounds of Down Ampney House this photo shows the remains of a waterwheel which looks like it was powered by forcing water out of the Ampney Brook using a hatch, passed the wheel and into the Poulton brook which then feeds back into the Ampney Brook after only a few metres.

Photo 7 taken just upstream of the village of Down Ampney the river here can be seen to be over wide and consequently suffering from low flows. Habitat value is poor with no variation in morphology, aquatic/marginal vegetation due to dense shade.
Photo 8 taken further upstream shading is becoming even more dense

Photo 9 taken approaching the Folly this photo illustrates how the dense shading has contributed to the channel incisionment by keeping banks unstable
Photo 10 taken within the Folly stretch there are frequent remains of extensive infrastructure which were probably used to direct water through the network of flood meadows.

Photo 11 taken at the most upstream extent of the river within the Down Ampney stretch the river is still very shaded but does benefit from a natural meandering form.
Photos of Poulton Brook within Down Ampney Parish taken September 2013

Photo 12 Taken just upstream of Down Ampney House channel has no water and is quite shaded

Photo 13 Taken near Poulton Farm the channel is still dry and is very densely shaded hidden to the left
Photo 14 upstream further still near Charlham Farm

Photo 15 still dry the Poulton Brook up close to Charlham farm
Photo 16 upstream near Poulton Priory the brook course looks winterborn

Photo 17 the brook within the grounds of Poulton Priory is very manicured
Photo 18 here the brook has been fenced with a good buffer but the lack of water is still apparent.

10.4.15  Appendix 4 Cycle 1 Waterbody Summary Report Thames
Source to Down Ampney 30170 and Down Ampney to Waterhay Bridge 23760

2015 Data

<table>
<thead>
<tr>
<th>WATERBODY_ID</th>
<th>Catchment</th>
<th>WB Name</th>
<th>2015 Class</th>
<th>2015 Class</th>
<th>2015 Class</th>
<th>2015 Class</th>
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</thead>
<tbody>
<tr>
<td>GB10039030300</td>
<td>Upper Thames</td>
<td>Ampney and Poulton Brooks (Source to Thames)</td>
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<td>Moderate</td>
<td>High</td>
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### Previous data 2014

#### Classifications

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<th>Overall</th>
<th>Ecological</th>
<th>Chemical</th>
<th>MMA</th>
<th>Invertebrates</th>
<th>Fish</th>
<th>Phytothems</th>
<th>Macrophytes</th>
<th>Phosphate</th>
<th>Ammonia</th>
<th>Dissolved Oxygen</th>
<th>pH</th>
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<tbody>
<tr>
<td>2010</td>
<td>Bad</td>
<td>Bad</td>
<td>DNRA</td>
<td></td>
<td>High</td>
<td>Bad</td>
<td></td>
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<td>High</td>
<td>High</td>
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<tr>
<td>2011</td>
<td>Bad</td>
<td>Bad</td>
<td>DNRA</td>
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</tr>
<tr>
<td>2012</td>
<td>Bad</td>
<td>Bad</td>
<td>DNRA</td>
<td></td>
<td>High</td>
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<td></td>
<td>High</td>
<td>Good</td>
<td>High</td>
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<tr>
<td>2013</td>
<td>Good</td>
<td>Good</td>
<td>DNRA</td>
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<td></td>
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<td>High</td>
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<td>Good</td>
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<tr>
<td>2009</td>
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</tbody>
</table>

Note: DNRA = "Does not require assessment"  NA = "Not assessed"

