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**The role of collective action in the provision of agri-
environmental public goods: theoretical development
through case studies in Italy**

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Acronyms

AEM	Agri-environmental Measure
AIS	Agriculture Innovation System
AKS	Agricultural Knowledge System
ASSAM	Agenzia Servizi Settore Agroalimentare delle Marche
CAP	Common Agricultural Policy
CPRs	Common Pool Resources
CTE	Contrat Territorial d'Exploitation
GT	Grounded Theory
ILDS	Integrated Local Development Strategies
IPM	Integrated Pest Management
ITP	Integrated Territorial Project
LAG	Local Action Group
LRDP	Local Rural Development Plans
MD	Mating Disruption
NVZ	Nitrate Vulnerable Zone
PRA	Participatory Rural Appraisal
PSE	Payments for Environmental Services
RDP	Rural Development Plan
RRA	Rapid Rural Appraisal
TAEA	Territorial Agri-Environmental Agreement
TORA	Theory of Reasoned Action
TpB	Theory of Planned Behaviours
UAA	Utilised Agricultural Area

From a centralistic, technocratic perspective a landscape of local and regional institutions which were set up to deal with local problems are often regarded as “chaotic”. But this labelling is wrong. In fact, the capacity of associations set up by responsible citizens to find solutions for real problems is outstanding and more human.

Elinor Ostrom

(Nobel Prize Lecture, 2009)

Introduction

The public support to agriculture is increasingly under scrutiny from governments, academic, policy analysts, NGOs and producers organisations. In particular, at the EU level, the debate on the future orientation of the Common Agricultural Policy (CAP) is increasingly shaped by the role of agriculture in providing public goods, and there is a broad consensus that this approach will be particularly relevant in legitimating the EU policy intervention in agriculture in the future (Cooper *et al.*, 2009).

Several studies (OECD, 2010a; Renting *et al.*, 2009; Van Huylenbroeck and Durand, 2003) have analysed the complex relationships between agriculture and public goods, describing all the positive or negative effects (externalities) associated to agriculture for which markets are absent.

A detailed classification of public goods associated to agriculture has been provided by Cooper *et al.* (2009), who classify public goods into two main categories: environmental goods and non-environmental goods (or social goods). In the first category are placed those public goods closely related to environmental externalities as farmland biodiversity, water availability and quality, resilience to flooding and fire, climate stability (mainly carbon storage and reducing greenhouse gas emission), agricultural landscape. In the second one are placed those public goods more related to the social dimension of agricultural activities, such as farm animal welfare and health, rural vitality and food security.

From a theoretical perspective, the provision of public goods and the provision of positive environmental externalities through agriculture has been acknowledged by the concept of multifunctional agriculture. The well-known OECD's (2001) working definition of multifunctional agriculture includes two core elements that are particularly relevant for the public goods debate, both in terms of theoretical development and in terms of policy definition. The OECD acknowledges 'the existence of multiple commodity and non-commodity outputs that are jointly produced by agriculture and the fact that some of the non-commodity outputs exhibit the characteristics of externalities or public goods, with the result that markets for these goods do not exist or function poorly'.

Thus, multifunctionality has represented the main conceptual framework to understand the public goods objectives that have been pursued through the EU policies, especially during the last decade.

To incentivise the multifunctional role of agriculture and to overcome the market failures caused by public goods and externalities associated to sector, a broad set of

agri-environmental policies are currently in place, based on environmental standards and regulation, taxes, payments, tradable permit schemes, etc.

An increasing number of scholars is analysing the effectiveness of these measures (see Cooper *et al.*, 2009; Desjeux *et al.*, 2011), while other studies focus on the proposals on how re-orienting agricultural policies to increase their efficiency and effectiveness in providing public goods (see Anania *et al.*, 2009, Buckwell, 2009; Bureau and Mahé, 2009; Zahrnt, 2009; Hart *et al.*, 2011). All these studies show that no single instrument can achieve all the public goods objectives, but in many cases policy mixes are needed in order to combine instruments that complement each other.

At the same time the literature shows that in many cases the policy tools implemented to date have been largely inadequate to provide agri-environmental public goods at the required scale, by acknowledging the need of carrying out additional theoretical and empirical researches on the relations between agricultural and rural development policies and the provision of agri-environmental public goods.

It may be also observed how in this academic and institutional debate one of the more understudied issues is the role of collective action for the provision of agri-environmental public goods.

Indeed, the many studies related to public goods associate with agriculture have mainly focused on individual farms rather than on collective action, while in many cases it is evident that in order to provide effectively agri-environmental public goods such as biodiversity and landscape a collective approach is necessary, with a joint involvement of farmers and of other rural stakeholders in the same area.

It may be also observed that the majority of studies related to natural resources and collective action are mainly based on the management of Common Pool Resources (CPRs) in developing countries, while few studies are focused on general collective action theory or on collective action for agri-environmental public goods in developed countries (Ayer, 1997; Davies *et al.*, 2004).

At EU level, for example, it is not clear to what extent collective action could be taken into consideration as a valuable alternative to market or state regulation in contributing to the provision of environmental public goods associated with agriculture, and to what extent is possible design and implement agricultural policies that incorporate a collective approach for the provision of agri-environmental public goods.

Thus, the aim of this research is analysing the role of collective action in the provision and protection of environmental public goods through agriculture at EU level, as well as providing policy recommendations regarding agri-environmental strategies based on these collective approaches.

Could collective action be an important driver of workable solutions regarding the provision of agri-environmental public goods through agriculture? Which are the main drivers that stimulate the participation of farmers into collective actions? How can government stimulate collective action? At which level of government collective action can be better stimulated? What kinds of policies are necessary to promote collective action?

The present research aims at addressing these questions by exploring, through participatory methods, two case studies of collective action for the provision of agri-environmental public goods that have been recently developed in Central Italy.

The in depth analysis of these case studies was completed with an extensive work of literature review, in order to contribute with some insights to the theoretical development on the role of collective action for the public goods associated to agriculture. Indeed, as observed above, this argument, at least in the context of developed countries, is largely unexplored.

The thesis is structured in eight chapters.

The first chapter provides an introduction to the research subject as well as a detailed description of the conceptual framework which has been used in analysing the role collective action for the provision of agri-environmental public goods. The conceptual framework was completed with the definition of the research thesis, the research objectives and the four research questions. The chapter concludes with a short description of the two case studies.

The second chapter describes the theoretical approach regarding the definition and the provision of public goods. This theoretical approach, rooted in institutional economics, is then applied to the relation between agriculture and the associated public goods and externalities. The chapter describes the different approaches to multifunctional agriculture as well as the type of analytical framework needed to address the public goods agenda in a policy context. It is showed how the different approaches in the notion of multifunctionality have different implications in terms of policy development and policy implementation. This analysis critically assesses the most conventional scientific formulations for approaching multifunctionality, based on neoclassical economics, by showing how this approach provides only partial and limited insights into possible trajectories of the public intervention in agriculture. It is then showed that the conventional approach has usually a narrow focus on the policy instruments needed to incentivise multifunctional activities at farm level, while a 'wider' approach on multifunctionality, rooted in institutional economics, allows exploring innovative policy tools and institutional arrangements that may be effective in providing public goods at territorial scale.

On the basis of this theoretical approach, chapter three focuses on the definitions, role and characteristics of collective action. A very relevant issue to consider when analysing the dynamics of collective action is what type of organisation has developed such action, and this section provides a detailed description of the main institutional arrangements that may favour the development of grass roots collective action aimed at increasing the provision of public goods. It is argued that some innovative institutional arrangements based on mixed private-public solutions, such as co-production and co-management, may represent effective territorial strategies to promote and support collective action. The analysis then is shifted towards the conditions that must be specifically addressed to favour the implementation of collective strategies aimed at providing public goods through agriculture. The final sections of the chapter shows how the provision of agri-environmental public goods, by showing the necessary structural shift regarding farmers behaviours and attitudes, together with a new structure of the agricultural knowledge and innovation systems in agriculture.

Chapter four explains the methodology employed in the research. It introduces the epistemological approach, which is based on social constructivism, and the participatory methods used, by describing their relevance to address the research objectives. It also provides a detailed description of the Rapid Rural Appraisal methods utilised for the analysis of the collective action through the two case studies. Since one of the most important methodological tools used in the research have been semi-structured interviews, the final section of this chapter describes the analytical approach used to analyse the data collected through the interviews, which is based on the Grounded Theory principles.

The case studies are analysed and described in chapters five and six.

Chapter five describes the collective action related to the ‘Custodians of the Territory’ project, an initiative promoted by a territorial agency of a mountain area of Tuscany (reclamation district “Media Valle del Serchio”) which set an agreement with local farmers for co-production of some environmental services such as the cleaning of rivers, riverbeds, rivers banks and canals. This collective action shows how the relations between farming activities and environmental services could be addressed at territorial level, what resources are mobilised during the related collective action, what type of information is exchanged and what outcomes are reached. The case study shows how social learning and co-production of knowledge (amongst farmers, institutions, technicians, and citizens) are very important issues for a collective provision of environmental services.

Chapter six describes the innovative and collective approach to agri-environmental action which was experienced in Valdaso area (Marche region), where a group of farmers started a grass root initiative to adopt integrated agriculture at territorial

scale, with the objective of protecting water and soils from pesticide and nitrate pollution. This collective action was supported by the regional and provincial authorities, which settled a territorial agri-environmental agreement financed by the regional Rural Development Programme. The case study shows that farmers' collective action may play a significant role in controlling negative externalities from agriculture, especially if local institutions positively influence collective decision making behaviours, by structuring a range of incentives, capacity building programs and technical assistance to align individual and group interests and, above all, private and public goods objectives. Finally, through the analysis of this initiative it was possible to explore how a collective approach to agri-environmental action could be better embedded and institutionalised in the current political settings.

Chapter seven summarises the findings of the previous two chapters through a more detailed discussion of the theoretical and policy implications of such results, also in the light of the four research questions.

Chapter eight draws some conclusions regarding the role of collective action in agriculture, together with some suggestions for further research.

1 Collective action and public goods provision

1.1 Background

The increasing attention to the role of agriculture in the provision of public goods must be contextualized in an evolutionary process which has involved the support to the primary sector over the last decades, where an increasingly importance of new issues has emerged, which have extended the initial objectives of the agricultural and rural development policies towards the main goal of sustainability.

Indeed, it has been increasingly recognised that the EU agriculture must satisfy the demands of the market for food but also the expectations of society concerning the environmental public goods associated to the sector, such as agricultural landscapes, farmland biodiversity, water quality and water availability, climate stability (greenhouse gas emissions and carbon storage), air quality, resilience to flooding and fire.

From this perspective, one of the main challenges related to the development of policies for public goods provision is ensuring a high competitiveness of the EU agricultural sector and at the same time maintaining (or increasing) the provision of those agri-environmental goods. Indeed, since the EU agricultural is facing significant pressures to concentrate and specialise production, to increase economies of scale and to maintain competitiveness, agricultural practices adopted to pursue such efficiency gains usually have to replace environmentally beneficial management practices.

Thus, in order to ensure an adequate provision (and protection) of the environmental public goods associated to agriculture, the public intervention is crucial, especially in areas where there is a strong evidence of the negative environmental impacts of the agricultural practices.

For this reason, it is evident the need of carrying out theoretical and empirical research on the institutional mechanisms and on the policy measures that could ensure an adequate provision of agri-environmental public goods.

The need of increasingly the provision of public goods through the EU agricultural policies has been particularly emphasised since the 2008 CAP Health Check that, by further increasing the level of decoupling, has further stressed the uncertainties in how conciliate the objectives of competitiveness with the social and environmental objectives of the primary sector (Brunori *et al.*, 2008).

In the current debate for the CAP post 2013, the role that agriculture has to play in delivering public goods in Europe has been recognised in the European Commission's Communication of November 2010 'The CAP towards 2020: meeting the food, natural

resources and territorial challenges of the future' (European Commission, 2010). This document sets out three key objectives for the CAP to 2020: viable food production, sustainable management of natural resources and climate action, and balanced territorial development, all three of which relate to the provision of environmental and other public goods by land managers (Hart *et al.*, 2011).

One of the main limitations of the agri-environmental policies currently implemented is that they are focused on and targeted to individual farms. On the opposite, there is an increasingly recognition that agri-environmental public goods could be more effectively delivered if farmers in a given area take joint action.

The European Court of Auditors, for example, in a recent report on the EU agri-environment support (ECA, 2011, p. 43) claimed that 'in certain cases it may be necessary to have in a particular geographical area a minimum number of farmers signing a contract. Such cases can be to maintain/improve a typical local landscape, to reduce pollution in a river catchments area, or protecting certain species or habitats'. The European Commission, in its reply, argued that 'it is strongly in favour of collective approaches to agri-environment objectives and contracts [...] however [the collective approach] requires a certain structure, organisation, provisions of advice and is often linked to higher transaction costs. It may also be difficult to establish collective contracts under the current rules, since there has to be joint responsibility for respecting the rules'.

At the same time, the European increasingly recognise the need of addressing these barriers, since an effective implementation of agri-environmental measures may be better secured by adopting landscape scale and territorial approaches to delivery, by ensuring that the focus of action widens beyond the individual farm to adopt a more integrated approach towards achieving sustainable solutions in rural areas (Hart *et al.*, 2011).

A recent OECD (2012b) study on farmers' behaviour reveals, for example, the importance of collective action in the context of mitigation and adaptation to climate change. Similarly, public goods such as biodiversity and landscape may be provided efficiently only by multiple persons and through collective action of farmers and other stakeholders in rural areas. At the same time collective agri-environmental strategies are difficult to implement, because of several structural and organisational barriers related to transaction costs, as well as to monitoring and enforcement rules.

Nevertheless, in the several Member States and regions across Europe it is possible to find some example of collective approaches in delivering agri- environmental public goods.

Environmental co-operatives in the Netherlands, for example, are formal organisational structures that offer members the opportunities to participate

collectively to projects related to sustainable agriculture. These co-operatives, defined by Renting and Ploeg (2001, p. 87) as ‘innovative associations of farmers based at local or regional level, which promote and organise activities related to sustainable agriculture and rural development in their locale’, offer the opportunities to operate at landscape level, a scale that is more appropriate to address ecological issues (Franks and McGloin, 2006).

Another example in the Netherlands is the ‘Meadow Birds Agreement’, an agri-environmental scheme applied at landscape level, which require that 10-20% of entered land is subject to the delayed mowing scheme and the minimum eligible area for a collective package is 100 ha (Schwarz *et al.*, 2008; Verhulst *et al.*, 2007).

The ‘Hedgerow Planting Scheme in Denmark’, originated to prevent soil erosion, it has expanded its objectives to also increase biotopes and ecological corridors on agricultural land. The scheme is not exclusive to collectives only, individuals can apply but in 2005 78% of all funded projects were collective (Schwarz *et al.*, 2008).

In France different integrated policy tools have been implemented, such as the CTE, or ‘Contrat Territorial d’Exploitation’ (land management contracts), during the programming period 2000-2006, which represented territorial contracts combining different agri-environmental measures and CAD, or ‘Contrat d’Agriculture Durable’, the collective contracts following CTE (Allaire *et al.*, 2009).

The examples listed above are only a not exhaustive list of a higher number of local strategies across the EU, financed both the RD measures of the current (2007-2013) and next (2014-2014) programming period, which involve a territorial and collective approach to agri-environmental public goods provision.

Some of these examples show the importance, in order to provide effectively agri-environmental goods at territorial level, of the use of multiple RD measures in combination, by using the agri-environmental measure (214) but also Natura 2000 measure (213), non-productive investments (216), natural handicap payments (211 and conservation of rural heritage (323). In many cases these measures were integrated with accompanying measures, especially vocation training and advice (111).

