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The Role of Localized Agri-Food Systems in the Provision of Environmental and Social Benefits in Peripheral Areas: Evidence from Two Case Studies in Italy

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Abstract: The article focuses on the role of Localized Agri-food Systems (LAFS) in the provision of environmental and social benefits (ESBs) in peripheral areas, by comparing two case studies in Italy: bergamot production in Grecanic area (Calabria region) and a basket of local products in Garfagnana area (Tuscany region). On the basis of the evidence collected through semi-structured interviews with key stakeholders, the paper shows the different mechanisms by which LAFS may stimulate the provision of ESBs in such areas. In both case studies the provision of ESBs was the result of the interplay among three different types of drivers: markets factors, the set of policies implemented in the specific territorial context and collective actions performed by local actors to promote new governance patterns and new institutions. The article shows that in peripheral areas LAFS, alongside food production, have a strong potential in delivering a broad range of environmental and social benefits, which are highly valued by local communities and consumers. However, this potential varies to large extent according to the socio-economic and institutional settings, as well as on the type of interactions of market drivers with public policies and collective action.

Keywords: environmental and social benefits; localized agri-food systems; peripheral areas

1. Introduction

An increasing number of studies and research projects have come up with different ways to classify and analyse public goods and ecosystem services associated to farming, such as agricultural landscape, rural vitality, farmland biodiversity and climate stability [1–4]. The literature acknowledges that such public goods and services are often jointly delivered with private goods, which are generally the core focus of the agri-food sector. Due to the joint nature of this delivery, in this article an innovative approach was explored, with the aim of integrating the social and natural dimensions of public goods and services in one holistic frame [5,6]. Pursuing this approach, we will refer more generally to environmental and social benefits (ESBs) delivered by agro-food systems, in order to consider all the outcomes which are of benefit to the community in an integrated manner.

The main objective of this work is the study of the role of Localized Agri-food Systems (LAFS) in the provision of ESBs in peripheral areas. LAFS can be considered as the agri-food systems where all—or the majority of—the variables related to agri-food production are closely connected and dependent on local production systems [7–11]. The article aims at providing some evidence of the role of LAFS in the provision of ESBs through a comparison between two territorial case studies in Italy: Garfagnana area, in Central Italy and Grecanic area, in Southern Italy.

Garfagnana is a mountain area in the Tuscany region comprising fifteen municipalities, characterized by interesting economic trends due to increasing tourism attractiveness and development of innovative services and sectors. In particular, the local agro-food sector is characterized by a broad range of niche products, such as Garfagnana spelt, Saraceno wheat, corn, sheep, honey and trout, which are mainly valorised through rural tourism [12,13]. Grecanic area, on the opposite, includes the territory of fourteen municipalities of Reggio Calabria Province, where the production of bergamot is concentrated. In this area, the local agri-food system is strongly shaped by the presence of this citrus tree with pear-shaped fruit, whose oil is exported and used in perfumery industry [14,15]. These two case studies can be considered examples of two different typologies of peripheral areas which are nowadays objectives of Italian public policies, in particular the National Strategy for Inner Areas (NSIA), funded by European and national financial resources in the period 2014–2020 [16].

Nowadays there is great attention to the contribution that agri-food systems can provide to sustainable development at territorial level. This is particularly true in peripheral areas, where the agri-food sector still plays a significant role as source of employment and income and there is a strong and increasing demand of quality products in local and broader markets. The ways in which LAFS are organized, the distribution of the power within their value chain, the appreciation coming from markets (local, national, international) of the mix of public/private goods delivered, and, finally, the mix of policies driving the development of the LAFS are all relevant factors influencing the ESBs delivered by the LAFS.

The focus of the analysis is on the inter-relations between the different components of LAFS (e.g., actors in the supply chain, governance arrangements, resources, drivers and policy mix) and their potential in stimulating alternative (and innovative) mechanisms of ESBs delivering.

In greater details, the comparative analysis of the two Italian case studies has two specific objectives. Firstly, it aims at exploring through which mechanisms LAFS may stimulate the provision of ESBs associated to farming in peripheral areas. Secondly, it aims at exploring how, in different socio-economic and institutional settings, market drivers interplay with two other key drivers: public policies and collective action.

The paper is structured in five main parts. Section 2 provides the theoretical background, describing the conceptual framework used in developing the analysis; Section 3 includes an overview of the two case studies, as well as the description of methods used for data collection; Sections 4 and 5 focus on the results, by showing the different relations between the LAFS and the ESBs provision in the two case studies, while the main conclusive conceptualization from case studies and policy implications are discussed in Section 6.

2. Theoretical Background

2.1. Environmental and Social Benefits Associated to Farming

During the last decade, the provision of public goods and ecosystem services through agriculture has been explored in several studies, which identify a wide range of environmental and other public goods and services that can be provided by farming systems [1–6]. An initial classification of public goods associated to agriculture was provided by Cooper et al. [1], who highlighted the distinction between environmental and social public goods. The most significant environmental public goods identified—although with different level of "publicness"—were agricultural landscapes, farmland biodiversity, water quality, water availability, soil functionality, climate stability (greenhouse gas emissions), climate stability (carbon storage), air quality, resilience to flooding and fire. The social public goods included were food security, rural vitality and farm animal welfare and health, although such functions and services cannot be considered public goods in *sensu strictu* but rather societal aspirations that, if achieved, represent socially and politically outcomes [17]. Such outcomes are particularly relevant in peripheral areas, since in such areas enhancing the socio-economic fabric is usually a key challenge to avoid land abandonment and to strengthen the role of agri-food sector.

In Italian literature on local development, social public goods are delivered in some successful context in terms of new inclusive local institutions, social norms, trust, learning practices and new social capital. All these can be considered as public goods historically accumulated within some specific territorial contexts (and not in others), which have no market but which are appreciated by consumers because they are embodied in the culture and identity of those specific territorial contexts. The market appreciation can be manifested through either better prices or higher demand share for that peculiar territorial brand.

With regard to the relations between the agricultural activities and public goods provision, a much-debated issue is whether public goods are provided as joint outputs of an activity or of a combination of activities. Indeed, certain public goods may be provided incidentally as a side-effect of economically viable activities, or as a result of farmer self-interest or altruism [1]. The level of this "jointness" of different public goods with agriculture practices is very complex and it is usually characterized by high variability across areas, countries and specific environmental and social goods [18,19]. Instead of dealing with the challenge of understating the level of jointness between private and public goods, this article approaches this issue with a different and more comprehensive theoretical and analytical approach, by looking at the provision of public goods through agriculture as a demand of society for multiple functions of farming. This approach encapsulates public goods and ecosystem services in a unifying way, by accommodating both concepts in a holistic framework to describe human and social interaction with the wider environment [5]. The concept of public goods has origins in neoclassical economic theory and it describes goods and services with properties of non-rivalry and non-excludability, which explain their often insufficient provision in commercial markets and suggest that some form of collective or public intervention may be needed to correct 'market failure' [20,21]. On the opposite, the concept of ecosystem services describes how 'natural' elements in ecosystems, with or without human influence or management, generate services to society through the functioning of the ecosystems within which they are embedded. It includes a wide range of services, private and public in provision and demand, from food production to amenity, landscape management and pollination [22,23].