### Reasons for not achieving Good

<table>
<thead>
<tr>
<th>Significant Water Management Issue</th>
<th>Reason</th>
<th>Element</th>
<th>Sector/Business Category</th>
<th>Pressures</th>
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<tbody>
<tr>
<td>Invasive non-native specie</td>
<td>North American signal crayfish</td>
<td>Fish</td>
<td>Not applicable</td>
<td>Invasive non-native species</td>
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<tr>
<td>Suspected</td>
<td>Suspected</td>
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<td>Other pressures</td>
<td>Groundwater resource impacts</td>
<td>Fish</td>
<td>Other (not in list)</td>
<td>Hydrology</td>
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<tr>
<td>Suspected</td>
<td>Suspected</td>
<td></td>
<td>Industry, Manufacturing and others</td>
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<tr>
<td>Physical modification</td>
<td>Barriers to fish migration</td>
<td>Fish</td>
<td>Other (not in list)</td>
<td>Morphology</td>
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<tr>
<td>Confirmed</td>
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<tr>
<td>Other pressures</td>
<td>Groundwater resource impacts</td>
<td>Hydrological Regime</td>
<td>Other (not in list)</td>
<td>Hydrology</td>
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<tr>
<td>Suspected</td>
<td>Suspected</td>
<td></td>
<td>Industry, Manufacturing and others</td>
<td></td>
</tr>
</tbody>
</table>
10.4.16  Wild Project Ampney Brook Progress Report
See separate report.

10.4.17  Background to the Wild Project
The WILD Project stands for Water and Integrated Local Delivery partnership project. It's a collaborative project including the Gloucestershire Farming and Wildlife Advisory Group (FWAG), Countryside and Community Research Institute (CCRI), Cotswold Water Park Trust (CWPT) and Gloucestershire Rural Community Council (GRCC) and is funded by the Environment Agency (EA).

The project aims to enable local communities in the Cotswold Water Park to work to improve the ‘water environment’. The key driver in this is the government’s responsibility to meet its commitments under the Water Framework Directive (WFD).

Under WFD legislation UK Rivers and streams are assessed according to how close they are to a natural state on a number of parameters

- Hydrology
- Ecology
- Chemistry (pollution)

FWAG South West is focusing on water courses that are failing for water quality issues, (i.e chemistry under WFD) particularly diffuse pollution.

The waterbodies failing GES for chemistry in the project area are;

- The Ampney Brook (Thames to Coln)
- Cerney Wick Brook
- River Key
- Marston Meysey Brook
- River Ray

The Cotswold Water Park Trust has been assigned the following priority water bodies, namely;

- Swill Brook
- Ampney & Poulton Brooks
- Ampney Brook (Down Ampney to Cricklade)
- Ampney Brook
- River Coln

These watercourses are all failing to achieve the required ecological standard under the WFD for Ecology. There are often a number of reasons that a waterbody would fail for ecology but in the local area it is largely due to historic modification of the watercourse making the river
less natural than they should be, this reduces the diversity of habitats within the river and consequently reduces the species that can live there.

Technically all the priority watercourses within the Cotswold Water Park biodiversity boundary have been modified to some extent with most river channels being wider and deeper than they would be naturally due to years of dredging. The Ampney and Poulton Brooks in particular have been straightened extensively in the past probably hundreds of years ago when flooding of the meadows was the best way to fertilise the land. The Ampney Brook has been split in to numerous channels and impeded by weirs to power mills; and on the Thames, trees that were pollarded in the past for animal fodder, are no longer actively managed sometimes resulting in excessive shading.

Consequently ecological enhancement works could be done almost everywhere but as we are limited by resources and the need to acquire landowner agreement, we have to identify priority areas first which offer the best value for money. The process of identifying what enhancement works we would like to pursue is conducted by reviewing survey information, existing fluvial audit information and well established river restoration techniques.

Areas are being identified for proposed works which could be as small scale as some tree works to reduce shading but if landowners are willing we will look at raising funds to conduct more dramatic habitat enhancement works for a high profile flagship venture like restoring meanders.

So in summary with local community input and commitment from local landowners, the project aims to devise and deliver a plan of enhancements and management advice over the project lifespan (until March 2016) to achieve Good Ecological Status in water bodies within the Water Park area in the long-term.

10.4.18 **Bibliography**

Buffer- a strip of land left unused to protect the river from land use activities. The ideal width is 10metres as this provides good protect of the river and allows access by machinery to conduct any maintenance that cannot be done or is too labour intensive by hand.

Leat- artificial watercourse or aqueduct dug into the ground especially one supplying water to a watermill or its mill pond.