Moreover, together with initiative strictly related to the RD policies, in many other examples the collective approach was pursued through public or private initiatives within the different Member States. Such initiatives are particularly interesting to be explored in order to understand how it is possible support these approaches that are currently in part or totally outside the CAP, through specific RD policy.

All the collective initiatives described in the literature (see Hodge and Reader, 2007; Cooper *et al.*, 2009, Poláková *et al.*, 2011) show that there are different ways to deliver agri-environmental public goods collectively. At the same time, all these approaches

usually interrelates and overlap and it is not easy to create divisions and to classify them. This variation reflects the complexity of the different agricultural and forestry practices as well as the need of tailoring the strategies to the local and regional needs.

For this reason it is evident the need of carrying out additional theoretical and empirical research on the institutional mechanisms and on the policy measures that can ensure a collective delivery of agri-environmental public goods in the different contexts across Europe.

1.2 Conceptual framework

The provision of agri-environmental public goods is a very complex task which encompasses several dimensions, such as the bio-physical, socio-economical and socio-political dimensions. In many cases the public or private solutions which are currently in place to pursue the public goods objective have failed in address the complexities and the interrelations of these dimensions, by focusing on the implementation of single measures aimed at optimising single dimensions.

In order to ensure an adequate provision of public goods through agriculture, in many cases pre-established and command and control measure are not effective, but it is necessary to propose solutions that fit with local ideas and visions. On the opposite, as will be extensively discussed in this research, in many cases the agricultural and rural development policies implemented for the provision of public goods do not take adequately into account the local situation as a starting point, and fail in incorporating the wishes, ideas and capabilities of local communities.

In the present research it is argued that this approach is unsatisfactory and vulnerable in many ways, since the increasing political, technical and social complexities regarding the relations between agriculture and public goods require integrated and more complex solutions.

The thesis supported in this research is that ***a new territorial approach, based on collective action, may represent an innovative and cost-effective way to deliver and protect agri-environmental public goods in rural areas.***

From a policy development perspective, this thesis implies the need of exploring innovative forms of intervention, which take more into consideration the collective dimension of agri-environmental action and, above all, that could represent viable and effective solutions, better tailored on the local situations.

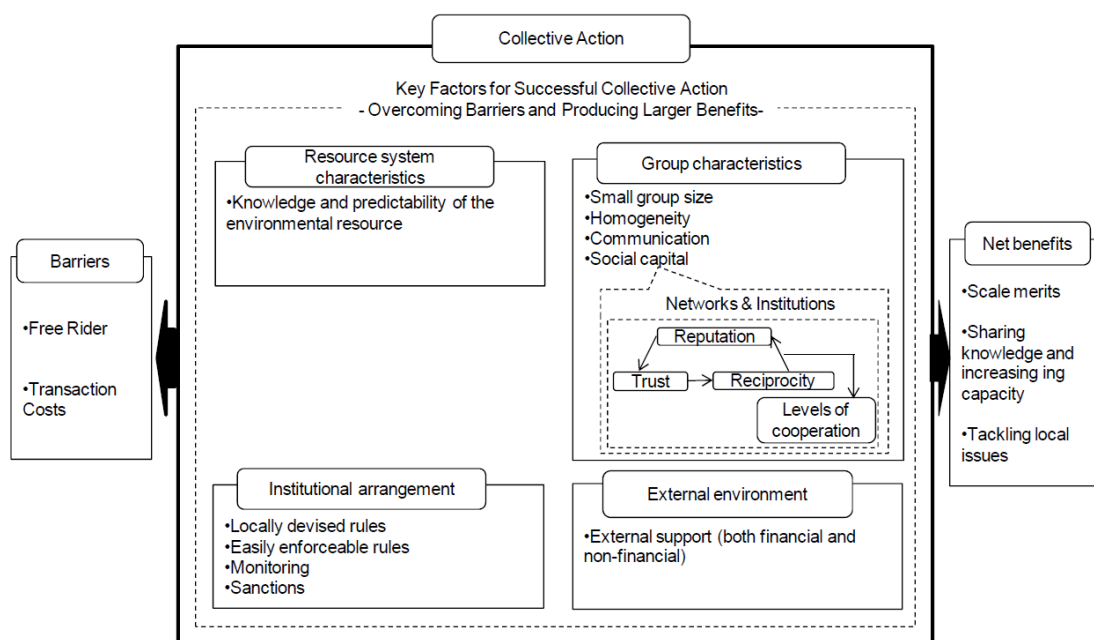
The conceptual framework supporting this thesis was based on the most relevant literature on collective action and natural resources, mainly rooted on institutional economics (Olson, 1965; Ostrom, 1990; 1994; 2007; Pretty, 2003; Wade, 1987). A special attention was given to the analytical framework that has been specifically

developed for the analysis of collective action associated to agriculture and rural development (Ayer, 1997; Davies *et al.*, 2004; Meinzen-Dick *et al.*, 2004).

Collective action was defined by Marshall (1988) as ‘the action taken by a group (either directly or on its behalf through an organization) in pursuit members’ perceived shared interests’. As showed by Meinzen-Dick *et al.* (2004), the more specific and varied definitions which have been added later have in common the following features: the involvement of a group of people, shared interests, common and voluntary actions to pursue those shared interests.

In the context of this research the role of collective action in the provision of agri-environmental public goods was, at least in part, analysed through the conceptual framework recently developed by the OECD (see figure 1.1).

Figure 1.1 - Conceptual framework for collective action



Source: OECD (2012a)

This conceptual framework allows exploring the key factors for successful collective action, as well as the barriers to be overcome to produce larger benefits through collective and territorial strategies.

The key factors that may affect the performance and the results of collective action have been synthesised in four main variables (Agrawal, 2001; Davies *et al.*, 2004):

- (1) *Resource system characteristics*: knowledge and predictability of environmental resources;

- (2) *Group characteristics*: social capital, group size, heterogeneity and communication;
- (3) *Institutional arrangements*: locally devised management rules, easily enforceable rules, monitoring and sanctions;
- (4) *External environment*: external support (both financial and non-financial).

Collective action is highly affected by (1) *the characteristics of the natural resources* (type of goods) involved and on the knowledge and predictability of such resources. Indeed, information and communication on natural resources, for example related to technical requirements, are crucial issues to implement successful collective action. The type of knowledge usually includes both local knowledge and scientific expertise, and a successful integration of these two types of knowledge in many cases is a key issue to enable communities to use natural resources in a sustainable way (Agrawal, 2001; Pretty, 2003). Here it is argued that grass roots collective actions, compared to the conventional top-down strategies, may facilitate the spreading of sustainable practices at different levels and, by creating positive learning environment, it may also facilitate a pro-active role of farmers in providing agri-environmental public goods.

This factor is also related to (2) *the characteristics of the group involved*, which should have an appropriate size and homogeneity and, above all, it should allow the actors involved to increase the social relationships that are necessary to achieve collective goals. These relationships, which may be synthesised through the concept of ‘social capital’, include trust, norms, reciprocity, obligations and expectations, values and attitudes, culture, information and knowledge, formal groups/associations, institutions, rules and sanctions (Davies *et al.*, 2004).

The success of collective action is also determined by (3) *the involved institutional arrangements* which, according to the main studies on the topic (Ostrom, 1990; Wade, 1988), should involve on one side, locally devised and simple rules and, on the other side, they should rely on an effective monitoring and sanction systems. In addition to the rules implemented, the success of local strategies is also linked to the ‘thickness’ of local institutions, which may be able to generate public objectives from economic activities. ‘Institutional thickness’ in a given territory is linked to the combination of ‘human capital’ (knowledge resources), ‘social capital’ (trust, reciprocity and other social relations) and ‘political capital’ (capacity for collective action) (Mantino, 2010).

Finally, *external forces and authorities* (4) also affect collective action to a large extent, and these forces be interpreted as both financial and non-financial support. Financial support is particularly relevant at the initial stage of the collective action, since it is usually involves higher transaction costs compared to individual activities (Mills *et al.*, 2010). On the opposite non-financial support is related to the need of governments to

play a pro-active role in setting basic rights, guidelines, rules (also with penalties and sanctions) and public objectives which may encourage collective action (Ayer, 1997).

According to the conceptual framework developed by the OECD (figure 1.1), through the analysis of the different combinations of those four factors it is possible to explore the key drivers of collective action and the main determinants for its success.

According to this conceptual framework, through collective action it is also possible obtaining larger benefits, which were identified in the following ones: *scale merits*, *sharing knowledge and increasing capacity* and *tackling local issues*. Nevertheless, successful initiatives must overcome the most common barriers to collective action, which are the problems of *free riding* and *transaction costs*.

With regard to the benefits of collective action, the issue of *scale* is particularly important, since collective action may have ecological scale merits and may improve the economy of scale and scope. As showed by some studies (Davies *et al.*, 2004; Mills *et al.*, 2010) since environmental public goods such as biodiversity and landscape in many cases cannot provided by single farmers, collective action allows to address the problem of public goods provision at the geographically and ecologically appropriate scale. In addition, by mobilising territorial resources in a coordinated way, collective action may reduce the costs of public goods provision (economy of scale) and may improve the co-ordination mechanisms for the joint provision of several public goods (economy of scope).

As it will be further discussed, another of the key benefits of collective action is the possibility of *sharing knowledge and learning* for the stakeholders who take place in the collective initiatives. Indeed, in many cases a cooperation approach rely heavily on the local knowledge of stakeholders and on the possibilities to integrate this knowledge in the decision making process. Thus, collective action increases the credibility and legitimacy of decision-making, but also allows collecting and sharing information at lower costs compared to the individual approaches.

The other important benefit of collective action is the possibility to tackle efficiently local issues. In many cases central governments have increasing difficulties in tackling local issues and cannot find viable solution for local problems, while through collective action it is possible to find better measures and strategies to local issues, since it allows greater flexibility, responsiveness and local relevance (Davies *et al.*, 2004).

Together with the aforementioned benefits, the literature acknowledges that free riding and higher transaction costs may represent important barriers to collective action.

The problem of *free riding* is particularly relevant when collective action takes place with the objective of public goods provision. Indeed, as it will be further discussed in

chapter 2, the benefits of public goods, which are non-rival and non-excludable, cannot be limited to the group members of collective action.

Finally, especially in the initial phase of their implementation, collective initiatives may have *higher transaction costs* compared to individual actions (Ostrom, 1990; Davies *et al.*, 2004). This implies important implications when implementing policies to support collective strategies for public goods, since the collective action usually involves higher costs related to search costs (incurred in the identification of possibilities for mutual gains), bargaining costs (associated with negotiation and agreement) and monitoring and enforcement costs (Singleton and Taylor, 1992).

It may be argued that this conceptual framework also presents two important limitations, that the present research attempted to address.

The first limitation is related to the key factors of success of collective action. While the conceptual framework well represents the social and learning environment where farmers operate, it is also necessary to explore the main personal drivers that push individual (in our case farmers) to adhere to and to participate into collective action. These drivers are worth to be analysed since, as it will be further discussed (section 3.3), farmers willingness to get involved in collective projects for the provision of agri-environmental public goods is also strongly related to personal emotions, personal capacity and biases that reflects in attitudes and behaviour. From this perspective, the theoretical and empirical findings of behavioural studies which so far have been largely ignored in applied works and policy application (Gowdy and Erickson, 2005), could play an important role in exploring the main drivers that push farmers to participate into collective action for agri-environmental public goods.

The second limitation is related to the analysis of the external drivers (authorities and policies) that affect collective action. Indeed, the conceptual framework described above is particularly useful to analyse collective action that are already in place, but does not provide a comprehensive analytical framework to deal with on the role of public institutions and policies in stimulating the development of grass root collective action.

On the opposite, when studying collective action for public goods it is necessary to analyse not only innovative policy tools and institutional arrangements which support the already existing collective action, but also exploring the arrangements that may stimulate the development of collective approach for public goods provision. These arrangements may stimulate, for example, the creation of specific association/organisations/institution that permit the development of territorial strategies for public goods provision.

As it will be further discussed (section 3.1), in the agricultural context it is possible to distinguish two main types of collective action: (i) *cooperation*: bottom-up, farmer-to-

farmer collective action and (ii) *coordination*: top-down, agency-led collective action (Davies *et al.*, 2004).

While some bottom-up (cooperation) collective actions may receive government support, other may be carried out without government support. Similarly, some top-down (coordination) collective actions are promoted by government policies but do not receive any support, while other collective actions receive support by the local and/or central government (OECD, 2012a).

This categorisation sheds the light on the difficult challenge of setting an appropriate and effective support for each type of collective action, since the main drivers of success, as well the main barriers, vary to a large extent according to the local conditions.

Moreover, with regard to the collective action for the provision/protection of the agri-environmental goods in agriculture, the process of integration of the different type of support to collective action into the mainstream policies (mainly into the CAP) presents important implications, which are worth to investigate.

As it will be explained in the following chapters, in order to up-scale the successful initiatives observed at local level, it is necessary to codify the formal and informal rules in place and, above all, to translate such rules in effective policy tools to be implemented at territorial scale.

1.3 Research objectives and research questions

As discussed in section 1.1, while a high number of researches are focused on provision of goods and reduction of negative externalities by individual farms, much less studies, especially at the EU level, are focused on the role of collective action for the provision of agri-environmental public goods and services.

The study aims at showing to what extent and through which mechanisms it is possible to provide agri-environmental public goods through collective action. The main issues explored are related to farmers' behaviours and to the modalities of structuring a range of incentives, capacity building programs and technical assistance which allow aligning individual and group objectives and, above all, which enable farmers to provide agri-environmental public goods collectively.

By following the research thesis described above, this dissertation aims at exploring more in details the role of collective action in the provision and protection of agri-environmental public goods, by focusing on following four main objectives:

1. Exploring the roles of collective action for the provision of agri-environmental public goods associated to agriculture, by analysing the conditions under which

collective action may emerge as well as the factors necessary for successful collective action;

2. Exploring the drivers that affect farmers' participation in collective action;
3. Exploring the effectiveness, in terms of provision of agri-environmental public good, of the collective action, by analysing the mechanisms that lead to the provision of public goods and which public goods are provided;
4. Exploring what type of government intervention and policies are necessary to promote successful collective action.

These four main objectives may be translated into specific research questions:

1. How collective action may be structured in order to increase (directly or indirectly) the provision of agri-environmental public goods? What kinds of factors affect collective action?
2. Which are the main behavioural factors (such as motivations, attitudes, social norms, habits, cognition effects) that affect farmers' participation in collective action? What kind of innovation may be generated and diffused in order to increase the participation of farmers in providing agri-environmental public goods through collective action?
3. What kind of public goods are provided or negative externalities are reduced by collective action? Could these results be obtained more efficiently through collective action compared to the traditional approach based on the action of individual farmers? Is collective action more cost-effective compared to individual action?
4. To what extent it is possible to incorporate collective aspects into policies aimed at providing agri-environmental public goods? To what extent collective action could be further financed and supported through the EU rural development and agricultural policies?

1.4 The case studies

In the context of the research, the two case studies carried out in Italy regard two collective actions promoted to increase the provision of agri-environmental goods and services at territorial level (see table 1.1).

The first case study, the 'Custodians of the Territory', is a local project in a mountain area of Lucca and Pistoia provinces, in Tuscany region. The project was created and implemented by a local government agency, which set an agreement with the local farmers for the co-production of the environmental services, in order to increase the

resilience to flooding and to improve the landscape and hydro-geological management of the territory.

The second case study focuses on Aso Valley area (Valdaso) in Marche Region, where a group of farmers started a grass root initiative to adopt integrated management techniques at territorial scale, with the objective to protect water and soils from pesticides and nitrates pollution. This action was institutionalized and supported through a ‘territorial agri-environmental agreement’ (TAEA), giving some insights on the potentials and the limits of the territorial agri-environmental measures of the CAP.