Although public goods and ecosystem services are not mutually exclusive, each approach illustrates different and valuable aspects of relations between farming and their natural and socio-cultural contexts [5]. The holistic approach schematized in Figure 1 illustrates how assets generate services and how governance shapes the determination of how far assets and services are captured as either private or public goods, even in cases where a single process generates joint products. The two main types of driver—societal/personal and market on the one hand and biophysical on the other—will shape the way in which and the extent to which, these processes operate in a given situation.

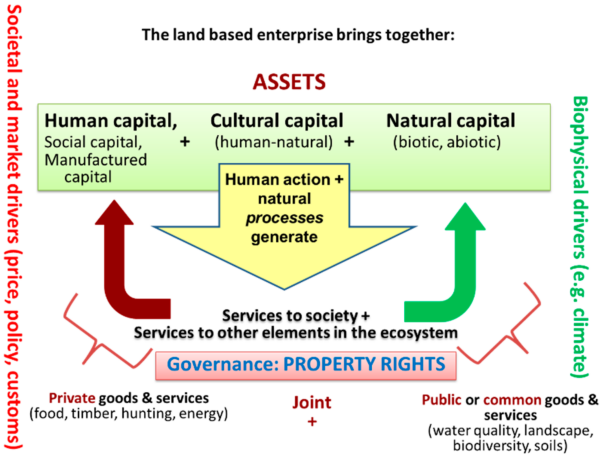

Figure 1. The provision of public goods and ecosystem services from agriculture and forestry. Source: Dwyer et al., 2016 [5].

Following this approach, we will refer more generally to environmental and social benefits (ESBs) delivered by agro-food systems, in order to consider, in an integrated manner, all the outcomes which benefit society (the ESBs analysed are listed in the Appendix A).

ESBs are then located at the crossroad between the public goods and ecosystem services concepts, by including social and cultural outcomes derived by agro-food systems and how their provision can be enhanced together with the production of food. Since the relationship between food production and environmental, cultural and social assets and attributes may vary between conflict and antagonism at one extreme, to synergy at the other, depending upon local circumstances [6], it may be argued that research should focus more extensively on two issues. The first issue relates to the different typologies of drivers and their interplay in determining a joint production of public and private goods at territorial level. The second issue is related to the synergies and trade-offs between environmental and social goods and services in different contexts, which were rarely the focus of research [6]. These research needs are particularly relevant in peripheral areas, where it would be necessary to assess in a more extensive way the social and economic benefits deriving from specific (and localized) agro-food systems and to what extent such benefits are bundled with environmental and ecosystem services. From this perspective, a key ESB analysed here is the so-called "rural vitality" [1,6], which may be represented by factors which have very often immaterial nature and are fundamental requisites for local development processes, although not strictly considered as production factors. These factors can be defined by various socio-cultural and economic indicators, such as the extent of development of associations and local groups, the provision of essential services for the population (in order to allow a sufficient access to rural inhabitants), the cultural richness of local communities and practices, the depth and diversity of knowledge and traditions, levels of equal opportunity and status for men and women, etc.

2.2. Localized Agri-Food Systems

LAFS can be a useful methodological frame to study ESBs. Initially, the concept of LAFS was strongly focused on the production system and interactions among firms within a given territory: this can explain why it was strongly influenced by the concept of cluster, adopted by Porter [24,25] to define the spatial proximity of many production units and their reciprocal relationships. Spatial proximity, specialization of territorial systems and their complex interplay were also at the centre of studies on the new economic geography in Krugman [26], on one side and in Becattini and his school focusing on the concept of Marshallian industrial district [27]. LAFS emerged in the mid of 1990s as a concept referring to geographical concentrations of specialized farms, food-processing units and distribution networks, private and public entities in a determined place. LAFS appeared in French literature as SYAL, or Systèmes agro-alimentaires localisés (SYAL). Three distinctive features characterize LAFS: (a) place; (b) social relationships and (c) institutions. The specificity of LAFS is in the spatial features of the product, people, institutions and social relations that are embedded in food production. Place is considered in its widest meaning as used in the French school, that is "terroir." Social relationships relate to trust and cooperation among actors. Institutions include all private and public agents promoting actions regulated by formal and informal rules. As Giacomini and Mancini point out [28], the LAFS "*constitutes an approach or method of analysis of development processes for local resources that is useful for the formulation of development policy*". One of the most quoted conceptualization of SYAL has been provided by CIRAD-SAR: "*production and service organizations (agricultural and agri-food production units, marketing, services and gastronomic enterprises, etc.) linked by their characteristics and operational ways to a specific territory. The environment, products, people and their institutions, know-how, feeding behaviour and relationships networks combine within a territory to produce a type of agricultural and food organization in a given spatial scale*" [29]. More recently, Torres Salcido and Muchnick [30] put more emphasis on the role of governance mechanisms within the LAFS, defining an ideal type of LAFS as "*an agri-food system (production/transformation/services) in a specific territory in which actors try to set up coordination and collaboration processes in partnership terms, with internal management and regulation but with*

strong ties to public managers and companies [. . .] Since SYAL base their collective action on appropriation and building of tangible and intangible territorial heritage, it is necessary that their action be sustainable, promoting modes of production and consumption that are less harmful to natural and cultural diversity". These authors outline the capability of main actors to set up innovative and effective solutions to govern the system and to ensure the participation of farmers, processors, services providers and marketing operators.

The governance of the LAFS is very crucial in the context of our research, because these systems seek to increase territorial coordination and, by doing this task, also provide positive environmental and social outcomes. This means that, within the same LAFS, specific coordination methods can emerge and governance mechanisms can be put in place to change production, processing and consumption practices and create alternative networks. This paves the way for change also in the more conventional networks within the same territory [31].