Hatch- a board which could be lowered or raised to allow water to flow downstream
10.4.19 References

Anon 2006. The UK Biodiversity Action Plan. Website www.ukbap.co.uk


Lewis V (2004) Habitat Advisory Visit, Ampney Brook (Windrush AEC) on behalf of Charles Newington-Bridge


Signal Crayfish www.nonnativespecies.org
Produced by Olaf Booy, Max Wade and Vicky White of RPS Key ID

10.5 Appendix 5: The role and impact of policy in ESBO provision - further details

Cross compliance: it has been created to make a link between receipt of CAP support by farmers and respect of a set of basic rules related to the main public expectations on environment, public and animal health, as well as, animal welfare. In order to receive payments, farmers shall respect a set of basic rules. Farmers not respecting EU law on environmental, public and animal health, animal welfare or land management will see the EU support they receive reduced. The CC covers two elements:

- Statutory Management Requirements (SMRs): legislative standards in the field of the environment, food safety, animal and plant health and animal welfare.
- Good Agricultural and Ecological Conditions (GAECs): range of standards related to soil protection, maintenance of soil organic matter and structure, avoiding the deterioration of habitats, and water management.

Rural Development Programme England: provides money for projects to improve agriculture, the environment and rural life. It is drawn up by England but it is based on the European Rural Development Programme, 2nd Pillar of the CAP. Each member country can adapt its programme on the needs of their territories and addressing at least four of the following six common EU priorities (knowledge and innovation; viability and competitiveness of all type of agriculture, promoting food chain organization, animal welfare and risk management; restoring and preserving rural ecosystems, promoting resources efficiency; promoting social inclusion and economic development in rural areas).
Countryside Stewardship: In addition to mandatory European policies, farmers can apply to the Countryside Stewardship. This programme is based on the Rural Development Programme but it is a national initiative. It provides financial incentives for land managers to look after their environment. It is not mandatory but farmers who apply and respect it have more subsidies.

Catchment sensitive farming: it is a support given to farmers to reach countryside stewardship goals, and helps them to obtain the CS grants. The project is run by Natural England in partnership with the Environment Agency and the Department for Environment, Food and Rural Affairs. It raises awareness of diffuse water pollution from agriculture (DWPA) by giving free training and advice to farmers in selected areas in England. The selected areas are called priority catchments. The aim of the advice is to improve the environmental performance of farms. The amount of aid given for advisory services for farmer is limited to 1,500€ per farmer per advisory theme.

EU Water Framework Directive: The European Water Framework Directive requires that surface water discharges are managed so that their impact on the receiving environment is mitigated. The objective is to protect the aquatic environment and control pollution from diffuse sources such as urban drainage – a key aspect that effectively precludes use of the traditional approach to drainage.

10.5.1 Water Quality

<table>
<thead>
<tr>
<th>Policy frame impacting on water quality</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulatory Framework</strong></td>
<td></td>
</tr>
<tr>
<td>Water framework directive</td>
<td>EU</td>
</tr>
<tr>
<td>Cross-compliance rules :</td>
<td>State /Region</td>
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<tr>
<td>GAEC 1,2,3</td>
<td>Thames river management plan</td>
</tr>
<tr>
<td>SMR 1,10</td>
<td></td>
</tr>
<tr>
<td>Countryside Stewardship</td>
<td></td>
</tr>
</tbody>
</table>

| Policies with direct focus             |                      |
| Drinking Water directive               | EU                  |
| Nitrates Directive                     | State /Region       |
|                                        | Thames river management plan |
|                                        |                     |
| Heavily linked to WFD & River Basin Management Plans. |                     |
|                                        | Local areas         |
|                                        |                     |
| Discharge of dangerous substances      | EU                  |
|                                        | State /Region       |
|                                        | Thames river management plan |
|                                        |                     |
|                                        | Local areas         |
|                                        |                     |

The EU Water Framework Directive (WFD), adopted in 2000, aims to protect water based on natural geographical formations: river basins. It set out a precise timetable, with 2015 as the deadline for getting all European waters into good condition, in term of ecological and biological quality, and a new timetable from 2015 to 2027. Under the WFD, Member States have to hold extensive consultations with the public and interested parties to identify the problems, the solutions and their costs, to be included in river basin management plans. This requires a broad consultation lasting at least six months on draft river basin management plans in 2015 and every six years thereafter when the plans are updated. WILD area is included in Thames...
River Basin Management Plan. The plan assesses the evolution of Thames water quality between 2010 and 2015, giving many data of water body ecological and chemical quality. The plan provides a framework for action and future regulation. To do this it summarizes the existing mechanisms, both statutory and voluntary, that are used to manage the quality of the water environment. It also summarizes the types of action and who needs to do this, to achieve the statutory objectives.