These two territorial case studies allowed exploring, on one side, the role of collective action in the provision agri-environmental public goods through agriculture and, on the other side, allowed exploring the possibilities of incorporating collective aspects into policy design.

As showed in the table 1.1, the two case studies are quite different, since different territories and farming systems are involved, but also the type of collective action is quite differentiated in terms of institutional organisation, approach to delivery and in terms of environmental objectives to be achieved.

Table 1.1 - The case studies

Case Study	Custodians of the Territory	Valdaso TAEA
Type of collective action	Collective action led by the local agency in charge of the project (<i>coordination</i>)	Farmers-led action, later institutionalised and supported by local institutions (<i>cooperation</i>)
Objectives	Increasing farmers' stewardship, landscape management, hydro-geological management of the areas, reducing farm abandonment	Reducing the environmental externalities of agriculture through the adoption of more sustainable practices (Integrated Pest Management)
Location	Media Valle del Serchio (Pistoia and Lucca Provinces, Tuscany) Mountain and marginal area	Aso Valley (Ascoli and Fermo provinces, Marche region) Area characterised by intensive agriculture (fruit production)
Public goods	Hydro-geological management of the territory	Soil quality, water quality and food safety
Policy measures	Local initiative, funded by a local agency and by the regional RDP (measure 226)	Measure 111 and 214 of Rural Development Programme
Approach to delivery	<i>Holistic approach</i> : local strategy for sustainability outcomes	<i>Integrated delivery</i> : package of RDP measure

These differences also allowed exploring to explore the role of collective action in different contexts and for different goals, in one case for providing environmental services such as the hydro-geological management and the resilience to flooding in mountain areas, and in the second case in controlling negative externalities in intensive farming systems.

As it will be further discussed, these initiatives provide some useful indications on the policy tools as well as on the institutional arrangements necessary to promote local collective action for provision of agri-environmental public goods.

With regard to the relation of Custodians of the Territory project to the CAP it may be observed that the environmental services were mainly financed through local funding, integrated in some cases with the RDP measure 226, regarding the restoring of forestry potential.

With regard to the main policies measures involved, in Valdaso TAEA an integration of different RD measures was implemented, namely the agri-environmental measure (214) and, as accompanying measure, vocational training and advice (111).

Finally, it is possible to observe the difference of the two case studies not only in terms of different type of collective action involved, but also in terms of different types of approaches to delivery.

Valdaso TAEA represents a case of *integrated delivery*, where a package of measures from the regional RDP was used, while the project 'Custodians of the Territory' is characterised as an *holistic approach* to achieve sustainability outcomes in mountain area, since this approach aimed at delivering environmental services alongside economic and social outcomes.

2 The provision of public goods through agriculture

2.1 Institutional approach to public goods provision

According to the well-known definition of Samuelson (1954), the main characteristics of public goods are the non-excludability and the non-rivalry. A good is public when if it is available to one person, others cannot be excluded from the benefits it confers (non-excludable); at the same time if a public good is consumed by one person it does not reduce the amount available to others (non-rival). These characteristics imply that users have no incentive to pay for consumption of such goods and, on the supply side, there is no incentives to provide public goods, because potential producers are not remunerated by the market to do so. The combination of these factors explains the so-called 'market failure', and the reason for the need of public intervention in order to achieve a socially optimal level of public goods, consistent with societal demand.

According to this approach, the reasons beyond the so-called market failure are related to the characteristics of non-excludability and non-rivalry, which determine both the lack of incentives to produce public goods and the presence of opportunistic behaviours (*free riding*). The efficiency of market mechanisms regarding the allocation of goods is mainly related to the characteristic of (non)excludability, since market mechanisms work better for goods with high-excludability level (Merlo *et al.* 1999). At the same time, goods with low-excludability level present several problems related to congestion and over-exploitation, as described in the 'Tragedy of Commons' (Hardin, 1968).

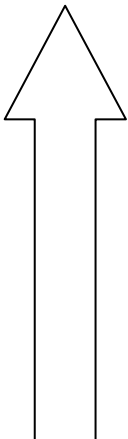
In case of market failure, public intervention is needed to avoid the under provision of public goods, which is determined by the degree of non-excludability and non-rivalry of goods and, as consequences, on their degree of 'publicness'. Indeed, by using the concepts of non-rivalry and exclusion, it is possible to show that there are intermediate forms between pure public goods and private goods. Common goods or common pool resources are the goods where rivalry exists but exclusion is not possible (e.g. common fish grounds or water systems) and quasi-public goods are the goods (also called club goods or toll goods) where exclusion is possible, but rivalry does not exist (see table 2.1).

The conventional approach based on Samuelson definition presents several conceptual and operational limitations, as highlighted by several economists who have carried out their analysis on public goods provision through an institutional approach (Kaul and Mendoza, 2003; Hagedorn, 2008).

According to these authors, from a theoretical perspective the limitations of this conventional approach are mainly related to the narrow definition of private/public goods.

Indeed, while the definition of public goods based on (non)excludability and the (non)rivalry is based solely on market criteria, the private and public domains of goods in the reality are also determined by the general public and by the political process. Thus, it is necessary to consider goods not only in their original forms, but also as social constructs and as results of deliberative policy choices (Kaul and Mendoza, 2003). According to this vision, public goods are not just market failures, since public and private domains exist on their own, but are those goods, technically non-excludable, which are placed or left in the public domain by policy choice.

Table 2.1 - Typologies of goods

Level of 'publicness'	Type of good	Excludability and rivalry	Example
	Pure public goods	Non-rival Non-excludable	Biodiversity Non-use values of landscape
	Impure public goods (Common Pool Resources)	Non-rival Excludable only at high costs (high risk of congestion)	Public access to farmland Ground and surface water Soil conservation
	Club goods	Non-rival for a small user group Excludable (subject to congestion)	Private parks Golf course
	Private goods	Rival Excludable	Wheat, timber

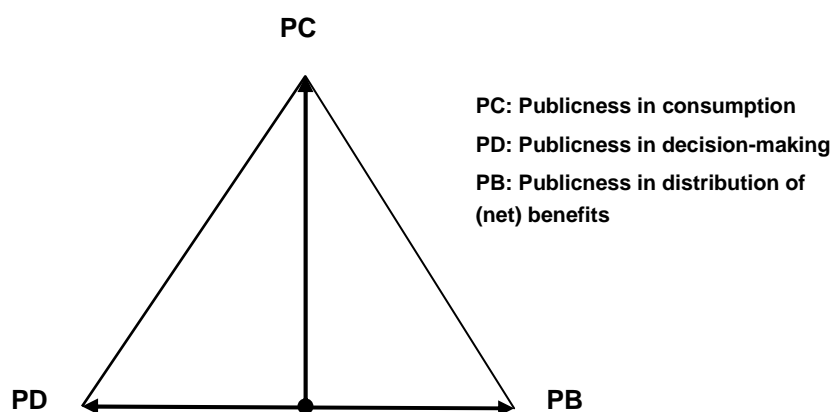
Source: Elaboration on Cooper et al. (2009) and OECD (2001)

Indeed, while the definition of private/public goods based on non-excludability and the non-rivalry is an indirect definition based on market conditions (private/public are mainly considered as market/non-market goods), in reality such characteristics do not specify properties of goods themselves, but refer to the institutional and organisational fit of a social construction (Hagedorn, 2008).

Indeed, together with the evolution of social institutions, many goods have developed into mixed cases, showing both exclusive and non-exclusive proprieties that have a temporary dimension, since they may change, for example, as result of the development of new technologies and, above all, according to the different policies and regulation that are implemented.

By introducing the notions of social construction and public choice in the definition of public goods, Kaul and Mendoza (2003) provide a useful conceptual framework to evaluate the *publicness* of goods according to this perspective. Through the *triangle of publicness* (figure 2.1) it is possible to examine goods according three dimensions: (i) publicness in decision-making, (ii) publicness in the distribution of a good's benefits and (iii) publicness in consumption,

Figure 2.1 - The triangle of 'publicness'



Source: Kaul and Mendoza (2003)

The first two criteria to assess the publicness of goods are represented by the base of the triangle:

- PD: The publicness of decision-making is the criterion to assess the *participatory nature* of the process to place goods in the public domain and also refers to the decisions related to the provision of the good, such as the level and the modalities of production of the goods and how to distribute its benefits among the users.
- PB: The publicness in distribution of benefits is the criterion to assess the *equity* of benefits, namely to what extent the various groups of users and consumers derive the benefits from the public goods.

These two criteria have to be combined with the main criterion to assess the publicness of goods:

- PC: The publicness of consumption, which represents the criterion to assess the *non-exclusiveness* across individual and groups.

The triangle of publicness provides a theoretical support to examine the discrepancies between the publicness of a single good in the three dimensions. Indeed, while the figure 2.1 shows an ideal situation where a good fully meets the three conditions,

usually goods do not fully meet all the three criteria and this conceptualisation may help policymakers and the public to understand the issues to be addressed to increase the provision of public goods through policy tools, as well as through an institutional change and new governance settings.

This extended definition of public goods allows going beyond the incomplete market/state dichotomy. Traditionally neo-classical economics have dealt with the provision of market goods by private actors in opposition to the need for public management for goods with some degree of 'publicness'. This approach has been unsatisfactory from many points of views and especially for goods with intermediate features between public and private goods. Indeed, the two criteria of (non)excludability and the (non)rivalry are not helpful for deciding what governance structures are suitable for coordinating transactions of goods that do not fulfil the criteria: they only provide a general indication that these goods should be dealt with by any other governance structure (Hagedorn, 2008).

Many environmental resources, such as forests, pastures and fisheries are common-pool resources that in some circumstances are still governed by customary common property arrangements. On the opposite, there are also some larger common-pool resources (bodies of water, air basins, and global atmosphere) that usually are governed by formal governance institutions. These types of goods and resources do not involve only different types and entities of public intervention, but, above all, create different kind of governance challenges. Starting from this consideration, new theoretical and analytical approaches have been developed in order to explore innovative institutional arrangements and governance settings for the provision public goods and common goods resources. In particular, Ostrom, in her extensive work, developed a new theoretical and analytical framework for the management of collective goods and services, by exploring the management of commons goods with the direct involvement of local communities regarding both the allocation and the use/exploitation of the common resources.

Through a neo-institutional approach, Ostrom has focused her analysis on the local dimension, in order to observe the process of self-organisation of local communities and on the ways in which the subjects who are in a condition of interdependency can obtain permanent results, even though are tempted of over-exploiting the resources. According to Ostrom (1990), to make rules effective it is necessary the presence of organisational solutions (governance structures), in order to guarantee the rights and the duties and their use in coordinating transactions. Governance structures, which may be public or private forms of organisations, includes hierarchies, markets, hybrid forms, planning processes, knowledge and information systems and networks, monitoring infrastructures, procedures for conflict resolution and distribution of costs, and incentives to promote innovation and learning (Prager, 2010, p.228).

This approach, by involving a broader conceptualisation of public goods, provides a different analytical framework for the definition of policy tools for public goods provision. This model clearly shows the need to go beyond the criterion of cost efficiency alone and the need to add equity considerations both for the supply and for the demand side of public goods provision.

Thus, this broader conceptualisation allows identifying another important limitation of the conventional approach, which is related to the concept of optimal supply of public goods. As defined by the Bowen-Lindahl-Samuelson condition, the optimal supply requires that the sum of all individuals' marginal willingness to pay for an additional unit of a particular public good equal the marginal cost of producing that unit. Many conceptual and methodological problems arise when attempting to empirically assess this condition. Indeed, especially for global public goods, the mechanisms to be implemented are particularly complex, since the high number of the potential consumers and their heterogeneity in terms of features and proximity to goods (Desjeux *et al.* 2011). In addition, while this condition provides guidance on how to adapt government revenue and spending of the consumers, a balanced pattern of spending and preferences does not necessarily indicate that a public good is adequately provided (Kaul and Mendoza, 2003). Thus, the optimal supply should be substituted by the concept of adequate provision, which is based solely on technical considerations, without reference to costs, benefits or existing preferences and willingness to pay (Conceição, 2003). The criterion of adequacy is not meant to indicate optimality but it is meant to establish a simple and reliable tool for measuring the present provision of a certain good against a technical notion of adequacy, which may be defined as the missing or biased components and the actions needed to enhance the current provision of such good (ODS, 2002).

The actions to achieve the adequate provision depend on the type of public good, as well as the related 'corrective actions', which may include new standards and regulations, financing capacity-building measures, subsidies and direct payments. Even though the notion of adequate provision has been mainly debated in relation to the provision of global public goods at international level (the concept was developed in the context of United Nation debate, see Kaul *et al.*, 2003, Conceição, 2003 and ODS, 2002), this approach may provide useful insights also in the debate regarding the provision of public goods through agriculture at the EU level, where the focus on the cost efficiency of the measures in many cases has resulted to an undersupply of the most relevant public goods associated to the primary sector.

2.2 A 'wider' approach on multifunctional agriculture

In the context of the European academic and institutional debate, the relations between agriculture and the associated public goods have been acknowledged by the concept of multifunctionality. It is possible to distinguish two analytical approaches on multifunctionality of agriculture (see Aumand *et al.*, 2006; Van Huylenbroeck *et al.*, 2007): the first one focuses on the supply side issue (positive approach) while the second one on the demand side issue (normative approach).

The supply-side approach is well synthesised by the working definition of the OECD (2001), which defines multifunctionality as 'the existence of multiple commodity and non-commodity outputs that are jointly produced by agriculture and the fact that some of the non-commodity outputs exhibit the characteristics of externalities or public goods, with the result that markets for these goods do not exist or function poorly'. This definition includes the core elements to understand the relation between the agricultural activities and public goods provision from a supply side perspective, both in terms of theoretical development and in terms of policy definition. Indeed, this approach conceptualises public good provision in terms of joint outputs of an activity or of a combination of activities, where 'the term multifunctionality refers to this nexus between commodity and non-commodity output production in agriculture' (OECD, 2008). The analysis of this *jointness* is at the core of this approach, since this concept involves important implications in terms of public support to the primary sector and on the evaluation of the public policies implemented with the objective of providing public goods through agriculture. As showed by Vereijken (2001), the level of *jointness* of different public goods with agriculture activities is very complex and it is usually characterised by high variability across areas, countries and specific environmental and social goods.

On the opposite, the demand-side approach looks at multifunctional agriculture as societal objective and at the demand of society for the multiple functions of agriculture. This approach involves a concept of multifunctional agricultural more territorially embedded and related to rural areas rather than to the agricultural sector. Indeed, according to this vision, multifunctional agriculture must satisfy societal expectations and meeting societal demand and needs not only in relation to the agricultural sector, but also according to agricultural production processes and the spatial extent of agriculture.

In this approach, the characteristics of non-rivalry and non-excludability of goods are straightened by the 'non-user values' or 'option values', which reflect the interests of citizens in securing the provision of public goods, such as habitat preservation or the protection of endangered species, and who are willing to bear the costs, even though they are not immediate users and the goods concerned may be far distant from them

(ENRD, 2010). This approach is usually characterised by economic analyses that aim at assessing the demand of external benefits produced by the agriculture in monetary terms, both through indirect methods (contingent valuation method) and through direct methods (hedonic pricing method) (i.e. see Randall, 2002).

According to Van Huylenbroeck *et al.* (2007), the main difference between the supply vision and the demand vision lies on the implicit treatment of externalities: while the supply definition considers negative and positive externalities as good and bad outputs respectively and treat them equal, the demand approach privileges the positive contributions of agriculture to public goods, usually emphasising the positive contribution and benefits that agriculture may deliver to society.