In our study LAFS are also places where relevant interplay emerges between public policy, organization/collective action and provision of ESBs. There are many examples of positive interplay between these factors [28,32,33]. This can especially happen when policy incentives promote a better governance of the LAFS. When in a LAFS governance works well, also market-based mechanisms can deliver the necessary incentives for the provision of ESBs. By re-adapting the classification proposed by Wunder [34], we can distinguish at least four market-based mechanisms [33]: (a) premium price payments; (b) compensations for additional costs; (c) certification schemes (e.g., organic production or environmental certification); (d) integrated and development projects. Initiatives aiming at the provision of ESBs can be supported at the same time by public policies and market-based mechanisms in a complementary way, since the co-existence of public and private payment schemes in the same territory is very frequent [35]. This means that the driving factors are not only in the market forces but also in civil society demand for new values as public participation, natural resource conservation and social cohesion. One variable emerges in each LAFS as a crucial key for success: the capability of setting up better contractual relations among the producers of the supply chain and between producers and retailers. In this regard, collective action can play a key role in reaching a right balance. Collective action may take different forms and typologies of organization. The OECD [36] classical definition identifies three types of collective actions, based on the participants: (a) farm-led action; (b) non-farm-led action; (c) government-led action. Then it identifies the first two as bottom-up and the third as top-down approach. In practice, however, collective action is usually carried out by multiple actors and some studies point out that a good start depends on a sufficiently large number of participants and on the management capability of those who take a lead in the process. Indeed, LAFS is a typical multi-actor situation where farmers are only a component, whereas the real leading role can be played within the supply chain or within civil society. Moreover, the lead can also be taken jointly by a public-private partnership. Initiatives might also be driven either by public or by private actors but in many cases, it is hard to distinguish the real driving factors because, over time, they may appear as a combination of top-down and bottom-up approaches.

3. Case Studies Overview and Methods

The article is organized around two territorial case studies in Italy: Garfagnana area, in central Italy (Tuscany) and Grecanic Calabria area, in Southern Italy (Calabria). The overall objective is comparing these two cases in order to highlight general and specific factors stimulating the provision of ESBs in two quite different peripheral areas and, at the same time, exploring how market drivers associated to local agri-food products interplay with public policies and collective action to improve social and environmental sustainability.

The two case studies can be considered as two examples of Italian peripheral areas characterized by relevant differences, thus making it interesting to compare the relations between LAFS and provision of ESBs. As many peripheral areas in EU countries, such areas experimented the decline of the agri-food sector over time and the process of out-migration from the region and the consequent ageing and depletion of essential services. Garfagnana was more involved in the recent economic crisis (2008–2016),

due to the presence of small and medium industrial firms since the industrial development of 1970s [12], which has always been irrelevant in the Grecanic area, a typical lagging-behind area located in one of the less developed regions of Southern Italy [14]. Both areas were interested by an intense touristic development in the rural context: typically, in the coastal area of Grecanic Calabria and more in the mountain areas in Garfagnana. There are also strong similarities in the capability to capture policy opportunities, both in Rural Development and in Cohesion policy. However, huge differences emerge, as we will see in the next section, in the social capital and the cooperative attitude: Garfagnana presents typical social ingredients that feed local development in the Central Italy [37], while Grecanic Calabria shows the typical socio-political constraints blocking development processes in Southern Italy.

The analysis of these case studies is based on the data collected through 31 semi-structured interviews with key actors, including farmers, representatives of farmers' associations, local authorities, processing firms, local associations and cooperatives, local development agencies, technicians and independent experts. Table 1 shows the categories of stakeholders interviewed in each case study.

Table 1. The semi-structured interviews with local stakeholders in the case study areas.

Garfagnana Area		Grecanic Area	
No. of Interviews	**Institutions/Organizations**	**No. of Interviews**	**Institutions/Organizations**
3	Representative of local institutions (Municipality Union, Local Action Group, germoplasm bank)	5	Representatives of local institutions and associations (Municipalities, Local Action group, Social Cooperatives, Regional Park)
2	Technicians, independent experts	4	Technicians, independent experts
2	Processing firms, marketing actors	1	Processing firms, marketing actors
4	Representative of farmers associations and cooperatives	3	Representatives of producers' associations (Consortia)
4	Local farmers	3	Local farmers and tourism operators

Due to the explorative nature of the research and its objectives, selecting interviewees using sophisticated sampling techniques was not considered essential: the sample of local actors interviewed for each case study was selected, among those more involved and pro-active actors in the LAFS, with the objective of representing a wide cross-section of interests in the local communities. Indeed, the main objective of the interviews was to explore the socio-economic and institutional processes beyond the provision of ESBs associated to the local agro-food systems by identifying the actors involved, their socio-economic relationships, the resources mobilized during the process, the type of institutional mechanisms experimented and the outcomes reached. The interviews were conducted individually, on the basis of a questionnaire with open-ended questions, keeping the possibility open to discuss related topics in the course of the interview. The answers were analysed from taped transcripts, also by extracting statements that were considered particularly relevant in relation to the different issues. Data collected through interviews were complemented with information deriving by regional and national data sets, as well as cross-checking with local environmental and socio-economic data.

4. Garfagnana (Tuscany Region)

4.1. The Area

Garfagnana is a mountain area located in the north-western Tuscany, in Lucca Province, very homogeneous from an environmental, historical, economic, social, cultural and institutional perspective. This is mainly due to the geographic features of the area, since Garfagnana is a valley enclosed by mountains on three sides and coincides with the northern part of the catchment area of the Serchio River. The area comprises fifteen municipalities and covers 533 km^2, with a population density of 54 inhabitants per square kilometre (about one third of the regional average) and a per capita GDP of about a quarter below the regional average [13]. Although the productive structure is typical of peripheral areas, with a lower economic weight of services and higher weight of agriculture, the recent

economic trends shows that it is a quite lively area in terms of employment, tourism attractiveness and development of innovative services and sectors, especially in the agri-food sector [12]. Indeed, in the area farming and tourism are amongst the most relevant activities shaping the social and environmental features of the territory [38]. To make an example, the presence of tourism is strongly linked to the availability of niche products provided by the local agri-food sector such as spelt, Saraceno wheat, corn, sheep, honey and trout, as well as by the presence of a well-developed agro-tourism sector. This is also due to the presence of part-time, pluri-active farms (usually small and diversified farms) [13].

A key feature has been the richness of the social capital, in particular the capacity of local institutions to react to difficult social and economic conditions experienced during the 1980s and 1990s, by adopting a broad range of coordinated public policies and market mechanisms designed and implemented through participatory and inclusive methods and new governance modes. As described by Romano and Tudini [12], until the 1990s Garfagnana experienced an important phase of devolution of power to local institutions by the Tuscany regional administration, which created a decentralized and plural governance system. In the early 2000s, this system created the pre-condition to experiment more innovative solutions, which transformed Garfagnana in a successful example of local endogenous development. Indeed, during the last twenty years the combined effects of local, national and EU policies, together with the development of collective and cooperative initiatives in the agri-food sector, delivered important socio-economic results.