Several cross-compliance points target especially water quality:

- **GAEC 1: establishment of buffer strip along watercourses to protect them against pollution and run-off from agriculture**

  (You must:
  1. take all reasonable steps to maintain a green cover on land within 2 metres of the centre of a watercourse or field ditch, or to land from the edge of the watercourse or field ditch to 1m on the landward side of the top of the bank. This rule does not apply to land forming part of a parcel of 2 hectares or less.
  2. produce and keep a map of your holding showing: all surface waters and land within 10 metres of them all springs, wells and boreholes on your holding or within 50 metres of the boundary and land within 50 metres of them
  3. update the map with any changes within 3 months from the date of change.)

- **GAEC 2: water abstraction = need of a license of Environmental Agency (EA) to take more than 20cube meter of water in a single day**

  (You must have a licence from the Environment Agency (EA) to take (abstract) more than 20 cubic metres (4,400 gallons) of water, from an inland or underground source for irrigation, in a single day. Once you have an abstraction licence (issued by the EA) you must comply with its conditions when abstracting water for irrigation purposes. You don’t need a licence if you abstract 20 cubic metres (4,400 gallons) or less in a period of 24 hours, provided your abstraction is part of a single operation. If you ab-stract from the same source at multiple points, the exemption only applies if the combined total of all abstractions is 20 cubic metres or less a day.)

- **GAEC 3: ground water = need of a permit from EA before be allowed to release substance which could harm* groundwater**

  Example of substance requiring a permit to be released: pesticide washings, sol-vents, mineral oil, diesel , sewage , trade effluent , certain biocides.

- **SMR1: is related with Nitrates Vulnerable Zone management. The aim is to reduce water pollution in NVZ by using and storing manure and fertilizers carefully. It pro-vides indications of Nmax limits of use according different crops, restriction dates to spread manure, help for planning N application etc.**
SMR10: limits plant protection products to control the pesticide use, so indirectly avoid water pollution by chemical.

About the RDPE, the protection of the water and the environment is included in the Country-side Stewardship (CS) and can be achieved by several groups of measures like:

- enhanced field management, including seasonal livestock exclusion, winter cover crops, buffer and riparian management strips next to watercourses and reduced nutrient applications from fertilizers
- land use change, including woodland and wetland creation or converting arable land to grassland which requires less fertilizer
- water and woodland capital grants, including sediment traps, fencing of watercourses and tree planting
- renaturalizing rivers and coast defenses, including making space for water and coastal realignment

Farmers don’t necessarily have to follow all the rules. Thanks to the Magic Maps, they can see what are the priorities targeted by the CS in their area. For example if we look at the CS priorities in the WILD project area we can notice that it is classified as:

- High level priority in water quality
- Medium priority in surface pesticide issue
- High priority in phosphate issue
- High or lower spatial priority in woodland flood risk (depending of the area)

Whereas on some other points the priority is not important (like fecal organism issue, nitrates issues ...) even if these points are important and have to be consider (in case of nitrate, the area is classified as NVZ anyway). Thanks to the Magic Map we also notice that the area was considered as a priority catchment in the former catchment sensitive farming priority area run between 2011 and 2015.

The CS is related to the Catchment Sensitive Farming (CSF), supposed to help to improve water quality provision, especially in Cotswold because the local catchment was designated as a priority catchment between 2011 and 2015. In the first eight years of CSF (2006-2014), 167,788 individual mitigation measures have been advised to farmers on 16,133 farm holdings, with many results like for example monitored pollutant levels have reduced by up to 30%. It had also good effect on capital grants: from 1st April 2011 to 31st March 2014, the scheme contributed to approximately £71.6m of improvements. These grants have been matched with a similar amount of funding from the local farmers and land managers involved; demonstrating their impressive commitment and representing a total investment of up to £143.2m into the environment, farm infrastructure and local businesses across the catchments. [http://publications.naturalengland.org.uk/publication/6510716011937792](http://publications.naturalengland.org.uk/publication/6510716011937792)
### 10.5.2 Flood protection