The need of a more integrated approach, which could adopt a more territorial vision of multifunctional agriculture has been also highlighted by the OECD in its publication on the 'new rural paradigm' (OECD, 2006) and is a model which is increasingly influencing the EU academic and institutional debate.

The recent studies on the CAP and public goods provision (Cooper *et al.*, 2009; RISE foundation 2009, ENRD, 2010; Hart *et al.*, 2011) have made an effort to integrate some issues related to the demand side approach in the policy analysis, in order to obtain a sound theoretical framework which takes into account in a more exhaustive way both the positive and normative approach on multifunctional agriculture.

However, besides the supply vision and the demand vision, there is also a third and more holistic interpretation of the concept of multifunctionality. According to this 'wider' perspective, multifunctional agriculture is the result of a transformation process in the relations between agriculture, rural society and society at large. According to this vision, the growing attention to multifunctional agriculture is not considered a direct response to market failure, but a consequence of the changing needs and demands of consumers and society in combination with the failure of conventional, productivist farm development models (see Van Huylenbroeck and Durand, 2003; Renting *et al.*, 2005; Wilson, 2007).

The theoretical framework developed by these scholars, based on the study of multifunctional agriculture by looking at this wider institutional relations of the farm with social networks, markets, consumer groups and policy frameworks (Ploeg *et al.*, 2000; Ploeg and Roep, 2003), provides a sounded conceptual basis to explore the role of collective action in the provision of environmental goods associated with agriculture.

According to this wider vision, new institutional arrangements are becoming more and more relevant in order to achieve important results concerning the new priorities attached to rural areas, since it is necessary to articulate the demand for countryside goods, establishing incentives for resources managers and co-ordinating resource

management across space (Hodge, 2001). This emphasis towards the territorial provision of countryside goods does not remove the requirement to promote supply at minimum cost, but it also emphasises the need for new institutions with the difficult task of providing a diverse range of goods according to the public goods characteristics and to the range of environments within which they are to be supplied.

According to Hagedorn *et al.* (2002, p. 7), there are many reasons for conceiving the multifunctionality of agriculture as an institutional problem. Indeed, the different types of public goods that agriculture may produce differ in aggregation and scale, usually representing complex aggregates of different scale and nature that claim for different coordination mechanisms. In this context some institutions and governance structures may be designed intentionally by economic and political actors, while in many cases such structures may evolve not intentionally or are self-organised.

With regard to public goods provision, the analytical focus of this approach is not restricted to pure public goods (biodiversity, landscape, sustainable water management), but also includes private goods and services (energy, tourism, social farming) and ‘functions’ that are provided by agriculture as distinctive product attributes on specific food markets (food quality, animal welfare, organic products etc.). Finally, functions and services that are not directly linked to agricultural production are also considered, such as the vitality of rural areas, rural viability, and the maintenance of settlement patterns in remote rural areas.

According to this wider perspective, the degree of farms multifunctionality is highly influenced by a wide range of – often interrelated – institutions and policies, and for this reason it is necessary to go beyond the livelihood strategies, by analysing the institutional arrangements necessary to implement successful local actions which enhance the multifunctional role of agriculture. According to this approach, ‘jointness of production’ is not defined in relation to the production functions, but regarding the economic and institutional arrangements which may deliver a combination of commodities and non-commodities, private and public goods and in many cases may also deliver other types of non-private goods, such as club goods and common-pool resources. Thus, it is necessary to explore how the various local actors (farmers, politicians, bureaucrats, agricultural organisations, environmental NGOs, national and EU institutions) can arrange relevant economic activities related to the primary sector in order to make use of the multifunctional capacities of agriculture (Hagedorn, 2004).

2.3 The EU debate on multifunctionality

As described in the previous sections, the provision of public goods from agriculture is strongly related to the concept of multifunctional agriculture. This concept emerged at European level during the 1990s as response of the primary sector to the broader challenge of sustainable development, and it is based on the rediscovering of the additional functions of agriculture besides the production of food and fibre.

The CAP, especially before the MacSharry reform of 1992, was largely criticised for its limited cost-effectiveness and for the largely unforeseen environmental and social consequences of its supporting instruments. Thus, in the context of the most recent CAP reforms - especially in the context of Agenda 2000 in 1999 and of the 2003 Mid Term Review - there has been an increasing effort to implement measures related to the multifunctional role of agriculture, by emphasizing the role of farmers as guardians of the landscape and of natural resources, together with an attempt to better integrate the primary sector in the rural economy.

This strategy, 'officially' implemented to obtain a more integrated and sustainable development of rural areas, has been largely criticised, especially in the extra-EU context. Indeed, several scholars and institutional stakeholders have interpreted the increasing acknowledgment of the secondary functions of agriculture as a tool for legitimising the implementation of protectionist measures in the EU and, more broadly, for legitimising the high public support to the agricultural sector, with negative consequences in terms of fair competition within the international markets.

However, the evolution of the CAP has brought to the development and implementation of strategies that go well beyond an undifferentiated and protectionist support to the sector. On one side, the rural development policy, introduced in the framework of Agenda 2000, has transformed a part of the CAP from a sector policy to a territorial policy which, even though not always in a very efficient way, it has certainly contributed to the social and economic development of many rural areas across Europe. On the other side, the increasing attention to the agri-environmental measures, together with the implementation of the decoupling and of the cross compliance in the framework of the 2003 reform, were aimed at increasing the integration of environmental issues within the CAP, a process which has been defined the *greening* of the CAP.

Thus, the concept of multifunctionality has represented the main conceptual framework to understand the social and environmental objectives that have been pursued through these CAP reforms, since the decoupling of direct aids, together with the rural development policy, have been conceived as strategic tools to link the EU public support to the objectives of sustainability in a more effective way.

Nevertheless, during the last years, especially in the institutional and political debate, it seems that the concept of multifunctionality has lost part of its value and the words 'multifunctional agriculture' have been used to a lesser extent. This was particularly evident in the context of the 2008 CAP Health Check, when the debate on the future of the agricultural policy has been focused, rather than on multifunctional agriculture, on the need to support the public goods and services produced by the agriculture which are not remunerated by the market.

In the debate on the future of the CAP, this transition regarding the political discourse from multifunctional agriculture to public goods provision is particularly significant, since the new words used to define the secondary functions of the primary sector should have involved a new 'normative' vision of the agriculture as producer of immaterial goods. This shift from multifunctionality to public goods provision should have implied, especially amongst the policy makers and the other stakeholders, a broader cultural change which goes well beyond this different 'wording'.

On the opposite, the word multifunctionality has been abandoned mainly for political reasons, since in the international debate the word had lost its political appeal and it had increasingly perceived as a way of legitimising the high public support for the EU agriculture. At the same time, it may be argued that the debate surrounding the new public goods agenda is not characterised by a real innovation regarding the conceptualisation of the environmental and social dimensions of the agricultural activities and, above all, by an innovation of the definition of the policy instruments to be implemented to pursue the public goods objective.

Indeed, in spite of the increasing emphasis on public goods provision to define the social and environmental role of agriculture, the current debate is largely based on the main conceptual and policy framework that was used in the debate of multifunctionality of agriculture. As showed above, this conceptual framework is based on neo-classical economics, where the public goods provision is strongly related to the concept of jointness of production and of externalities.

The degree to which the recognition and the support, through the CAP, of the non-commodity outputs from agriculture have led to an improvement in the environmental performance of the sector is matter of continued debate. The most controversial issue is disentangling the impacts of specific policy measures from the range of the external drivers affecting agricultural management, but also the variability in the way certain CAP policy measures are funded, designed and implemented nationally and regionally (OECD, 2011).

In the current debate, the important role that agriculture has to play in delivering public goods in Europe is recognised in the European Commission's Communication of November 2010 'The CAP towards 2020: meeting the food, natural resources and

territorial challenges of the future' (European Commission, 2010). This document sets out three key objectives for the CAP to 2020: viable food production, sustainable management of natural resources and climate action, and balanced territorial development, all three of which relate to the provision of environmental and other public goods by land managers (Hart *et al.*, 2011). The re-orientation of the CAP towards the provision of public goods is supported by several agricultural economists (Anania *et al.*, 2009; Zahrnt, 2009) and by the leading EU environmental organisations (Birdlife *et al.*, 2009), but also a growing number of producers' organizations seem receptive to the idea that the CAP budget should be more oriented towards remunerating farmers for the provision of environmental and ecosystem services (Copa-Cogeca, 2010).

In the recent proposal on the future of the CAP, the European Commission (2011a; 2011b) proposes several strategies aimed at re-orienting the CAP towards the provision of public goods. In particular, the current debate on the CAP for the 2014-2020 programming period and public goods provision is mainly focused to the *greening* of direct payments. In the European Commission (2011a) proposal, green payments are articulated as general and 'horizontal measures', targeted on single farms, with the objective of strengthening the approach of cross-compliance.

As it is further discussed below, this approach is still largely based on the remuneration of single farmers for the additional costs and the less income derived from the changes of the land management practices, with a strong focus on the policy tools rather than on the social and institutional innovations necessary to implement territorial and collective strategies.

2.4 The CAP and the provision of public goods

At EU level it is possible to identify several policy tools that, to some extent, are related to the provision of environmental goods through agriculture.

Cooper *et al.* (2009, p. 88) have identified three types of EU policy measures that have some potential to support the provision of environmental public goods:

1. Measures with a direct focus on the provision of public goods: cross-compliance, art. 68, agri-environmental measures (214) and non-productive investment (216) in the framework of the CAP, LIFE+ projects focused on agricultural and structural funds projects under the heading 'Preservation of the environment in connection with land and ... landscape conservation;
2. Measures with a partial focus on the provision of public goods, such as Rural Development advice and training measures (111, 114, 115), farm modernisation (121), infrastructure development (125), LFA payments (211, 212), Natura

2000 (213), conservation and upgrading of the rural heritage (323), training and Information (331),

3. Measures with no direct focus on the provision of public goods, but that may have a positive impact, such as direct payments and Rural Development measures on adding value to agricultural products (123), diversification (311) and encouragement of tourism activities (313).

Amongst the measures which have been implemented specifically for the provision of environmental public goods (first group of policy tools above), the most significant in terms of institutional, political and academic interests are the cross compliance and the agri-environmental measures in the framework of the CAP.

The idea beyond the CAP cross-compliance is placing environmental conditions on the receipt of agricultural support payments, an approach that started in the 1990s with the objective of improving the adherence to environmental standards at farm level. While the 1992 and 2000 CAP reforms provided member states with the ability to make the receipt of certain payments conditional on meeting specified environmental standards, cross compliance requirements were made compulsory for member states to apply as part of the 2003 reform of the CAP (OECD, 2011).

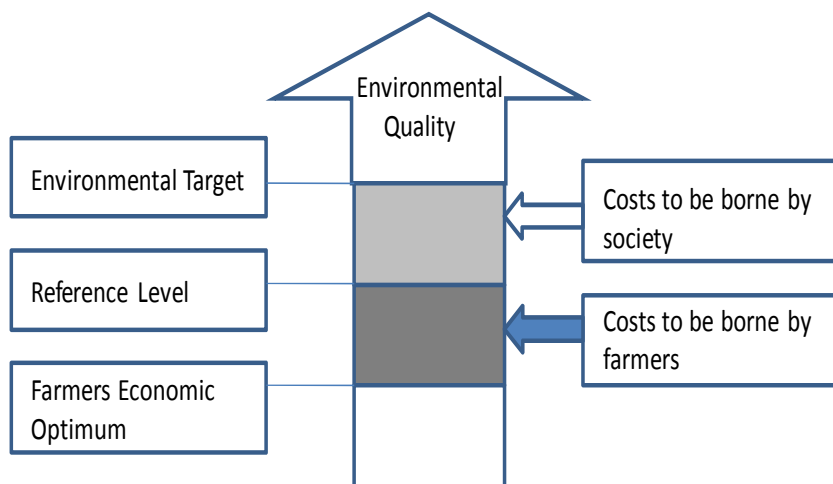
Implemented since 2005, this mechanism ties EU support for farmers to compliance with specific standards, by penalising farmers who infringe the law on environmental, public and animal health, animal welfare or land management – by reducing the CAP support they receive.

Cross-compliance mainly covers directives and regulations (SMR - Statutory Management Requirements) – that have existed for years and apply to all farmers but also a set of rules on Good Agricultural and Environmental Condition (GAEC), designed specifically for farmers receiving CAP payments. GAEC standards were designed to promote more sustainable agriculture, as well as to act as a flanking measure to address unwanted side-effects of the introduction of single payments, most notably the cessation of the active management of farmland and the risk of land abandonment (OECD, 2011).

In all countries farmers are required to respect certain environmental regulations, whether or not cross compliance approaches are used. In the EU, due to the introduction of GAEC, the reference level of environmental quality for cross compliance is higher than defined by the environmental regulations. At the same time, where farmers voluntarily enter into a contract with the government to provide environmental quality beyond what is required (the reference level) and for which no market return exists (public goods), then they would be entitled to a compensation or incentive a payment as long as they complied with specified criteria (OECD, 2010b).

Figure 2.2 shows the relationships between environmental targets, reference levels and farmers' economic optimum (the level of environmental quality farmers would provide on the basis of private profitability).

Figure 2.2 - Environmental targets, reference levels and farmers' economic optimum



Source: OECD (2010b)

With regard to the environmental performance of cross compliance, it has been showed that the introduction of this requirement since 2005 has undoubtedly expanded the area of land subjected to basic environmental management requirements, it has increased the pressure on a proportion of farmers to comply with baseline environmental standards and in many cases raised their awareness of environmental legislation (Hart *et al.*, 2010).

At the same time, several limitations have also been observed, especially in relation to the levels of compliance and enforcement and to the lack of monitoring and evaluation (European Court of Auditors, 2008), but also to the general approach of this policy tool.

Indeed, as observed by Brady (2011), targeted measures would be more effective than cross compliance to improve the environmental performance of agriculture given the immense heterogeneity of agri-environmental conditions across Europe.

Nevertheless, the EU considers this policy tool the most important mechanism for delivering environmental benefits in agriculture across a large land area, and this is confirmed by the recent proposal of the European Commission (2011a) for the CAP for the 2014-2020 programming period.

The current debate on the future CAP is highly concentrated on the greening of the first pillar, which consists in three measures to be applied at farm level related to the eligibility of farmers to the 30 per cent in direct payments: (i) crop diversification; (ii)

maintaining permanent grassland and (iii) 7 per cent of ecological focus areas on all eligible arable land per farm.

This strategy confirms that the European Commission considers the approach of cross-compliance as the most cost-effective strategy in delivering environmental goods at large scale, especially in areas characterised by intensive and productive agricultural systems. At the same time, while the greening measures have an annual, non-contractual basis and apply to all farmers in a generic way, while public goods such as biodiversity could be better provided through regional coordinated measures that increase landscape heterogeneity through the construction of multi-annual green infrastructures (Westhoek, 2012).

The impact of this approach depends very much on local farming systems and on local biophysical and cultural features as well as on the details of the national/local regulations and on the practical implementation at farm level.

Indeed, this approach remains rather top-down and it may result in a lack of effectiveness since it does not take adequately into account the local situation as a starting point. It does not incorporate the wishes, ideas and capabilities of local communities, while it would be better to use persuasive power instead of obligations, and focusing on learning processes within the policy process (Hajer, 2011). The legislative proposals for the CAP still focus on regulation rather than providing objectives and a framework for Member States (and their regions) to seek effective measures for reaching multiple objectives (Westhoek, 2012).

Positive benefits can be reached through local-specific management conditions, especially through the improvement and/or supplement of command and control (and top-down) measures with more targeted rural development measures, in particular agri-environmental schemes.