4.2. The Local Agri Food System

Garfagnana area is characterized by a very diversified LAFS, with a very differentiated basket of typical products. This is due to the key support of local institutions, which have been able to implement strategies going well beyond the farming and forestry sectors and trying to include all relevant actors cooperating under the common objective of enhancing the "rural identity." As pointed out by a representative of the local Municipalities Union (MU): "multifunctionality has been one of the keywords of the recent development of the area. Since early 2000s, the strategy of the territory has been based on three focal points, which form the vertices of a triangle and complement and reinforce each other: multifunctionality, quality and identity. In this model, we tried to work on activities that could justify the presence of farmers in the area and at the same time that could make farming activities sustainable from the economic point of view. The farm is the most important element in strengthening this system. Farming diversification and especially agro-tourism is a key factor to improve the economic viability of local agriculture together with the enhancement of biodiversity, quality and landscape."

Two main institutional actors have played a key role for the (multifunctional) development of the LAFS in Garfagnana: (i) the Local Action Group (LAG) Garfagnana "Environment and Development," in charge of implementing the LEADER approach and other local strategies and investments; (ii) the Municipalities Union (MU), the main local authority in charge of the socio-economic development of the area. These two main actors activated a good governance process by taking the lead in coordinating and promoting collaboration among a broad range of rural stakeholders, including farmers and farmers' unions, local consortia, cooperatives and small businesses. In doing so, they were able to capture all policy incentives available (regional Rural Development Program) and to take advantage of a well-structured regional regulatory framework [13]. In some ways, this process can be considered the main driving force through which a broad range of initiatives impacting on LAFS became economically sustainable. Table 2 synthesizes the most relevant initiatives for the provision of ESBs related to the LAFS (conservation of local plants and breeds, valorisation of niche products and development of agro-tourism sector), together with the main enabling factors.

In Garfagnana, the strategy of producing a broad range of local agri-food products is facilitated by several geographical and socio-economic features of the area, such as land terrain, climate, land fragmentation, structural characteristics of the economy and infrastructure facilities. In fact, local agriculture is mainly characterized by the interaction of two different factors: (1) the mosaic

management of the agro-ecosystem based on natural woods, chestnut woods, arable land and pastures; (2) the support of environmentally sustainable agronomic techniques aimed at maintaining traditional agronomic practices (no use of pesticides and synthetic fertilizers, use of manure rotations with perennial forage crops) [38].

Table 2. The most relevant initiatives related to the Localized Agri-food Systems (LAFS) in Garfagnana.

Initiative/Sector	Main Enabling Factors
Conservation of local plants and breeds	(i) Supporting regulatory framework: the Regional Law 64/2004 provides different tools (including financial resources for local institutions and payments for local farmers) to protect and add value to the patrimony of local breeds and varieties; (ii) Presence of the regional Germoplasm seed bank, that plays a central role in motivating and involving local farmers; (iii) Positive attitude of local farmers, the majority of them highly motivated towards the biodiversity conservation objectives.
Valorisation of niche products	(i) Assistance and support provided by the Municipality Union to obtain PDO (Protected Designation of Origin), PGI (Protected Geographical Indication) and other certifications (i.e., slow food); (ii) Coordination amongst local institutions and farmers' associations and consortia; (iii) Presence of Garfagnana Coop, a company which is also a farmers' organization which processes and commercializes the majority of local agro-food products of the area.
Development of agro-tourism sector	(i) Regional laws on agro-tourism (RL 30/2003; RL 80/2009; RL 4/2014) that in mountain areas facilitate the tourism activities also for small farms; (ii) Availability of targeted Rural Development Program measures; (iii) Garfagnana Produce Consortium (GPC) which aims at supporting territorial marketing initiatives for agro-tourisms and local agro-food products (i.e., through websites, fairs and other initiatives).

The preservation of traditional agronomic practices has allowed the maintenance and improvement of species and varieties that otherwise would have suffered strong genetic erosion or extinction as shown, among others, by the cases of Saraceno wheat and Garfagnana spelt amongst the main local crops and by the case of Garfagnina Bianca sheep and Garfagnina beef, the local two endangered animal genetic resources. Other typical products of the area are: the *formenton 8 file*, which is a particular type of corn that has always been cultivated in Garfagnana, traditionally used to make polenta (porridge); the "sweet flour", which comes from chestnuts; honey; trout. Unfortunately, there are not official figures regarding the structures and the markets for the majority of such products, except the products with specific denomination of origin, namely Garfagnana spelt (PGI) and chestnut flour (PDO). PGI Garfagnana spelt is produced by around 50 farmers with a yield of 20–30 tons per years, corresponding to a yearly turnover of about 600,000 euros. PDO sweet flour is produced by less than 20 producers, for a total of 0.3 tons of final product, corresponding to a turnover of 700,000–800,000 euros per year.

As pointed out by the director of the LAG: "In some ways, low quantity of local products has become an added value; we managed to reconcile quality of products with their economic valorisation: we obtain higher prices because of the little quantities produced. The agricultural area is scarce and highly fragmented: the only possible strategy is producing small quantities of many local products including beans, potatoes, spelt, local varieties of wheat and maize, since quality and typicality ensure a fair income to local farmers".

Although each small local supply chain has its own characteristics, it is possible to recognize common features, which make Garfagnana case particularly interesting, also because the development of the LAFS is the result of a joint action of key actors often providing a horizontal support, independently from local products, which are usually produced and commercialized together.

A key actor involved in the LAFS is Garfagnana Coop, a company which is also a farmers' organization processing and commercializing the majority of local agro-food products of the area. This company and, more in general, local farmers are also supported for upstreaming and downstream activities by two other actors, respectively Centro la Piana and Garfagnana Produce Consortium (GPC). Centro la Piana is a section of the regional Germoplasm bank and it plays a central role in involving local farmers in rearing/cultivating local breeds/varieties and more in general in motivating them towards biodiversity conservation objectives (this small area concentrates almost 30% of total custodian growers at the regional level). Whereas, GPC aims at supporting territorial marketing initiatives for agro-tourisms and local agro-food products (i.e., through websites, fairs and other initiatives). Figure 2 shows the main structure of the local agri-food sector.