<table>
<thead>
<tr>
<th>Policy frame impacting on flood protection</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regulatory Framework</strong></td>
<td>EU</td>
</tr>
<tr>
<td>Cross-compliance rules</td>
<td>The Flood and Water Management Act</td>
</tr>
<tr>
<td>Countryside Stewardship</td>
<td>Lead Local Flood Authority</td>
</tr>
<tr>
<td>Water framework directive</td>
<td>Gloucestershire's Local Flood Risk Management Strategy (LFRMS)</td>
</tr>
<tr>
<td><strong>Policies with direct focus</strong></td>
<td>State /Region</td>
</tr>
<tr>
<td>Floods directive, Strategy on Green Infrastructure</td>
<td>National flood policy</td>
</tr>
<tr>
<td><strong>Policies with indirect focus</strong></td>
<td>Local areas</td>
</tr>
<tr>
<td></td>
<td>Water company strategy, local catchment partnership</td>
</tr>
</tbody>
</table>

Cross compliance offers the potential to deliver baseline and best practice land management measures of the kind that can reduce flood run-off across catchments as a whole. Countryside stewardship also support flood protection and water management through grants and advices for farmers and land managers who wish to adopt a variety of natural flood management techniques and help slow the flow of water with in a catchment and to reduce the impact of flooding downstream. Natural England has created an iconographic of the options already available within Countryside Stewardship which may contribute towards improved flood resilience within a catchment. On this document, the key solutions to reduce flooding are presented on a drawing and described: (cf picture)

- Woodland scrubs and creation
- Grip blocking
- Riverbank restoration
- Instream structures / large woody debris
- Wetland creation
- Overland sediment traps
- Offline storage ponds and washlands
- Modifying pathways ; beneficial land use change (land and soil practices management)
At the national level, The Flood and Water Management Act, set up in 2010, provides for better, more comprehensive management of flood risk for people, homes and businesses, helps safeguard community groups from unaffordable rises in surface water drainage charges, and protects water supplies to the consumer. It regroups together actors of water management in England, including Environment Agency, water and sewerage companies, district councils, highways authorities and internal drainage board. Defra investment plan sets out how this commitment will transform flood and coastal erosion risk management over the coming 6 years. This program of work was aimed to reduce flood risk to more than 300,000 households by March 2021. The program of flood and coastal erosion risk management investment includes projects developed by local authorities, internal drainage boards and the Environment Agency. These risk management authorities work with communities to develop schemes. Each community council has responsibilities to ensure a good water management in its county and avoid flooding and degradations. Gloucestershire City Council (GCC) is designated as the Lead Local Flood authority in WILD area and has to ensure:

- investigation and report of flooding incidents
- management of flood risk from surface water, groundwater and ordinary watercourses (i.e. non main rivers)
- production of a local flood risk management strategy
- works on ordinary water courses
- works to maintain the flow on ordinary water courses
In addition GCC has a responsibility for managing flood risk from the highway network and planning for emergencies. Under the same legislation GCC has produced and published Gloucestershire’s Local Flood Risk Management Strategy (LFRMS). The measures to reduce flood risk include a better understanding of local flood risk; the setting of plans to manage the risk through a risk-based asset management programme, the identification and localization of drainage ditches and watercourses and support landowners to clean them. GCC also made a Strategic Flood Risk Assessment to map all form of flood risk according to a gradient: low (zone 1), medium (zone 2) and high (zone 3) risk.