Agri-environmental schemes are sitting within Pillar 2 of the CAP alongside other land management measures in Axis 2, and they are the oldest and the single most significant measures for pursuing environmental objectives across the farmed landscape, both in terms of the spatial coverage of schemes and the resources allocated to them (OECD, 2011).

These measures provide payments to single farmers to adopt specific farming practices on producing land, and are implemented specifically to achieve positive environmental effects and/or providing public goods (such as landscape, biodiversity, etc.).

Farmers sign a contract with the administration and are paid for the additional cost of implementing such commitments and for any losses of income (e.g. due to reduced production) which the commitments entail. Agri-environmental payments are co-financed by the EU and the Member States and may be designed at national, regional

or local level so that they can be adapted to the particular farming systems and environmental conditions (European Commission, 2005).

However, these payments in many cases are largely inefficient and they seem inadequate to improve the provision of such goods at the required scale. Their lack of efficiency is mainly related to their lack of targeting and tailoring, but also to the fact that usually their targets are defined in the form of a specific farming practice rather than a specific (measurable) environmental outcome (Vojtech, 2010).

Moreover, agri-environmental schemes have generally been promoted through the provision of fixed payments for certain environment-friendly farming or management practices but the location and the quality of agricultural land and production systems used by farmers vary enormously, especially for small households in hilly and mountainous regions, where fixed payments that are uniformly distributed at regional level cannot correspond to the individual heterogeneity (OECD, 2012b, p. 43).

The voluntary policy mechanisms based on the agri-environmental measures in the framework of the second pillar of the CAP are mainly based on formal contracts between individual farmers and government agencies, under which the farmers agree to follow a particular set of practices and not to undertake others. Hodge (2001) has identified the main limits of those formal environmental contracts, which may be synthesised in the following points:

- Formal contracts restricts the range of objectives and requirements for farmers, since they involve a strong formalisation (common rules and range of actions to be controlled);
- In some cases farmers may evade the contract requirements, because there are always aspects of the contracts which are not readily observable by the government agency;
- The nature of the contracts usually results in a lack of incentives for entrepreneurship and, above all, may limit the incentives and the opportunities for co-operation between landholders.

In addition, while such measures are usually targeted to individual farms, environmental public goods could be more effectively delivered if farmers in a given area take joint action, since in many cases the provision of environmental goods may be ensured only where groups of local stakeholders in rural areas agree to adopt a coordinated approach to resource management (Hodge, 2001).

This highlights the need of a different approach regarding innovative forms of intervention, which take more into consideration the collective dimension of agri-environmental action, in order to favour joint action to provide public goods at territorial scale. This kind of action, in fact, can provide a higher level of public goods

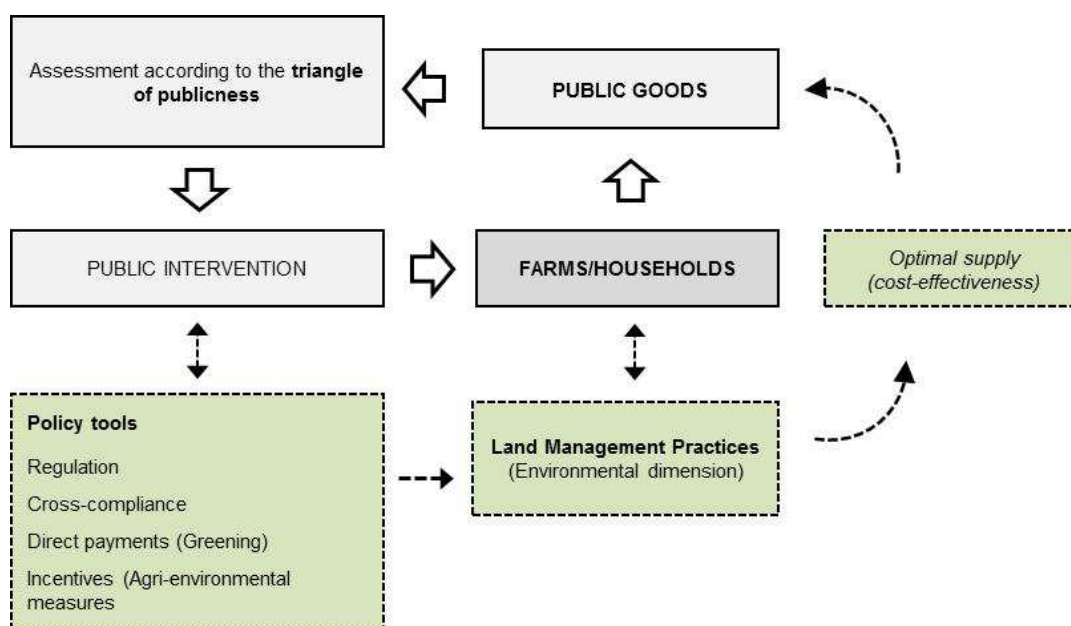
provision which otherwise would not be possible to reach by individual farmers, and which is particularly relevant in cases of some environmental objectives such as improving public goods such as biodiversity, landscape and water quality (ENRD, 2011).

There is an increasing awareness, also at the EU level, that a more effective implementation of agri-environmental measures could be secured by adopting territorial approaches to delivery, ensuring that the focus of action widens beyond the individual farm, in order to achieve sustainable solutions at landscape scale (Hart *et al.*, 2011).

2.5 A new model of public goods provision in rural areas

The current model of public goods provision in the EU (mainly through the CAP) is based on the neo-classical definition of public goods (the characteristics of non-excludability and non-rivalry of goods) and, as consequence of this approach, the need of public intervention is defined as results of market failures (see figure 2.3).

Figure 2.3 - The current model of public goods provision through the CAP



In the most comprehensive study on the CAP and the public goods provision financed by the European Commission (Cooper *et al.*, 2009) as well as the in the proposals on the future CAP (European Commission, 2011a; 2011b) there is still a strong predominance of the positive approach to multifunctionality, with a focus on the policy tools to be implemented rather than on the social and institutional innovations necessary to implement the public goods agenda.

According to Cooper *et al.* (2009), the current EU policy framework is not achieving the improvement in the provision of public goods through agriculture on the scale that is required, and the main constraints which do not allow to reach important environmental goals are related to the relative weight afforded to the different objectives of policy, the choice of policy instruments, the design and implementation of policy measures, the governance and institutional capacity and above all, the adequacy of budgetary resources.

By taking into account the extended definition of public goods proposed in this research (section 2.1), it is possible to recognise the main limitations of this model:

- The assessment of the publicness of goods according the excludability/rivalry criteria does not allow to take into consideration the public domain of the goods, namely the social construction of the problems concerned and the decision making process related to the strategies to be implemented;
- A narrow focus on policy tools aiming at modifying the land management practices at farm level, leaving behind the territorial and collective dimensions of the strategies to be implemented;
- Un satisfactory recognition of the technical and institutional innovation needed to implement effectively the policy tools proposed;
- Un satisfactory recognition of the knowledge and competencies needed to effectively implement the policy tools proposed;
- A narrow focus on the cost effectiveness of the measures proposed rather than on the effective level of public goods to be provided;
- A strong focus on the environmental dimension of the agricultural activities and on the environmental public goods (implicit to this model).

The conceptual limitations surrounding the conventional approach of public goods provision also highlight the need of a different approach regarding the forms of intervention, the institutional arrangements and the governance patterns to be implemented.

Indeed, in many cases the support of the agriculture as multifunctional activity has been translated into an indiscriminate support to the sector, since agriculture was considered *per se* a multifunctional activity. By contrast, the implementation of policies which are effective in public goods provision should involve a radical change in the way are defined and implemented. Decoupled policies, such as the current CAP, which for definition are not linked to production, should have as first objective the achievement of social and environmental objectives as well as the provision of

immaterial goods, and their effectiveness and efficiency should be mainly evaluated in relation to these goals.

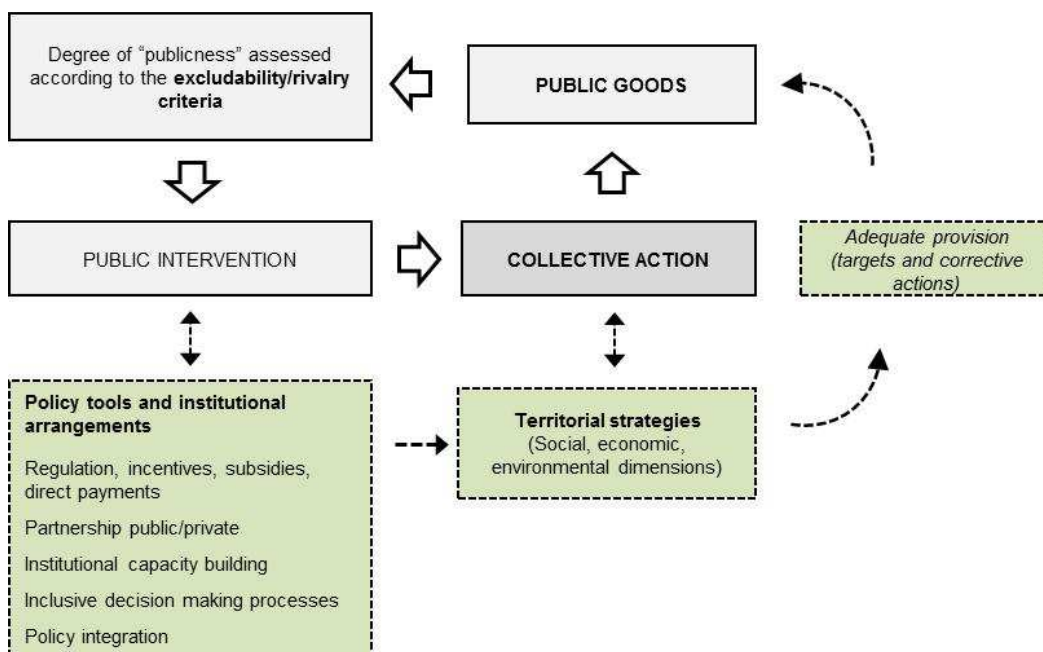
As discussed in section 2.2, an institutional approach to multifunctional agriculture provision broadens the scope of the analysis, by focusing, on one side, on a different classification of public goods associated to the primary sector and on, the other side, on the institutional arrangements and the territorial strategies which are aimed at providing and adequate provision of such goods in rural areas.

This model highlights the need of not focusing only the policy tools to be implemented, but also on the social and institutional arrangements and on the collective dimensions of the decision-making processes.

In figure 2.4 it is proposed a different framework for public goods provision in rural areas, together the most significant implications that this new conceptualisation could have for the definition and implementation of agricultural and rural development policies in the EU. Indeed, the characterisation of goods according the triangle of *publicness* allows considering other important dimensions, including the participatory nature of the process to place goods in the public domain and the distribution of benefits amongst the final users.

This model highlights the need of not focusing only the policy tools to be implemented, but also on the social and institutional arrangements and on the collective dimensions of the decision-making processes.

Figure 2.4 - A new model for public goods provision in rural areas



The main differences between the conventional approach and this approach may be synthesised as follow:

- An extended role of the public intervention, where policy tools are conceived together with the necessary social and institutional arrangements to make them effective;
- A recognition of the technical and institutional innovation as well as the knowledge and competencies needed to implement effectively the policy tools proposed;
- A focus on collective actions and local strategies rather than on single farms/households to increase the public goods provision in rural areas;
- A shift from the cost effectiveness of the measures to the adequate provision of public goods, by setting targets and by defining corrective actions;
- A broader vision of multifunctional agriculture which goes beyond the provision of (pure) environmental goods, but which aims at integrating the three dimensions (economic, environmental and social) of sustainability at local level.

The model of public goods provision described above calls for a more holistic interpretation of the concept of multifunctionality, where public intervention is not only deemed to regulate the supply and demand of public goods, but to create the governance structures which determine an adequate provision of public goods.

Indeed, as it will be further discussed in the next chapter, the provision of public goods is usually the results of the interactions of several stakeholders: it is the result of a deep change in farmers' behaviours as well as the results of territorial dynamics, where different actors re-shaped their behaviours and their relations for collective goods.

Thus, the public intervention should be focused on this collective dimension, by supporting the collective action that are already in place and, in the other cases, incentivising the development of collectives and territorial strategies for public goods provision.

As it will be further discussed, in order to achieve these objectives it is necessary not effective policy tools, tailored and targeted to the local conditions, but also innovative institutional arrangements, public-private partnerships and other mixed solutions (i.e. co-operatives) which may design and implement effective strategies at the local level.

The present research focuses on the role of collective action as a viable alternative to provide environmental goods in rural areas. As argued by Ayer (1997), this does not imply that grass roots collective action always provides a more efficient (or better distributed) allocation of environmental benefits. Indeed, in many cases the typical

public intervention (i.e. subsidies, direct payments etc.) may resolve in an efficient way agro-environmental problems. At the same time grass roots collective action, which are little considered in the current debate, may be represent interesting alternatives that is worth to investigate.

Indeed, few studies on the role of collective action for the provision of environmental public goods have been carried out in the EU context, and it is not clear to what extent collective action implemented specifically for the provision and/or protection of environmental goods could be supported and incentivised by the instruments traditionally adopted in the framework of the Common Agricultural Policy (CAP).

3 Collective action

3.1 Definition and characteristics of collective action

During the last decades an increasing amount of literature on collective action and natural resources has emerged, with a great emphasis on the conceptualisation of collective action and on the analytical framework necessary to study it (Olson, 1965; Wade, 1987; Ostrom, 1990).

Marshall (1988) defined collective action as ‘the action taken by a group (either directly or on its behalf through an organization) in pursuit members’ perceived shared interests’. As showed by Meinzen-Dick *et al.* (2004), the more specific and varied definitions which have been added later have in common the following features: the involvement of a group of people, shared interests, common and voluntary actions to pursue those shared interests.

A very relevant issue to consider when analysing the dynamics of collective action is what type of organisation has developed and/or supported such action. In many cases the outcomes of the collective action are highly dependent on the type of organisations involved, but also to the institutional arrangements which are in place at the local level, for example between organisation controlled directly by farmers and public agencies controlled by a national/regional governmental agency.

From this perspective Davies *et al.* (2004) distinguish two types of collective action: (i) *cooperation*: bottom-up, farmer-to-farmer collective action and (ii) *coordination*: top-down, agency-led collective action. While some bottom-up collective actions may receive government support, other may be carried out without government support. Similarly, some top-down collective actions are promoted by government policies but do not receive any support, while other collective actions receive support by local and/or government (OECD, 2012a).

This categorisation implies the involvement of different level of government (either central or local), which may provide the most effective support to the different strategies. From this perspective, the literature on collective actions and institutional arrangements for managing common pool resources has increasingly recognised the dynamic dimensions of institutions, which are context dependent and evolve over time. It is therefore necessary to understand how individuals interpret and respond to the different institutional arrangements in the different contexts.

A very important challenge for the analysis of collective action refers to the understanding of the role of formal and informal organisations that coordinate and support such actions, since in some cases these organisations exist only on paper and

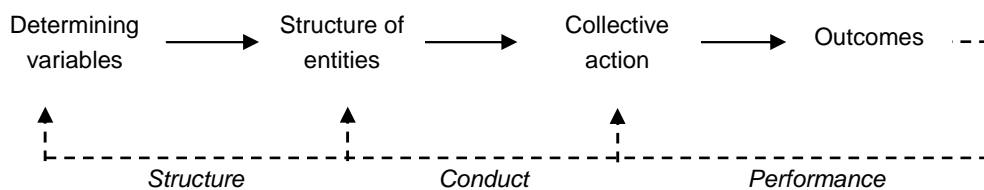
collective action occurs spontaneously, while in other cases institutions may play a vital role in creating and coordinating local action for a shared interest (Meinzen-Dick *et al.*, 2004).