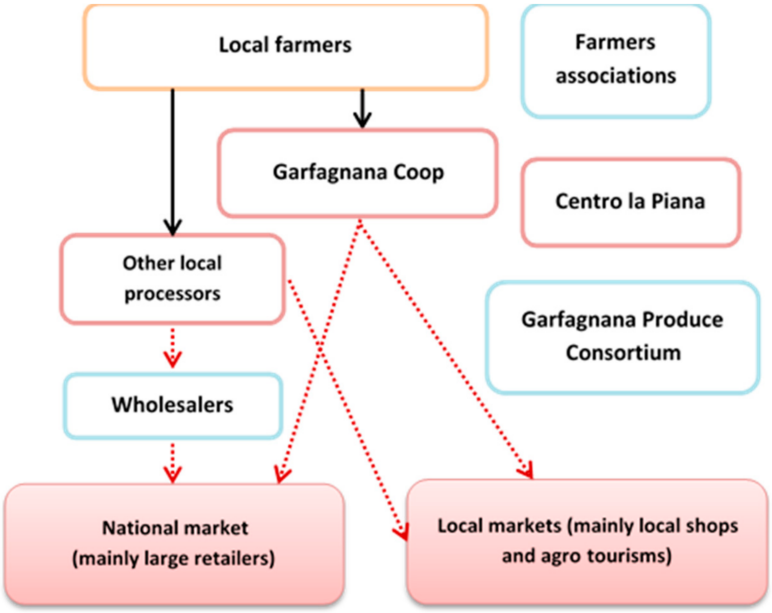

Figure 2. The structure of the agri-food supply chain in Garfagnana.

4.3. The Environmental and Social Benefits Associated to the LAFS

According to local actors, the most representative and relevant ESBs provided in synergy with the LAFS are: (i) biodiversity—high levels of crop and livestock genetic diversity; (ii) landscape—protecting landscape character and cultural heritage; (iii) rural vitality. These ESBs are highly interconnected, since the development strategies implemented in the area are strongly oriented towards the valorisation of both material and immaterial resources of the territory, as well as the combined provision of social and environmental outcomes.

With regard to biodiversity, in Garfagnana there are several initiatives aimed at preserving crop and livestock genetic diversity, with a special focus on traditional breeding and varieties maintained in situ by farmers. The most relevant initiative is the well-developed network of custodian growers, who preserve and cultivate a broad range of traditional crops, together with local farmers' associations that ensure the preservation and livestock farming of traditional breeds (the most relevant traditional breeds are the "Garfagnina Bianca" sheep and the "Garfagnina" beef cattle). According to the stakeholders interviewed, the increasing presence of traditional crops and livestock systems gives a substantial contribution not only to the preservation of agro-biodiversity (crop and livestock genetic diversity) but also to the landscape character and cultural heritage, since traditional agricultural crops are often associated with specific landscape features, such as terraces and open fields and with traditional rural buildings (an example is the "metato", the traditional stone building where chestnuts are dried to make the typical flour): "*the small parcels of land, usually less than a hectare, ensure heterogeneity*

to the cultivated areas and represent a value added to the landscape. In Garfagnana the rotation and diversity of crops, the presence of forests with chestnuts cultivations and the presence of hedges, trees and metato have been reconciled with the agri-tourism sector in a very synergic way, with the overall result of reinforcing the socio-economic structure of the territory" (interview with the director of the LAG). Some data and trends relevant for biodiversity and landscape are provided in Table 3.

Table 3. Biodiversity and landscape: data and trends.

Sectors and Practices	Data and Trends
Crop varieties preserved by custodian growers	In situ conservation and cultivation of 29 ancient horticultural varieties and of 26 ancient fruit varieties (data 2016)
Custodian growers	33 custodian growers in 2016 and additional 19 farmers belonging to the custodian growers network (cultivating but not preserving the varieties)
(in situ) preserved Garfagnina Bianca (white Garfagnina sheep)	In 2003, only 70 heads of the white Garfagnina sheep were left. In 2014, 800 heads were reared by a small network of farms.
(in situ) preserved Garfagnina beef cattle	The number of heads dropped from 6000 in 1956 to 400 in 1998. Actually, there are almost 800 heads reared.
Chestnut wood	Strong decrease during the last 40 years (from 15,000 ha in 1978 to 3000 ha in 2013) but in recent years the quota of cultivated and managed chestnut wood is increasing (from 300 ha in 2008 to 1000 ha in 2013)
Spelt	In the 1980s, only 5–10 ha were cultivated with Garfagnana spelt (it was considered a variety at risk of extinction). In 2016, there were 200 ha of certified PGI spelt.
Grasslands and mountain pastures	The recent increase of traditional livestock system with Garfagnina Bianca sheep and Garfagnina beef cattle has brought to a better preservation of grassland on farm land and of pasture at higher altitude. Unfortunately, there are not official figures on grasslands and mountain pastures recovered.

Source: data collected through the interviews.

The mechanisms through which ESBs are provided are strongly linked to the features of the local system, not only in terms of farming structure and practices but also in terms of rural traditions, cultural heritage, sense of belonging to the rural community, cultural and social habits. Indeed, they are linked to several cultural and social factors which can be synthesized in the concept of "rural identity." According to the stakeholders interviewed, the valorisation of local identity is the main factor involved in the provision of rural vitality, which is ensured not only by the presence of several associations, organizations and consortia but also by traditional agri-food products and associated farming practices, which play a key role in embodying, maintaining and sustaining the "sense of place".

When looking at rural vitality, due to the complexity of interrelated factors contributing to this multidimensional ESB, it is possible to provide only selected information and data that, although indirectly, may capture the main socio-economic trends over the last decades. For example, during the last twenty years the agro-tourism sector has experienced an impressive development: in 1995 there were only 4 agro-tourisms, which became 20 in 1999. In 2016, there were 130 agro-tourisms, corresponding to over 1200 beds and 8000 guests per year, with an annual turnover of 4–5 million euros [13]. To summarize, the quality and quantity of each ESB provided in Garfagnana is the result of a complex combination of policy and market drivers. Policy mechanisms play a central role in this LAFS, however common goals and objectives were also achieved through the activation of market mechanisms. In many cases, in fact, public policies and strategies stimulated local actors and the development of local networks. The most relevant examples are: (i) the regulatory framework and the policy support for agro-tourisms, which enabled local actors to invest in the sector and (ii) the public support and the technical assistance ensured the preservation of local varieties and breeds, finalized to create market valorisation of products through niche markets.

The valorisation of key ESBs was then the result of steady coordination of local governmental institutions, which has been the basis for the development of this rural area, where integrated strategies were implemented for the recovery, preservation and maintenance of the linkages between cultural and biological diversity.

5. Grecanic Area (Calabria)

5.1. The Area

The Grecanic area is located in the southernmost part of Calabria region. Due to the complex interplay of the predominantly mountainous morphology, the poor accessibility of inner villages and the dispersed nature of rural inhabited locations, most of the area suffers from geographical isolation and low provision and access to services for the population and for the productive system that undermine quality of life and economic opportunities. Therefore, over the decades, this area has experienced a gradual and enduring process of peripheralisation marked by loss of population, employment and services and by abandonment and deterioration of the territory. The major source of employment and income comes from the tertiary sector, which is responsible for more than 60% of employment. The remaining employment is provided by agriculture (25%) and industries (14%) [14,15].