### 10.5.3 Rural Vitality

<table>
<thead>
<tr>
<th>Policy frame impacting on rural vitality</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Framework Policies with direct focus</td>
<td>EU</td>
</tr>
<tr>
<td>LEADER programme and associated projects</td>
<td></td>
</tr>
<tr>
<td>Policies with indirect focus</td>
<td>Strategy on Green Infrastructure, aimed at increasing areas of natural cover in built up areas.</td>
</tr>
</tbody>
</table>

LEADER programme (French acronym for Liaison entre Action de Developpement et l’Economie Rurale) is a part included in Rural Development Programme England. Under the LEADER scheme, the creation of LAG (Local Action Group), some project to boost rural economy can be funded (138m£ available in England between 2015 and 2020). To be granted, all project must support one or more of the six LEADER priorities, including some focusing directly on rural vitality:

- support micro and small businesses and farm diversification
- boost rural tourism
- provide rural services
- provide cultural and heritage activities

A new LEADER group has been set up recently in the Cotswold, which if an Area of Outstanding Natural Beauty, covering a part of WILD area. For the moment, they are mainly focus on supporting local businesses and hubs, with no direct link with WILD project. However in the future we can imagine a connection between WILD project and supporting the local economy.
10.5.4 Species and Habitats

<table>
<thead>
<tr>
<th>Policy frame impacting on species and habitats</th>
<th>Level of governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Framework</td>
<td>EU</td>
</tr>
<tr>
<td>CAP cross compliance Rules Pillar 2</td>
<td>State /Region</td>
</tr>
<tr>
<td>Countryside Stewardship</td>
<td>Local areas</td>
</tr>
<tr>
<td>Policies with direct focus</td>
<td>Policies with indirect focus</td>
</tr>
<tr>
<td>European Species Habitat directive &amp; Birds Directive Natura 2000 initiatives, LIFE projects</td>
<td>Biodiversity 2020 National Biodiversity Strategy</td>
</tr>
<tr>
<td>Water framework Directive CAP</td>
<td>Local development Plans</td>
</tr>
</tbody>
</table>

The CAP cross compliance rules impacting the biodiversity are statutory management requirements, targeting wildlife protection:

- SMR 2: Wild Birds: protect wild birds, their eggs, nests and habitat.
- SMR 3: Habitats and species: ban to pick, collect or destroy wild protected plants; ban to destroy or damage the special interest features of the area or disturb any protected flora or fauna that are a special interest feature
- The GAEC 7d sets rules about the Sites of Special Scientific Interest (SSSI). It ensures a special protection for sites with special flora, fauna or habitats.

Moreover, by applying to the CS, farmers can support the biodiversity by conserving and restoring wildlife habitats, and by the woodland creation and management.

WILD project area is a key region for species and habitats protection, so many programmes for biodiversity are applied here. Biodiversity 2020 is an English strategy to tackle the decrease of natural English species (birds, butterflies, plants...) and provides a comprehensive picture of how implemented international are and EU commitments. We can find Granted European Protected Species, especially bats and amphibia and many bird species (turtle dove, corn bunting, curlew, grey partridge, lapwing, redshank, snipe, tree sparrow, yellow wagtail...) Several grasslands in the area are registered as Priority Habitat Inventory, which means they have been identified as being the most threatened and requiring conservation action, as well as most of the parishes are classified as SSSIs (Minety, Cricklade, South Cerny, Lechlade on Tames etc) (source: Magic Maps).

Indirectly, the Water frame Directive plays a role in biodiversity in watercourses, ponds, rivers etc, by protecting the native water species and managing the invasive species.

### 10.5.5 Soil Quality

<table>
<thead>
<tr>
<th>Policy frame impacting on soil quality</th>
<th>EU</th>
<th>State /Region</th>
<th>Local areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Framework</td>
<td>Cross-compliance rules (GAEC 4, 5, 6)</td>
<td>Catchment sensitive farming</td>
<td></td>
</tr>
<tr>
<td>Policies with direct focus</td>
<td>Soils thematic strategy</td>
<td>Local officers</td>
<td></td>
</tr>
<tr>
<td>Policies with indirect focus</td>
<td>Water Framework Directive Nitrates directive</td>
<td>Planning regulations</td>
<td></td>
</tr>
</tbody>
</table>

### 10.5.6 Landscape character

<table>
<thead>
<tr>
<th>Policy frame impacting on landscape characters</th>
<th>EU</th>
<th>State /Region</th>
<th>Local areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory Framework</td>
<td>Cross-compliance rules (GAEC 7) Countryside Stewardship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policies with direct focus</td>
<td>European Landscapes Convention</td>
<td>National Character Areas</td>
<td>Landscape Partnership (LPs), where project exist</td>
</tr>
<tr>
<td>Policies with indirect focus</td>
<td></td>
<td></td>
<td>Local landscape character plans</td>
</tr>
</tbody>
</table>
## 10.6 Appendix 6: WILD Phase 2 Outputs