Although collective action is often associated to activities carried out by formal organisations, according to Ostrom (2004), more attention should be paid to informal collective action, where local networks or local group of people organise and coordinate local action to achieve specific short-term purposes.

Since institutions play a crucial role regarding the development and the success of collective action, in the context of the present research, the implications of the institutionalisations of the more spontaneous and bottom-up collective actions are also explored. Indeed, any kind of collective action for routine maintenance will likely become institutionalised or integrated in mainstream policy frameworks (in the case of this research mainly into the CAP). On one hand this institutionalisation may reduce the transaction costs of negotiation, but on the other hand the more institutionalised collective action, the less adaptable and flexible become (Meinzen-Dick *et al.*, 2004).

The same authors argue that all the factors that influence the structure of groups and their organizations are relevant because they influence their conduct and then their outcome. Indeed, neither the institutions involved nor the collective action itself are the ultimate objective: performance outcomes are important as well. At the same time, in a dynamic setting, when exploring the endogenous relationships among the many variable of interests within collective actions, feedbacks and co-movements are also likely to be very influential (see figure 3.1).

Figure 3.1 - Structure, conduct and performance of collective action



Source: Meinzen-Dick *et al.* (2004)

With regard to the barriers which may hinder collective actions, the main one is related to the fact that such actions are dynamic processes; they are very difficult to measure directly, also because their performance relates to institutional settings and social relationships and it may vary over time, cultures and communities.

Furthermore, as well documented in the literature (Ostrom, 1990; Davies *et al.*, 2004), in many cases collective action involves higher transaction costs compared to individual activities. The higher costs usually relate to the initial stage of the collective

action as well as during the its implementation and these costs in some cases may hinder collective action from taking place.

As showed in table 3.1, the higher transaction costs related to collective action are related to (i) search costs, (ii) bargaining costs and (iii) monitoring and enforcement costs.

Table 3.1 - Transaction costs in collective action

Transaction costs	Examples
Search costs incurred in identifying possibilities for mutual gains	Identification of funding sources identification of relevant stakeholders Cost of gathering information
Bargaining costs associated with negotiating an agreement	Time spent at meetings Effort expended in verbal and written communications
Monitoring and enforcement costs involved in making sure all parties keep to the agreement	Employment of external monitor Time and effort spent monitoring others informally

Source: Singleton and Taylor (1992)

At the same time in other cases collective action may also reduce transaction costs, because the economy of scale and scope (Hodge and McNally, 2000; Davies *et al.*, 2004), but also as result of the effects of social networks, trust and reciprocity among group members.

3.2 Institutional arrangements for the collective provision of agri-environmental public goods

The role of collective action is also increasingly analysed in the context of the agriculture and rural development. The majority of studies and analysis are related to collective marketing initiatives, since a collective and coordinated approach of farmers in the food supply chain may have positive economic effects, by increasing the economies of scale and by reducing transaction costs.

Although at EU level there is an increasing interest on collective agri-environmental measures, in many cases local and national institutions fail to establish coherent incentives for the development of territorial agri-environmental measures. Indeed, cooperation is not so common in the environmental realm and it depends mainly on the local environmental context. The main issue here for an institutions is establishing the conditions where groups of farmers within local areas can agree to adopt a co-ordinated approach to resources management. There is thus a need to identify appropriate areas and to set an agreed approach to management (Hodge, 2001).

Collective action of farmers and of other rural stakeholders may also play an important role in delivering public goods, non-commodity outputs and environmental services (Polman *et al.*, 2010b). A joint action can be undertaken by farmers organizations, farmers' associations or by an informal group of farmers for many reasons, such as reducing the transaction costs to collect information on innovative (and more sustainable) production practices, to comply with new legislation, to take market opportunities (i.e. to negotiate a premium price with the large distribution channels) or to monitor the jointness between commodity and non-commodity output (Van Huylenbroeck, 2008).

A very relevant issue to address when assessing the dynamics of collective action in the context of public goods associated to agriculture is what type of organisation has addressed the agro-environmental problems. Several studies show the differences, in terms of efficiency, success and outcome, according to the type of organisation involved, for example between an organisation controlled directly by farmers of controlled by a national/regional government.

A collective approach to agri-environmental issues implies necessarily coordination mechanisms at territorial level and in many cases mixed private-public solution may be more effective as intermediaries in coordinate the provision of agri-environmental public goods. Moreover, efficient coordination mechanisms between public and private institutions may implement more efficient strategies to avoid free riding behaviours.

From this perspective, the concept of collective action itself suggests the need of looking beyond the simple top-down management - that in the field of agri-environmental policies is usually based on state intervention - but also looking at the public/private partnerships and at innovative institutional arrangements which involve different levels.

Those multi-stakeholders arrangements are usually characterised by strong horizontal linkages among user groups at the same level of organisation, but also by vertical linkages between different levels, for example between local stakeholder and central governmental agencies (Berkes, 2009; p. 1693).

This multi-stakeholders approach is also very relevant to stimulate the collective provision of agri-environmental goods. Indeed, the 'wider' perspective on multifunctionality described in the previous chapter calls for a territorial approach for delivery, where collective action usually involve the role of a broader range of rural stakeholders.

As highlighted by Gatzweiler (2006, p.300), farmers cannot be expected to be the sole carrier of the costs for providing environmental goods services and the government cannot be the sole authority in the allocation of private and public goods, but in many cases is necessary to seek ways towards mixed solutions. As discussed by many

authors (Hagedorn *et al.*, 2002; Van Huylenbroeck *et al.*, 2009), the solution is not as easy as leaving the allocation problem of private goods to the market and that of public goods to the government, but it is usually necessary to explore innovative solutions, based on mixed public-private arrangements which could ensure an effective provision of public goods through collective and inclusive strategies.

Indeed, the provision of agri-environmental public goods through collective action does not involve just larger areas owned by many farmers, but also innovative institutional arrangements and coordinating mechanisms implemented at the right scale. For example, in case of public footpaths created for connecting across individual farms, landholders need to co-ordinate decisions in order to create networks of paths that can offer a worthwhile recreation experience. Thus, in many cases it is necessary to overcome the traditional environmental contracts represented by a direct link between an agency and a land user. Other arrangements may be more effective, by revealing demand within a market context, by establishing incentives for landholders to co-ordinate their actions, by reducing the requirements for public expenditure (Hodge, 2001).

Some innovative institutional arrangements that may represent the basis for collective action for the provision of agri-environmental public goods have been conceptualised through the definitions of *co-management* and *co-production*.

Co-management, defined as the sharing of power and responsibility between the government and the local resource users (Berkes, 2009, p. 1692), is an hybrid regime combining centralised and decentralised, state and community institutions. Co-management is usually combined with learning-based approaches, since it may be considered a knowledge partnership where different levels of organisations have comparative advantages in generating and mobilising of the knowledge acquired at different scales.

As described by Singleton (2002, p. 3), the appeal of co-management is related to both efficiency and legitimacy. The efficiency is related to the availability of higher quality and less costly information, since in co-management arrangements usually local knowledge is combined with scientific knowledge produced by state agency scientists. The integration of these two types of knowledge may result in producing a more complete, finely-tuned set of information. At the same time, monitoring and enforcement can be more effective by virtue of being carried out by local people involved in the collective action. Similarly, the legitimacy of the system is enhanced by the fact that user-groups and community members are involved, which may result in people being more willing to comply voluntarily with and even exceed the requirements placed upon them.

Moreover, while co-management refers to an arrangement in which private organisations or associations produce services in collaboration with the state, *co-production* refers to an arrangement where, at least in part, citizens produce their own services. Co-production has been defined by Ostrom (1996, p.1073) as ‘the process through which inputs used to produce a good or services are contributed by individuals who are not “in” the same organization [...]. Co-production implies that citizens can play an active role in producing public goods and services of consequence to them’.

The co-production concept, analysed mainly by American scholars in public administration studies, was born as an acknowledgement that production of a service, as contrasted to a good, was difficult without the active participation of those who are supposed to receive the service. Thus, the term co-production describes the potential synergy and collaboration that could occur between the provider of services (usually the government) and the users of services (usually the citizens), by showing different and possible roles of individuals or groups in the production of such services.

As showed by Ostrom (1996), reciprocity is an important requisite to make co-production advantageous. Indeed the co-production process implies the building of credible commitment of the participants to one another and clear and enforceable contracts between government agencies and citizens enhance that credibility.

The added values of these decentralised and hybrid regimes is due to the fact that the different actors need to work and think together, and deliberate to generate new knowledge or make sense of knowledge from different sources (Berkes, 2009, p. 1695). As argued by Davidson-Hunt and O’Flaherty (2007, p. 293): ‘working from the premise that knowledge is a dynamic process – that knowledge is contingent upon being formed, validated and adapted to changing circumstances – opens up the possibility ... to establish relationships with indigenous peoples as co-producers of locally relevant knowledge’.

Finally, it may be argued that institutional arrangements based on co-production and on co-management imply a shift from a linear approach to policy design towards a policy cycle where the strategies for public goods are designed and implemented according to the needs and the knowledge of local communities play a very pivotal role. Indeed, the conventional approach to public goods provision usually assumes that a greater amount of knowledge within the government than is actually available and, by failing to acknowledge society’s learning abilities, usually makes insufficient use of social dynamics for realising public objectives (Hajer, 2011, p. 26). On the opposite, an approach based on co-management and co-production implies a renewed role for government, which should favour experiments, innovation and learning processes, since government is responsible for setting public objectives but there is also a need of an increasing role of society, which is the carrier of required change.

3.3 Farmers' behaviours: from individuality to collective action

Amongst the different stakeholders involved in the collective action for agri-environmental public goods, the role and the attitude of farmers is particularly relevant, since farmers may be considered the most relevant decision makers to influence when managing positive and negative externalities from agriculture.

As discussed in chapter 2, mainstream policies have strongly focused on the external drivers – financial and regulatory – for pushing farmers to increase the protection and/or the provision of public goods. Collective initiatives, on the opposite, for their nature, shade the lights also on additional factors and call for a deeper understanding of the dynamics of policy intervention for public goods provision. Moreover, it is increasingly recognised that the effectiveness of policy intervention is also influenced by the internal drivers, namely by farmers' attitudes, motivations and norms.

Thus, understanding the reasons and the behaviours of farmers and how advice can help influence behavioural change is therefore crucial, since only through this understating is possible to incite voluntary environmental action (Blackstock *et al.*, 2010).

The analysis of these drivers have been traditionally analysed through the theories of behaviours, especially through the 'Theory of Planned Behaviours' (TpB) and through the 'Theory of Reasoned Action' (TORA). These theories provide a conceptual framework for exploring farmers' attitudes and intentions (Garforth *et al.*, 2006).

On the basis of these theories, DEFRA (2008, p. 5) developed a framework where it is highlighted that the intention of a farmer to adopt a particular behaviour is a function of both internal and external factors.

Internal factors are related to farmers' *attitudes*, of *social factors* and of *past behaviours*.

External factors may be defined (OECD, 2012b, p. 41) as 'monetary and effort factors which are stimulated by traditional market-based policy interventions'. Several kinds of policies aim to alter behaviour by lowering the financial cost of desirable behaviour or discourage undesirable behaviour. Traditionally, these kinds of policy instruments (subsidies, taxes, tax relief) are the main policy instruments to incite or discourage behavioural change.

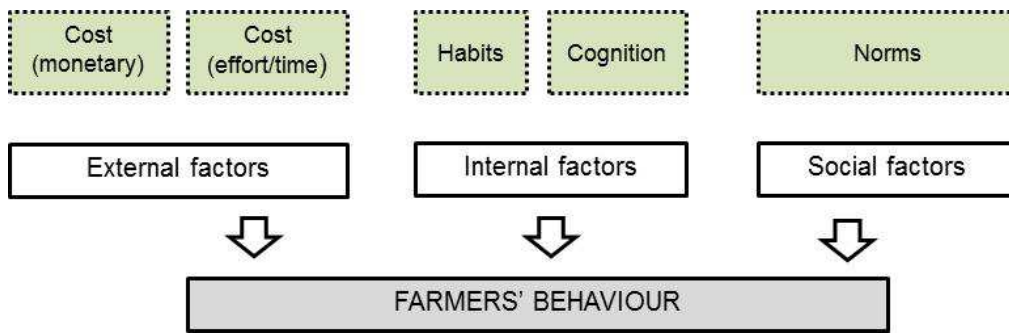
As showed in figure 3.2, while *external factors* (government intervention) may incentive farmers to undertake the desired action, also *internal factors* such as habits and cognition (emotions, personal capacity and biases) and *social norms* are very relevant.

This approach, based on behavioural economics, stresses the importance of developing a common framework that bridges economics, sociology and psychology and that allows jointly addressing the internal and external drivers that affect farmers' behaviours. As highlighted by DEFRA (2008), this integrated approach, by looking beyond the traditional approach of regulation and market-based instruments, provide a

more comprehensive framework that address motivational issues, social dynamics and information barriers. Thus, while traditional intervention (government intervention and market-based instruments) have operated mainly on external factors, this approach acknowledges the importance of two additional dimensions:

- *Social norms*, since individual choices are also influenced by observation, social learning, group dynamics and social expectations (Social Market Foundation, 2008). This is particularly true in case of management of Common Pool Resources, where people usually are prepared to act if others do it as well.
- *Attitudes*, since farmers' behaviours are strongly related to the personal and professional capacity, as well as to the personal values, emotions and biases.

Figure 3.2 – Factors affecting farmers' behaviours



Source: Adapted from OECD (2012a) and SMF (2008)

Thus, this approach involves a broader conceptualisation of behaviours, where farmers' decision making is not based only on a cost-benefits analysis (the approach usually undertaken by mainstream policies for public goods, see chapter 2), but it also influenced by a wide range of other social and personal factors. As underlined in a recent study carried out by the Social Market Foundation (2008): '...people, it turns out, often aren't actually at all "rational" in their behaviours and decisions ... they are just as likely to do what they have always done, what impulse tells them to do or what their neighbours or friends generally do ... they are often well aware that their own actions aren't in their best interests'.

Moreover, the increased complexity of this framework calls for multiple interventions at multiple levels, since these interventions should influence both personal factors (intentions and attitudes) and social norms. As suggested by DEFRA (2008, p. 7), different approaches are needed to address internal and external barriers and social factors. Regulatory and market-based instruments are usually focused on external factors that make desirable behaviours easier or cheaper and less desirable behaviours harder or more expensive. On the opposite, internal barriers are usually addressed

through communication, advice and other engagement options that influence attitudes and social norms.

In the framework of the present research, the internal barriers are particularly relevant, since the willingness of farmers to participate into collective action for agri-environmental public goods is strongly related to monetary and non-monetary benefits deriving from the participation, but also to other dimensions that help to reinforce behaviours, shape attitudes and derive social capital. As put it by Garforth *et al.* (2006): 'it is widely recognised that farmers' business and land management decision are influenced by factors other than profit, including perception of risk, attitudes (including attitudes towards new technology, government and the future of the agricultural sector), issues of family life cycles and succession, and the opinions of other farmers and of the professionals with whom they interact. As rural economic and land use policy itself become less focused on production and productivity, it is essential that policy analysis and appraisal is informed by models that reflect this wider range of factors which influence farmers' decisions'.

With specific reference to agri-environmental public goods, Defrancesco *et al.* (2008) show that the main factors that influence the adoption of agri-environmental measures are: farmer's future in the business and the relationship with neighbouring farmers and their opinions on environmentally friendly practices. The study suggests that farmers' attitudes and beliefs, as well as local behavioural influences, should be taken more into account when designing and communicating agri-environmental measures.