Whereas in the coastal municipalities the service sector is predominant, agriculture (mainly livestock breeding and citrus cultivation, among which the most notable bergamot citrus) and the diverse activities associated to it (agro-tourism, village renovation, landscape and environment protection, etc.) are a major source of employment and wealth, playing a vital role in local development.

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 framework, the bergamot cultivation is a way to maintain landscape (bergamot is part of the image and identity of the area), biodiversity and rural vitality [14].

Two key and interrelated factors explain the peripherality in this area: the weakness of local and regional institutions and the social relations based on patronage and opportunistic relations. Both factors feed each other in a mechanism of mutual dependence [15]. The overall effect is that public institutions (municipalities, national park, province, mountain community, regional administration) are unable to design a comprehensive and effective strategy to promote the creation of local public goods necessary to change living and employment conditions for the inhabitants. This means that the area suffers from "political" inability, as one local expert points out: "*One of the most relevant weaknesses is the quality of public institutions, both political and administrative, they do not perceive as a priority task the problem of development*".

5.2. The Local Agri-Food System

The local agri-food system is shaped by the widespread presence of bergamot, which is a high-specific species of citrus, whose cultivation is concentrated in this area (90% at world level) due to very peculiar climatic conditions (temperate climate even in wintertime, mitigating action of the sea, low difference in temperature between day and night, etc.) [14]. The local geographical features make unique the essential oil of bergamot produced in this area, characterised by 354 diverse fragrance components and therefore highly requested by the big companies of the perfume industry (the essential oil processed in the area is used in more than 65% of women's perfumes and almost half of men's fragrances). Moreover, a small portion of the production is also used in the local food industry, as well as in the pharmaceutical and cosmetics industries.

The typical landscape of Grecanic area is strongly dependent on the permanence of bergamot cultivation, which is highly appreciated by local and foreigner tourists. This implies that bergamot chain, including the processing of the primary products, has important second-order socio-economic impacts on the local economy [15]. In addition, several typical products (local sweets, bergamot beverages, perfumes, etc.) use as primary ingredient bergamot fruits and provide local economy a further source of income.

The bergamot cultivation is mainly concentrated in the coastal area of the province of Reggio Calabria. Farm structure is mostly small sized: 2/3 of bergamot farms are below 1 hectare and 89% below 3 hectares, concentrating about 72% of the entire area cultivated with bergamot [15].

The main institutions of this LAFS are two different consortia of bergamot producers: Unionberg and Bioassoberg (see Figure 3 for the schematic representation of the supply chain).

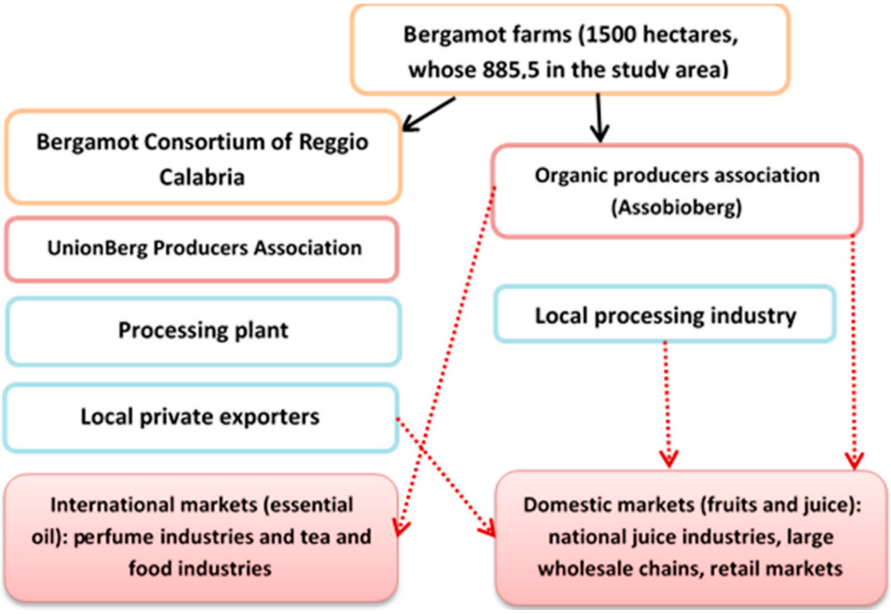

Figure 3. The bergamot value chain in Grecanic area.

Unionberg gradually took the place of the previous State-driven consortium and contributed to consolidate the conventional supply chain, within which 95% of the entire bergamot oil production is processed. Bergamot essence is exported in international markets through four private wholesalers having direct relations with cosmetic perfumery industry and food industry abroad.

Despite the presence of a Producers' Organization (Unionberg), the market is characterized by an oligopolistic structure, where few local private exporters buy the essence (and partly also process the primary production to obtain the essence) and sell it abroad to big cosmetic perfumery and food industries. In practice, the annual price of the bergamot essence is set by exporters depending on the international demand and on the annual production of bergamot fruit available in the area.

In parallel to the conventional market, an alternative supply chain has taken places during the last decade, represented by a small consortium of producers under Assobioberg (on the right side of Figure 3). This consortium gathers a small part of the production (about 5%) but its high-quality is certified as organic and pure essence, without any sort of manipulation. This production is processed by a small local industry and it is sold directly to international buyers (multinational cosmetic and perfumery industry), without any brokering by commercial operators. This allows the Assobioberg members benefiting from two additional premium prices: (a) the additional price for organic production; (b) the commercial margin, that elsewhere is usually taken by exporters.

Motivations are not only of economic nature (better prices) but also include different values and objectives characterizing the producers associated to Bioassoberg. In this regard, qualitative interviews highlighted the cultural and social distinctiveness of these producers (since the bergamot is also perceived as one of the main cultural asset in the area) and pointed out, among other motivations, the desire of escaping from the oligopolistic structure of the value chain. As underlined by the president of Assobioberg: "*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. When tourists come here, I don't sell simply a commodity, I am selling part of my identity. Everyone here has a family history linked to the bergamot. Our grandfathers and fathers were very wealthy producers of bergamot*".

The main strength of this organization is the common basis of shared values (trust and reciprocity) but also common practices and strategies (high-quality of the production and the adoption of

sustainable methods: "*Assobioberg aims to valorise the product quality. The big consortium (Unionberg), instead, aims to get only better prices and to the satisfaction of farmers for the price. We believe that quality is essential in the relation with our clients (buyers). Farmers in Unionberg don't care about who is buying their product, the main concern being the price. They sell all production to exporters and do not have any contact with their clients. Clients of our consortium, instead, contact us directly because they know us and the high-quality product*".

In this case, there was also a process of collective learning because the direct contact 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 scarce.