<table>
<thead>
<tr>
<th></th>
<th>Output</th>
<th>Outcome</th>
<th>Lead and Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100 farm and land owner visits per year to support sustainable productive farm businesses; to include small holders, paddocks and green spaces. 100% of landowners will be contacted in the project area over the lifetime of the project.</td>
<td>Improved soil structure and crop management; improved resource protection; Farm Infrastructure; compliance with EU regulation and uptake. Reduce DWPA and identify and implement solutions for Point Source pollution.</td>
<td>FWAG SW</td>
</tr>
<tr>
<td>2</td>
<td>Ditch maintenance programme over 5Km/project year to increase ecology and water quality to assist farmers and communities in water flow management through catchment/habitat restoration</td>
<td>Improved 15 km ditch management to improve biodiversity and embed local governance of water courses, in relation to key drainage features that impact on sustainable growth and climate change resilience.</td>
<td>FWAG SW, CWPT</td>
</tr>
<tr>
<td>3</td>
<td>Continue to support 16 parishes and 3 towns from WILD Phase 1 to embed practice and develop projects. Engage 2 new parishes and 1 market town.</td>
<td>Total 18 Parishes and 4 towns being assisted in the understanding environmental issues and how water is relevant to community-led plans e.g. Neighbourhood Plans. Example case study of a Neighborhood plan where water management is included e.g. Fairford</td>
<td>GRCC with FWAG SW &amp; CWPT</td>
</tr>
<tr>
<td>4</td>
<td>20km surveyed for identification &amp; update of potential river habitat enhancements 25 km of river monitored for water vole, otters and indicator species</td>
<td>Updated river restoration maps 6 per project year Biological data mapped for project area every year</td>
<td>CWPT</td>
</tr>
<tr>
<td>5</td>
<td>Encouraging &amp; facilitating management of riparian habitat to improve hydro-morphology &amp; ecology Encouraging &amp; facilitating the installation of formal drinking points for livestock to limit river bank damage &amp; diffuse pollution</td>
<td>Pollarding and coppicing of trees &amp; scrub, 1000m per project year for river shade management Installation of new/replacement riverside fencing 500m per project year Installation of drinking bays or pasture pump sites 3 per year</td>
<td>CWPT, FWAGSW</td>
</tr>
<tr>
<td>6</td>
<td>Encouraging &amp; facilitating in channel enhancements to improve hydro-morphology &amp; ecology</td>
<td>Installation of in channel enhancements including LWD, bank re-profiling/repairs, channel narrowing &amp; gravel installation 500m per project year</td>
<td>CWPT, FWAGSW</td>
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</tr>
</tbody>
</table>
| 7 | 4 standing water habitat surveys and management plans per year | 2 ponds enhanced per project year  
2 Flow Control Structures per year Yr2 and Yr3  
15,000 m² Lake and habitat restoration Yr 1 and Yr 2; and 20,000 m² Total 50,000m² | FWAG SW, CWPT |
| 8 | To offer follow up advice on water flow maps and data sets from Phase 1 and develop a minimum of one project per parish/town. | To implement physical actions on the ground as prioritised by community/farmers | FWAG SW/ CWPT. |
| 9 | To carry out 126 volunteer work parties over 3 years | Capture voluntary match funding and in kind contribution | FWAG, CWPT, GRCC |
| 10 | Walks, talks, events and training to engage people in the water environment and learn new skills. | 36 (1 month for 3 years) to engage people in: Helping those with a variety of health issues, considering physical exercise as a better prescription than medication through social prescribing Developing further the links with the NHS Green-Gym Bringing together different walks of life and breaking down social barriers | FWAGSW, CWPT, GRCC |
| 11 | Test the effectiveness of the project to deliver an integrated catchment approach. | Evaluate WFD delivery using ILD that enables the development of community led environmental resilience. Produce report on findings. Demonstrate evidence of a very cost effective approach to delivering WFD catchment delivery. | CCRI |