The participation of farmers in collective initiatives is highly influenced by the individual motivation of farmers but also by the presence of a bottom-up culture of cooperation in rural areas, which may result in community-of-interest based approaches. As emphasised by DEFRA (2008, p. 17), this is particularly true when collective action are related to public goods and CPRs, where 'a process of common-value identification and deliberative group choice can establish a consensus and rules that should govern resource use. In this way, people in situations of collective choice get involved to minimise some element of risk through mutual self-restraint (and monitoring) to produce a stable equilibrium. Fostering a 'culture of cooperation' is achievable - where willing parties have been proven to come together to tackle environmental problems'.

As will be further discussed in next section, this culture of cooperation, trust and reciprocity amongst farmers and more generally amongst rural stakeholders may be defined through the concept of social capital, a key pre-requisite for successful collective action for public goods provision.

3.4 The role of social capital

Social capital has been defined by Bourdieu (1986, p. 251) as ‘the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalised relationships of mutual acquaintance and recognition’. Similarly, Putnam *et al.* (1993) define social capital as ‘features of social organisations, such as networks, norms and trust that facilitate coordination and cooperation for mutual benefits’. The other definitions which have been added later have in common a strong focus on the ‘relations’ and on the benefits, such as mutual cooperation or various other resources, that result from these relations (Dahal and Adhikari, 2008).

As argued by Dahal and Adhikari (2008, p.3), the studies on collective action have widely used the definition of Putnam *et al.* (1993), since: (i) social capital in collective action is usually related to meso and collective units, such as associations, communities and regions; (ii) social capital is presented as a solution of the barriers of collective action and (iii) the social capital framework is applied to the study of the performance of institutions, such as regional governments.

An approach based on social capital and social norms may be efficacy applied to the collective management of environmental resources, since it can complement the traditional public policy approaches based on regulation, taxation and pricing to address environmental problems (World Bank, 2009).

In analysing the role of social capital and the collective management of resources, Pretty (2003, p. 1913) emphasises the importance of the following four features: (i) relation of trust; (ii) reciprocity and exchanges; (iii) common rules, norms and sanctions and (iv) connectedness in networks and groups.

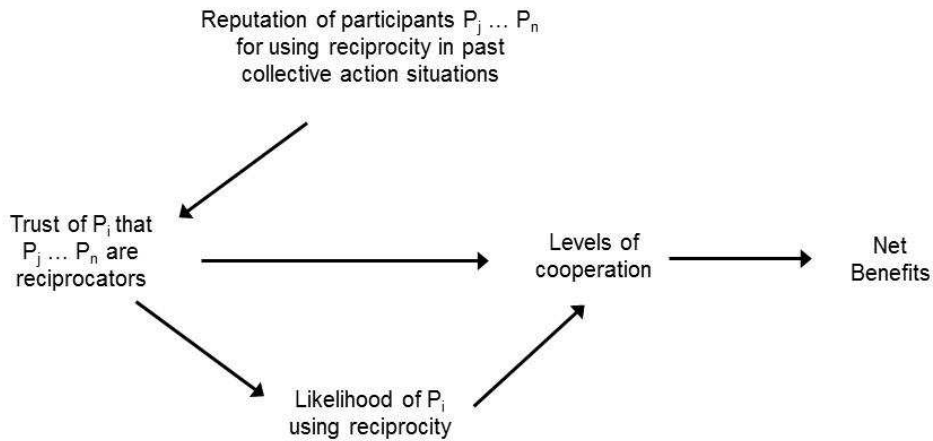
Relations of trust (i) are an important prerequisite to work-cooperatively, and this is particularly true in case of collective action, where mutual trust play a central role in reducing transaction costs between people, by avoiding the need to monitor others and thereby save money and time and, as argued by Baland and Platteu (1996), trust is easier to establish in societies and organisations with a long and established traditions of co-operation.

Trust is strongly related to reputation. Indeed, when paying attention to reputation, people are more bounded by mutual obligation and reciprocity and, as observed by Wade (1998), in many cases collective action increases the chances to be successful when people are concerned about their social reputation.

Similarly, Ostrom (2007) has observed that participants into collective action in many cases decide to trust or not other participants on the basis of their reputation in past collective action situations. According to Ostrom, at the core of successful collective

action are the links between the trust that one participant (P_i) has in the others (P_i, \dots, P_n) involved in a collective action situation, the investment other make in trustworthy reputations, and the probability of all participants using reciprocity norms. As showed in figure 3.3, the jointly action of reputation, trust and reciprocity is very important, since these factors positively reinforce each other and this results in increasing cooperation and, as a consequence, in increasing the net benefits of collective action.

Figure 3.3 – Relationships between trust, reputation, reciprocity and collective action



Source: Ostrom (2007)

Cooperation may be also promoted by (ii) *reciprocity and exchange*, since reciprocity increases trust and contributes to the development of long-term obligations between people, which helps in achieving positive environmental outcomes (Pretty, 2003). This reciprocity must be based on trust, since trust ‘lubricates co-operation’ between people and, by reducing transaction costs, may liberate important financial resources (Pretty and Ward, 2001).

Moreover, successful collective action is also dependent on (iii) *common rules, norms, and sanctions* which must be set up according an inclusive criterion, in order to ensure that group interests are complementary with those of individuals and should effective in changing behaviours. These ‘rules of the game’ should be also proposed and recognised as much as possible by people participating in collective action, in order to be effective in giving individuals the confidence to invest in the collective good.

Finally, with regard to the (iv) *connectedness in networks and groups*, it is possible to recognise three types of connectedness: *bonding*, *bridging* and *linking* (Pretty, 2003):

- *Bonding* describes the links from membership of groups of similar people with strong ties, such as networks of friends, family and associates;

- *Bridging* from membership of more diverse associations, with weaker links between individuals, such as interests groups or social and leisure clubs;
- *Linking* describes connections with people in position of power, and good for accessing support from formal institutions.

In the context of this research, in analysing the role of social capital for the success of collective action, a particular attention was given at all these aspects of social capital regarding two types of interactions: the interactions within the farmers' community and the interactions between farmers and the other local rural stakeholders.

Indeed, farmer decision making process is generally strongly influenced by the judgements of their peers, and this emphasises the need to explore the individual interests which allow farmers to interact each other, in order to understand the social networks, trust and norms of reciprocity which are in place in the farming communities under study. As showed by Carolan (2006), the acknowledgement of farmer's knowledge and the increasing interactions amongst peers may allow individuals to develop 'interactional expertise in bringing together knowledge produced in different contexts'.

At the same time, the study of collective action implies a territorial and integrated approach, where it is also important to analyse the interactions of farmers with wider networks, which may involve:

- Other farmers communities, also involving forms of cooperation both at local and at extra-local levels;
- Institutions (local and regional administration, public bodies and independent institutions);
- Other organisations (NGOs, environmental organisations, political groups);
- Citizens and consumers (local inhabitants, tourists, consumers, cultural associations).
- Technical services and experts who play a role in increasing the spreading of knowledge and innovation amongst farmers.

Even though there is increasing evidence that an high level of social capital is usually a central requisite for a collective effective provision/preservation of agri-environmental goods, it must be stressed that social capital 'it is not easy to find, see and measure as is physical capital' (Ostrom, 2000, p. 188).

From a public goods perspective, the promotion of social capital should be translated in norms or values that discourage behaviours that cause externalities, and by

strengthening community ties so that sanctions may be provided against those who transgress (DEFRA, 2008, p. 17).

As it will be discussed in the next section, this important challenge is strongly related to the role of learning and innovation in agriculture. Advisory systems, extension, diffusion of innovation and training have a crucial role in shaping attitudes and motivation of farmers and in determining important drivers for the success of collective action for public goods.

3.5 A new approach to learning and innovation

The formal Agricultural Knowledge System (AKS), based on the triangle of agricultural research, education and extension, has been the dominant paradigm for agricultural extensions in the 1970s and 1980s. This system, rooted on the so called 'knowledge transfer paradigm', it was based on the dissemination of information and technical solutions amongst farmers, with the objective of diffusing the adoption of predetermined practices.

This paradigm is based on a strong confidence on scientific progress, where the innovations are created by the scientific community and the new technologies are 'transferred' to farmers who 'adopt' them, through a top-down linear process, from research to farmers (Knickel *et al.*, 2009).

This traditional knowledge transfer extension approach assumes that innovations (and knowledge) are originated and developed by the scientific community who must transfer them to farmers.

This approach has been strongly criticised, and criticisms may grouped under three main concerns (Blackstock *et al.*, 2010): (i) it is not appropriate for the modern multifunctional agriculture; (ii) it does not reflect the empirical evidence of how farmers use information and (iii) it does not take in adequate consideration the multiple sources from which knowledge is generated, and the other influences of farmers, notably also by the information received by other farmers.

In the context of this research, it is particularly relevant to highlight the limits of the traditional AKS model in addressing the provision of agri-environmental public goods through agriculture. Indeed, the mission of AKS was mainly increasing the productivity of agriculture, usually relatively to a narrow range of crops. On the opposite, the changing scenario of global production system, involving the diversification on demand on agriculture, has showed in a quite clear way the incoherence of the dominant production system and the related accompanying AKS: an increasing gap between private and public goals was observed with a consequent emergency of different scientific and technological paradigms (Brunori *et al.*, 2011).

For these reasons, during the 1990s and 2000s an alternative 'human development' approach on innovation was developed, which emphasises the need for farmers to develop their own solutions to the problems, where the role of extensions is to facilitate interaction, learning and innovation rather than persuading farmers on the practices to be adopted. Thus, the agricultural innovation literature has developed the concept of Agriculture Innovation Systems (AIS) (Spielman and Birner, 2008), which were defined as 'networks of organisations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organisation into economic use, together with the institutions and policies that affect the way different agents interact, share, access, exchange and use knowledge' (World Bank, 2006).

To respond at the increasing complexity of the primary sector and to the need of increasing the provision of public goods, in some countries innovation process previously based on strong hierarchical patterns, have been increasingly substituted by systems structured as networks. A network-like structure of innovation patterns gives more flexibility and allow to the primary sector to respond to the emerging consumers demand as well as the new policies implemented. Indeed, while the AKS uni-linear approach, by focusing on the persuasion of individuals, it fails to explain the decision-making processes within specific social systems and the related collective behavioural changes, the new AIS paradigm emphasises the process of networking and interactive learning among a heterogeneous set of actors, such as farmers, input industries, processors, traders, researchers, extensionists, government official, and civil society organizations.

From this perspective, it may be argued that the provision of agri-environmental public goods through collective action is particularly challenging also from a knowledge and innovation perspective. Indeed, the new paradigm, based on AIS, in order to be effective in facilitating the collective provision of public goods must create new spaces for social and institutional innovation, by linking together different disciplines, different administrative and policy spheres and to encourage new learning processes.

The central issue of new approach on innovation (AIS) it is how farmers, scientists and advisors can co-create new meanings and new codes for sustainable practices. This process, which involves a transformation of values, norms, rules and powers amongst the actors, has been conceptualised as 'social learning' (Röling and Wagemakers, 1998).

Social learning may be defined as 'as learning that occurs when people engage one another, sharing diverse perspectives and experiences to develop a common framework of understanding and basis for joint action' (Schusler *et al.*, 2003, p. 311).

Indeed, social learning may be considered an iterative process of knowledge co-production amongst stakeholders brought into interaction: when stakeholders become aware of how other stakeholders understand reality and how these 'understandings' relate to practical experiences and defended interests (Steyaert *et al.*, 2007, p. 540).

As argued by Blackstock *et al.* (2010: 5637), within differentiated farming cultures there are different individual and group identities, which influence and interpret knowledge and the consequent behaviour change in different way. Therefore, understanding and influencing behaviour is a complex and multi-faceted issue, related to the issues of power and politics within farmer cultures and between these groups and the wider policy and political settings.

Thus, an understanding of relation within and outside the actors involved in the collective action, as well as the power dynamics, where different interests or influences are expressed is crucial to fully understand the process of knowledge exchanges and the collective decision making processes.

It may be argued that the achievement of new environmental objectives for agriculture involves significant changes in farmer's practices and it is related to two dimensions: a technical change but also a more structural shift regarding their professional identity and their role in the management of the territory (Deuffic and Candau, 2006, p.565).

As showed by Schneider *et al.* (2009), to make successful technological solutions for sustainable agriculture, such as no-tillage, integrated pest management and organic farming, such solutions need to be integrated with broad cultural, social, political and economic transformations. The new AIS approach must then involve a process of co-production of knowledge between academic and non-academic actors and above all, a process of knowledge co-production between farmers, experts and scientists.

As emphasised by Tarnoczi and Berkes (2010), information from government and producer organisations can be very important for the co-production of knowledge, and especially producer organisations may undertake bridge building, by linking policy makers to farmers, also by including local knowledge and local experiences when implementing extension strategies at the farm-level. Indeed the new AIS approach, based on the principles of empowerment and participation, emphasises the key role of the non-expert form of knowledge and the role of extensions in facilitating collective processes.

The case studies analysed in the following chapters show how an alternative approach to learning and innovation, based on the AIS principles has been successful experimented in two grass root collective action. This innovative system, based on co-management, co-production of knowledge and social learning, may represent an effective approach in increasing the provision of public goods through agriculture.

4 Methodology

4.1 Epistemological approach

The epistemological approach used in this research is in accordance with the explorative character of the study, which aims at exploring collective action as an alternative and more effective strategy to address agro-environmental problems. This objective has called for the need of re-conciliating pragmatism with the necessity to broaden the knowledge about the social and institutional change that occurred in the collective actions under study.

The epistemological starting point used for the analysis of the actors involved in the collective action as well as the social and institutional process is *social constructivism*. This approach emphasizes the importance of culture and context for understanding what occurs in society and for constructing knowledge (McMahon, 1997). This perspective is closely associated with many contemporary theories and it is based on the sociological and social psychological concept of social constructionism¹.

Social constructivism is based on specific assumptions about reality, knowledge and learning. Indeed, social constructivists believe that reality is constructed through human activity and, for this reason, it cannot be discovered; in other words, it does not exist prior to its social invention (Kim, 2001). According to this approach, individuals create meanings through their interactions with each other and with the environment they live in. Learning is then viewed as a social process and ‘meaningful learning occurs when individuals are engaged in social activities’ (*Ibid.*). This epistemological starting point reflects the nature of the research aims and objectives, as it facilitates a better understanding of the variables affecting collective action (see section xx). I

This approach seemed suitable to address the relationships among different actors involved in the collective actions as well as their knowledge on the environmental resources under study. Moreover, this epistemological approach may be considered also appropriate to analyse the institutional arrangements related to the management of natural resources and to the development of environmental policies, which ‘depend critically on the social constructions of environmental problems’ (Hajer, 1995, p. 264).

¹ Social constructionism is a school of thought introduced into sociology by Peter L. Berger and Thomas Luckmann with their 1966 book *The Social Construction of Reality*. The interest of social constructionism is to discover how individuals and groups create their perceived reality (McMahon, 1997).

From this perspective, it must be highlighted that the main assumption of the research is that agri-environmental issues and their solutions are ‘socially built’: they do not exist *a priori* but the participants involved in defining the problems construct them.

Following this epistemological approach, in the framework of this research, the agri-environmental public goods and services were not established *a priori*, but they were selected and identified in the context of two territorial case studies. Indeed, as already discussed, the main focus of the research is on how local groups address negative externalities such the over-use or inappropriate use of pesticides but also as local groups may also organise (collective) action for providing or protecting public goods such as biodiversity and natural habitat preservation. The identification by local communities of environmental goods and services to be provided and/or protected is therefore crucial, since the local actors are the main stakeholders who must take (collective) action to address the local agri-environmental issues.