Table 4 synthesizes the most relevant enabling factors contributing to the aggregation of the supply chain and the enhancement of production quality.

Table 4. The most relevant initiatives related to the LAFS in Grecanic area.

Initiative/Sector	Main Enabling Factors
Supply aggregation and product quality enhancement	(i) Public consortium set up by the State at the beginning of 1930s, operative until 1990s. (ii) The creation of a private organic consortium (Bioassoberg) in 1995 and new relations with foreign perfume industry (1998–1999). (iii) A second greater consortium (conventional production) was created in 2003. (iv) Increasing demand of essential oil from international market and also new applications of bergamot oil/fresh product in the food industry and pharmaceutical fields.
Conservation of peculiar landscape and sustainable practices	(i) Appreciation of organic production from foreign perfume industry. (ii) Public support from RDP 2007–2013 to bergamot growers. (iii) Need to save water resources in times of decreasing water supply due to climatic changes. (iv) More careful use of natural resources by more professional farmers.
Development of rural tourism	(i) Increasing appreciation of landscape characteristics by naturalistic tourism. (ii) Development of new forms of tourism in inner areas (mountain areas of Aspromonte). (iii) Strong public investment in village renovation (RDP and Cohesion policies).

5.3. The Environmental and Social Benefits Associated to the LAFS

In Grecanic area the improvements in the provision of ESBs are strongly dependent on new institutional arrangements of the LAFS of the bergamot production. How have these organizational/institutional changes impacted on the provision of ESBs at local level over the period examined? They impacted on ESBs both indirectly and directly.

The setting up of the two consortia brought about indirect effects through the contractual arrangements that Unionberg and Assobioberg set every year with the main buyers (local exporters for Unionberg, international buyers for Assobioberg). Both types of contracts have positive indirect effects on farm incomes, via the stabilization of annual market prices of the bergamot essence. These contractual arrangements contributed to the recovery of the bergamot cultivation and, consequently, to the conservation of the landscape. Moreover, they had positive impacts on rural vitality, notably through the increase of employment in the local processing industry of essential oil and in the tourism sector.

The role of the bergamot cultivation in the creation of landscape is linked not only to the presence of a typical evergreen tree (quite similar to other citrus trees like oranges, lemons and tangerines)

giving the image of a lush countryside but also to the presence of other landscape features associated to bergamot farming practices: hedges, rows and dry-stone walls. These landscape features are a key component not only of the quality of landscape but also of the territorial capital needed to maintain a sustainable land management. In the study area, bergamot farms adopt and maintain hedges, rows and dry-stone walls more than non-bergamot and other permanent crops farms (Table 5) and these components increase as the bergamot size increases: the highest share of adoption of conservative practices belongs to farms with more than 5 hectares under bergamot.

Table 5. Components of landscape (hedges, rows and dry-stone walls) by farm size in the study area (% of total farms of each size group).

Farm Size (Hectares of Bergamot)	Farms with Hedges	Farms with Hedgerows	Farms with Dry Stone Walls	Total Farms
no bergamot land	5.5	8.0	14.8	100.0
≤1	6.5	12.3	16.9	100.0
1.01–3	8.2	11.4	19.0	100.0
3.01–5	5.7	11.4	20.0	100.0
>5	18.2	21.2	24.2	100.0
Total	5.8	8.7	15.2	100.0

Source: our elaboration from Istat, Agricultural Census data, 2010 [39].

Another important relation between LAFS and ESBs is linked to the production contracts between Assobiorberg and international buyers, which have a direct impact on the diffusion of organic practices and, consequently, on the reduction of pesticides in the area. Therefore, a greater diffusion of organic production would be strongly beneficial for the provision of ESBs in the area, given that organic production has been scarcely adopted by bergamot farms (Table 6). However, the share of surface under organic production grows as the bergamot surface increases in the farm.

Table 6. Surface under organic production by farm size in the study area.

Farm Size (Hectares of Bergamot)	Surface under Organic Bergamot (Hectares)	% of the Total Organic Surface	% of Bergamot Surface
no bergamot land	2.4	0.0	-
≤1	9.1	0.0	5.3
1.01–3	108.9	0.2	37.5
3.01–5	71.2	0.4	52.9
>5	186.7	0.4	64.4
Total	378.1	0.1	42.7

Source: our elaboration from Istat, Agricultural Census data, 2010 [39].

Finally, with regard to rural vitality, the interlinkage of this ESB with bergamot cultivation can be evaluated only in a qualitative way. At the same time, data reveal that bergamot farms rely more on hired labour compared to the other types of local farming, especially when farm size is above 3 hectares. This component becomes very relevant, about 60% of total labour requirements, above 5 hectares of bergamot [14]. This implies that a further diffusion of bergamot cultivation and, in particular, the increase of cultivated area at farm level could have very positive impacts on the local labour market. Moreover, bergamot farms need a series of technical services, partly supplied by processing industries (technical assistance), partly by other firms, especially contract firms specialized in agricultural operations (contract labour). Usually, bergamot farms demand contract labour for farm operations and relatively more than other farms [15].

Another process is the growing demand for rural tourism in the area, which creates an increasing awareness of the multi-purpose characteristics of the bergamot production. On one side, this trend generates a new demand for essence oil, fresh fruits and other by-products from bergamot, coming mainly from the richest markets of Northern Italy and other European countries. On the

other side, the conservation of a peculiar landscape (of which bergamot is a fundamental component, with evergreen trees and its typical hedges, rows and dry-stone walls), located in a geographical position between the mountains and the seaside, creates new opportunities for the development of tourism facilities (agri-tourism farms, rural tourism, specialized services for nature hiking, etc.).

6. Conclusions and Policy Implications

In this article, we examined the main drivers for the provision of environmental and social benefits associated to different types of LAFS in peripheral areas. The two LAFS selected as case studies are located in two Italian regions characterized by very different socio-economic dynamics: Tuscany and Calabria. The methodological frame of the analysis assumes as reference two streams of literature: on one hand, the broad spectrum of works focused on assessing the provision of public goods by agricultural and agri-food systems; on the other, the extensive literature on localized agri-food systems.

As far as LAFS is concerned, Garfagnana presents a bundle of high-quality and diversified agricultural products, while Grecanic Calabria focuses on one product (the bergamot) that represents a sort of territorial brand of the area. The primary production, processing and marketing is based on small-scale structures in Garfagnana, while in Grecanic Calabria processing and marketing of the bergamot essential oil is entirely in the hands of few big exporters who dominate the market within an oligopolistic structure. These differences in the value chains structure, as described above, pave the way to a different distribution of the power among the chain actors: the structure of the chain is simpler and well-balanced in Garfagnana, while it is complex and strongly unbalanced in Grecanic area. In both areas, the LAFS has strong implications on ESBs: in Garfagnana especially on biodiversity, landscape and rural vitality; in Grecanic area on landscape, water availability and rural vitality. Finally, both LAFSs show strong interplay with tourism development, both directly and indirectly, because biodiversity, landscape, water availability and rural vitality represent the fundamental ingredients for tourism in both areas.

Although through different mechanisms, in both cases the provision of ESBs can be summarized as the product of the interplay among three fundamental types of drivers: markets factors, policy mix (the set of policies implemented in the specific territorial context) and collective actions performed by local actors to promote new governance patterns and new institutions. In Garfagnana the role of the historical and rooted social capital enabled a widespread climate of cooperation among local actors, driven by two strong local institutions set up over the time (the LAG and the municipality union). On the opposite in Grecanic area the lack of social capital and the presence of patronage/inefficient institutions generated a climate unfavourable to the provision of ESBs for a long time.

In Grecanic area environmental and social benefits were ensured only relatively recently mainly due to the interactions between (bergamot) market drivers and collective action (a coordinated action stimulated by a consortium of organic producers), whereas specific agricultural policies played only a marginal role in promoting the valorisation of the typical fruit supply. Non-agricultural policies, instead, especially those focusing on tourism development and village renovation have been much more relevant for the area and for the positive interactions generated on LAFS (increasing food demand from tourism presence in the area). Contrarily, in the Garfagnana area policies and local governance were the key drivers: in particular, the coherence and coordination of public investments and the ability of local institutions to stimulate private initiatives were the winning factors.

In both areas, among the diverse market factors, a significant role is played by the demand for quality products and their distinctiveness. Market valorisation deriving from mechanisms such as organic certification, PDO and PGI denominations, have supported local producers and allowed preserving bio-diversity, landscape and promoting rural vitality [40]. However, these mechanisms cannot be the exclusive key drivers, since collective approach turned out to be determinant in ensuring effectiveness over time in providing ESBs.

In conclusion, the two case studies highlight that localized agri-food systems in peripheral areas have a strong potential in delivering a broad range of environmental and social benefits, which are

highly valued by local communities and consumers. However, this potential varies to a large extent according to the type of socio-ecological system in place, as well as on the type of interactions of market drivers with public policies and collective action.

Progress towards a more efficient/effective provision of ESBs in peripheral areas is largely dependent on the local socio-economic and institutional conditions and, above all, by the conditions that favour a coherent and successful interaction between policy mixes, collective action and local agro-food systems. Indeed, the efficiency of rural development policies aimed at providing ESBs depends not only on the design and implementation phases of specific measures but also on the capacity of public support in stimulating alternative (and innovative) mechanisms of public goods provision. The case studies observed and analysed show that policy mixes should further stimulate collective action, private schemes and other mixed public-private arrangements, in order to better involve rural stakeholders in the definition and delivery of environmental and social benefits associated to farming. One of the most serious limitations of the present policies is given by the too narrow focus: the majority of funding instruments has been addressed to specific activities, whereas investments in infrastructure or payments for environmental land management have been characterized with agreements negotiated in a rather atomistic way, that is, by land managers. Although measures aimed to enabling advice provision, capacity building, cooperation and community-led local development exist, to date their use in EU programs has often been fairly limited [35,40].

The Communication on the Common Agricultural Policy post-2020 and the related proposals of CAP regulations underline some arguments which are in line with the main findings of this study. First, it points out the importance of a food chain approach aiming to improve the position of farmers in the value chain, in terms of distribution of the bargaining power and, consequently, of the value added within the food chain. Second, it emphasizes the need of encouraging "the promotion of cooperative/collective approaches, involving farmers and stakeholders in a result-oriented delivery of environmental and climate public goods" [41] (p. 20).

In this regard, the case studies analysed here highlight that governance solutions achieving a more favourable distribution of value added for farmers can have positive implications for the provision of public benefits. Other important findings concern the relations between LAFS and other economic activities: relevant actors are not only operators in the processing and marketing segments of the food chain but also research/development institutions, NGOs and other non-agricultural firms closely connected to the food value chain (e.g., rural tourism). Both case studies reveal that co-operation between land managers and other commercial actors, civil society and public actors is beneficial to the provision of public benefits. This implies that the cooperative/collaborative approach should be open to the participation of a larger set of actors and the EU Common Agricultural Policy (CAP) should promote it through adequate incentive and rules. Consequently, the focus should not be only limited to the CAP as sectoral policy but it has to be broadened to consider, within a proper mix of instruments, including environmental and regional development policies.

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Appendix A

Table A1. List of environmental and social benefits.

Environmental and Social Benefits	Short Description	Dominant Dimension
Food security	Achieving (or maintaining) a sustainable natural resource base to ensure a long-term food supply hence security	Economic, social, environmental
Water quality	Achieving (or maintaining) good ecological status of surface water and good chemical status of groundwater	Economic, social, environmental
Water availability	Achieving (or maintaining) a regular supply of water (i.e., avoidance of water scarcity)	Economic, social, environmental
Air quality	Achieving (or maintaining) minimized levels of harmful emissions and odour levels	Environmental and social
GHG emissions	Achieving (or maintaining) minimization of greenhouse gas emissions	Environmental and social
Carbon sequestration/storage	Achieving (or maintaining) maximization of carbon sequestration and storage	Environmental
Fire protection	Achieving (or maintaining) a high level of prevention and minimization of impacts of potential fires	Environmental and social
Flood protection	Achieving (or maintaining) minimization of impacts of potential floods	Economic, environmental and social
Soil functionality:	Achieving (or maintaining) good biological and geochemical condition of soils	Environmental and social
Soil protection	Achieving (or maintaining) minimization of soil degradation	Environmental
Species and habitats	Achieving (or maintaining) the presence of diverse and sufficiently plentiful species and habitats (ecological diversity)	Environmental
Pollination	Achieving (or maintaining) high levels of pollination	Environmental
Biological pest and disease control through biodiversity	Achieving (or maintaining) high levels of biological pest and disease prevention and minimization of the impacts of potential outbreaks using biodiversity	Environmental
Landscape character and cultural heritage	Maintaining or restoring a high level of landscape character and cultural heritage	Social and environmental
Outdoor recreation	Achieving (or maintaining) a good level of public access to the countryside to ensure public outdoor recreation and enjoyment	Social
Health and social inclusion:	Achieving (or maintaining) an appropriate level of therapeutic/social rehabilitation activities in relation to farming and forestry	Social
Farm animal welfare	Achieving (or maintaining) the implementation of high farm animal welfare practices on farms	Social and environmental
Rural vitality	Achieving (or maintaining) active and socially resilient rural communities	Social

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