In order to analyse collective action for environmental goods and services, it was considered particularly relevant to explore the local dimension of this action, since the local dimension is where people have a practical and experiential relationship with the objects and processes that have to be managed. In addition, the local dimension allows exploring the local interdependencies, since required changes such as land use and management practices are most likely to emerge from action, social relations and experiences that take place locally (Steyaert *et al.*, 2007).

As specified in the following section, in order to explore in depth the local dynamics and the social construction of the agro-environmental issues under study, perceptions, attitudes and actions of local stakeholders involved in the collective action were explored through participative research methods.

4.2 Participatory methods: an overview

The main features of conventional research may be resumed as the tendency of packaging intervention methods and programmes into one-size fits-all, off-the-shelf approaches, and usually this approach is based on a notion of universal best practices. On the opposite, participatory methods address the drawbacks inherent in the conventional approach by actively involving end-users in the research process, incorporating their views and representation into the prioritisation, review, conduct, and dissemination of scientific research (Lilja and Bellon, 2008, p. 479).

During the last decades an increasing acceptance and widespread use of participative research in many fields was observed. According to Campbell (2001) this is due to the following five principles: (i) optimizing trade-offs between the cost, quantity, relevance, truth, and benefit of possessing information; (ii) offsetting biases from development ‘tourism’ and hurried visits; (iii) triangulating by using more than one method or source to obtain and cross-check information; (iv) learning directly from

with rural people whose knowledge and capacities are generally underrated but required for sustainable development; and (v) learning rapidly and progressively through flexible, iterative, interactive processes aimed at the conscious exploration of local peoples' lives.

In the context of the participative research methods, Participatory Rural Appraisal (PRA) was settled as approach to development planning and as a method of investigation evolved from many different sources. Some of the sources were modified to be utilized in a participatory mode, and the others were taken up as they were used for investigation and planning. PRA was described by Chambers (1994b, p.1253) as a 'growing family of approaches and methods to enable local (rural or urban) people to express, enhance, share and analyse their knowledge of life and conditions, to plan and to act'.

PRA methods aim at gaining accessibility to rural people by involving them in the research process, that is in learning, collecting, finding and analysing information in open discussions and total interaction with the additional result that this participatory research also increases accessibility to sites.

In several ways, PRA methods reverse the conventional ways of doing research, since it assumes that local communities have knowledge and information but it needs to be organised and resources which need to be mobilised, by integrating traditional knowledge systems and external knowledge in the research process (see table below).

Table 4.1 - Methods reversal

Conventional research	PRA
Method: Closed, individual, verbal, counting	Method: Open, group, visual, comparing
Relationship: extracting, distance	Relationship: empowerment, rapport
Experience: boredom, frustration	Experience: Fun/enjoyment, relaxed

Source: Adebo (2000)

According to Chambers (1994a, p. 954) there are five streams which stand out as sources and parallels to PRA: (i) activist participatory research; (ii) agro-ecosystem analysis; (iii) applied anthropology; (iv) field research on farming systems; (v) Rapid Rural Appraisal (RRA).

The RRA, in particular, it is a quite widespread technique mainly used in development studies as a preliminary stage when embarking on surveys of farmers. The technique essentially involves an informal, rapid, exploratory study of a specified geographical area designed to establish an 'understanding' of local agricultural conditions, problems and characteristics. RRA may provide basic information on the feasibility of beginning

a survey project in an area, particularly when one is intending to survey an area about which little is known (FAO, 1997).

The philosophy, approaches and methods of RRA may differ from those of PRA. Although many of the set of practices overlap, there are several distinctions (Chambers, 1994a, p. 958-959): RRA is intended for learning by outsiders, while PRA is intended to enable local people to conduct their own analysis, and often to plan and take action. In this sense, PRA often implies radical personal and institutional change, and it would debase the term to use it for anything less than this. RRA methods are more verbal, with outsiders more active, while PRA methods are more visual, with local people more active, but the methods are now largely shared. The major distinction is between an RRA (extractive-elicitive) approach where the main objective is data collection by outsiders, and a PRA (sharing-empowering) approach where the main objectives are variously investigation, analysis, learning, planning, action, monitoring and evaluation by insiders.

PRA aims at assisting local people to plan, implement, monitor and evaluate their own action plans. Since it aims at people taking action themselves it is most suited for the community level, PRA presents a major step forward from RRA: local people do the analysis and plans for the future (Khodamoradi and Abedi, 2011, p.75)

Chambers (1994a) argues that a single formula of approaches and technique should be avoided, both because it may hinder the creativity during the fieldwork and because the guiding principle of PRA/RRA is to use 'your best judgment at all times'.

PRA/RRA do not refer to a single technique, but to a range of investigation procedures which rely mainly on experts observation, coupled with semi-structured interviewing with farmers, local leaders and officials. These techniques have much in common with the social anthropologists' case study approach but are executed over a period of weeks, or at most months, rather than extending over several years (FAO, 1997).

Chambers (1994a) provides a detailed list of techniques which may be used in the framework of PRA/RRA research. Amongst them, the most relevant techniques are:

- *Secondary sources*: analysis of files, reports, maps, photographs, academic and non-academic literature;
- *Semi-structured interviews*: open – ended interviews on a topic;
- *Group discussion and brainstorming*: focus groups by local people alone, by local people and outsiders together, by outsiders alone;
- *Do-it-yourself and Asking to be thought*: performing a particular task along with local people after it being demonstrated;

- *Transect walks*: walking with local people, observing and asking questions;
- *Seasonal calendars, daily time use analysis, and livelihoods analysis*: analysis of seasonal changes (on crops, labour, diet, migration, income, expenditures, etc.), daily changes (schedules of the main activities with also seasonal changes), general analysis of the livelihoods (stability, crisis, income, multiple activity, financial constraints etc.);
- *Institutional or Chapaty or Venn diagramming*: identification of individuals and institutions important in and for a community, or within an organisation and their relationships.
- *Matrix scoring and ranking*: ranking system or scoring to compare different physical characteristics (soils, tree, etc.) or different methods (soil, water conservation strategies, etc.).

All the methods listed above can be used in both RRA and PRA, but some are more emphasized in one than the other. RRA has tended to stress the use of secondary sources, verbal interaction especially through semi-structured interviewing, and observation: so these are sometimes described as ‘RRA methods’. PRA methods are more focused on shared visual representations and analysis by local people, such as mapping or modelling on the ground or paper; estimating, scoring and ranking with seeds, stones, sticks or shapes; Venn diagramming; free listing and card sorting; linkage diagramming; and presentations for checking and validation (Chambers, 1994a, p. 959).

Even PRA/RRA are mainly used from a development study perspectives, these methods are applicable in very wide range of situations, including natural resource management, agriculture, poverty, social and health care programmes, both in rural and urban areas and both in developing and industrial countries (Chambers, 1994a, 1994b; Khodamoradi and Abedi, 2011).

4.3 Data collection and analysis: Rapid Rural Appraisal (RRA)

In the context of this research, participatory research methods were applied in two case studies, regarding different public goods in different contexts (see section 1.4).

A case study approach was considered the most appropriate one for the following reasons:

- It was necessary to have an holistic perspective to the different local projects involving collective action, in order to have a deep understanding of the different units, of the links and networks in place, together with the main feedback mechanisms;

- Territorial case studies were considered the most appropriate method to attain the research objectives, which are related to social and individual learning, local institutions, territorial governance and local farming systems.
- A case study approach was considered appropriate since agri-environmental public goods are highly local and case-specific but also because different disciplines intervened in the analysis and it was necessary to have a holistic approach to the phenomena under study.

By taking into consideration the general frameworks of PRA/RRA methods, in the context of the present research one of the most significant streams is agro-ecosystem analysis. This approach, by drawing on systems and ecological thinking, it combines analysis of systems and system properties (productivity, stability, sustainability, and equitability) with pattern analysis of space (maps and transects), time (seasonal calendars and long-term trends), flows and relationships (flow, causal, Venn and other diagrams), relative values (bar diagrams of relative sources of income etc.), and decisions (decision trees and other decision diagrams) (Chambers, 1994a, p. 954).

Amongst all the RRA methods, in the context of the present research were mainly used four methods: (i) Secondary sources; (ii) Sketch maps; (iii) Transect walks; (iv) Semi-structured interviews and (v) Institutional and system diagrams.

- *Secondary sources: literature review and document analysis.* One of the most important approaches in integrating other qualitative methodologies is documentary analysis. The documentary analysis was drawn from different bodies of documentary material: academic articles, policy documents, conferences' minutes, technical documents. Public documents (i.e., policy documents, newspaper articles, and conferences' minutes) were particularly useful to explore the public profile of the projects under study and to analyse the institutional and economic relationships between the different actors (farmers, politicians, technicians and other stakeholders). Technical studies (i.e. academic articles, policy evaluation documents, environmental analysis, monitoring reports) and other available sources have been useful to assess the social and environmental outcomes of the projects under study. The use of this material has also helped to evaluate the validity of the data gathered through the interviews. Indeed, the need for triangulation arises from the ethical need to confirm the validity of the processes and increases the reliability of the data and the process of gathering it (Tellis, 1997). To reach this aim, the documentary analysis has been crucial, by allowing evaluating whether or not different sources of data agree with each other.
- *Sketch Maps.* The purpose of sketch maps is providing a visual representation of what the local actor perceives as their territory. This include showing the

shape (appearance) of the community, boundary and all the major features, including where resources, activities, problems and opportunities are located, as well as the dimension and scope of issues to be investigated. This method was conceived as a convenient way to systematically and accurately record basic data of the area under study, where local actors and farmers identified the main characteristics of the territorial systems. Such features, such as major and minor communication roads, major and minor settlements (villages, towns), land use, farms, rivers, water ways, and channels were annotated to illustrate the location and extent of each of the characteristics observed.

- *Transect Walks.* A transect is a walk or a series of walks through an area with local informants to learn of the range of different condition, problems and opportunities of the area. Transect walks, by showing a cross section of the area as observed by the walk, provide a very useful mapping information beyond that collected during the initial reconnaissance and verifies the information on the sketch map. It may also add information on specific features of the areas under study (slope drainage, vegetation, water, soils other sources). Thus, through transect walk it is possible to have more detailed and specific information on cropping pattern, trees, vegetation, farm size, problems and opportunities. Indeed, an important consideration underlying the choice for this method was seeing farmers acting in the field, see his/her enthusiasm for the nature conservation and environmental stewardships and assess his/her knowledge about the subject. This method was combined with the semi-structured interviews and documented in interview transcripts. In the context of the research, systematic walks were made with farmers and the local actors though the areas under study with the main objectives of observing, discussing, identifying different forms, local techniques, local knowledge, seeking local uses, problems, solutions and opportunities. Transect walks also allowed to fully explore the areas concerned, the spatial and physical differences, assessing the main infrastructures and the activities carried out by the local actors in their everyday life.
- *Semi-structured interviews.* The data collection process was largely based on semi-structured interviews, which may be considered a suitable method for researching the motivations, attitudes and values about a given theme. The interviews were conducted 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. Due to the nature of the research and of its objectives, it was not considered essential selecting interviewees using sophisticated

sampling techniques. The sample of farmers and local actors interviewed for each case study was selected with the objective of representing a wide cross-section of interests in the local communities. With regarding to farmers, the main criteria were selecting farmers from their location on the area under study, covering both small and large farmers, farmers with a large experience on the project under study and new entry farmers. In addition to the farmer, other key informants (informants with specialised knowledge) were selected in the local communities who had extensive and deep knowledge about the project, the rural development patterns of the concerned areas and of local conditions and problems. The use of information provided by local farmers and key informants allows access to information otherwise hard to gather. The analysis of interviews' data has been carried out following the Ground Theory approach, as it will be further described in section 4.5).

- *Institutional and system diagrams.* This technique was used in order to illustrate through graphs and diagrams the main local groups involved in each case study (including farmers, local communities, local institutions, environmentalist organisations, advisory systems staff, commercial interests, NGOs, researchers, etc.), the interactions between these groups and the interaction between the stakeholders and the resources/public goods under study (see Asia Forest Network, 2002). Information on local groups and local stakeholders were collected mainly by using secondary sources and semi-structural interviews with key informants. This information was then diagrammed in a systematic way. In the institutional and system diagrams arrows and lines were used in order indicate the various interactions between different user groups, and between user groups and the particular resource/public goods under study. Semi-structured interviews were particularly useful to identify the local groups, the local stakeholders involved in the case studies and to establish the types of interaction amongst them.

4.4 Overview of the RRA methods utilised for the case studies

As showed by Meinzen-Dick *et al.* (2004), in order to assess the effectiveness of collective action it is necessary to analyse multiple units of observation, including individuals, groups, farms and landscape, since perceptions of different dimensions of effectiveness may well differ amongst respondents, especially amongst group leaders and other members, as they are likely to have different knowledge, viewpoints and biases.

As described in section 1.4, in the context of the research, RRA methods were used to carry out two case studies represent two local projects for public goods provision/preservation involving collective action.

The participatory research methods implemented aimed at learning from and with the farmers and the local actors, by learning directly, on-site, and face-to-face, by gaining from directly from them the physical, technical and social knowledge. Indeed, local actors' perceptions and understanding of resource situations and problems are important to learn and comprehend because solutions must be viable and acceptable in the local context, and because local inhabitants possess extensive knowledge about their resource setting (FAO, 1997).

The participatory methods in the case studies were considered particularly appropriate to explore collective action, since it involves analysing local phenomena, exploring the relationships amongst the different units and identifying the main the feedback mechanisms.

Table 4.2 - The analysis of collective action through participatory methods

Variables affecting collective action	Objectives	PRA/RRA methods
1) Resource system characteristics	Identification and analysis of agri-environmental public goods Identification of farming knowledge and practices Analysis of farmers' attitudes, motivations and behaviours	<i>Secondary sources</i> <i>Semi-structured interviews</i> <i>Transect walks</i>
2) Group characteristics	Identification of the actors involved in the collective action and their role (group size and heterogeneity) Identification and analysis of the relationships among the involved actors (social capital and communication)	<i>Sketch Maps</i> <i>Secondary sources</i> <i>Semi-structured interviews</i> <i>Transect walks</i>
3) Institutional arrangement	Identification of the institutions involved Analysis of the mechanisms for control, enforcement, monitoring and evaluation Identification of new drivers, innovative decision making paradigms	<i>Secondary sources</i> <i>Semi-structured interviews</i> <i>Institutional and system diagrams</i>
4) External environment	Analysis of the typology of the implemented measures and strategies Description of the way policies are designed, implemented at the administrative level and delivered to farmers Assessment of the outcome of the policy measures and local strategies (identifications of the main constraints to achieve the full potential)	<i>Secondary sources</i> <i>Semi-structured interviews</i> <i>Institutional and system diagrams</i>

The objective of the case studies was exploring the variables affecting collective action described in the conceptual framework (section 1.2). As showed in table 4.2, RRA methods were used to analyse:

1. Resource system characteristics;
2. Group characteristics;
3. Institutional arrangement;
4. External environment.

Through the analysis of the variables 1 and 2 it was possible to explore farmers behaviours and the innovative farming practices associated to the agri-environmental public good(s), as well the learning and social environment where farmers operate, together with farmers preferences, attitudes and perceptions.

On the other hand, the variables 3 and 4 are related to institutional and policy setting, and were analysed to assess the different institutional systems, territorial strategies, and institutional capacity relevant for the provision of agri-environmental public good(s) through collective action.

4.5 Grounded theory and analysis of the qualitative data

The main sources of data and information of this study were the semi-structured interviews with the local stakeholders. By following the constructionist approach described in section 4.1, the analysis of the data followed the grounded theory principles.

Grounded Theory (GT) is structured in a way that the researcher asks a question or series of questions which are designed to lead to the development or generation of a theory regarding some aspect of social life.

GT is a qualitative approach that uses a systemic set of methodological tools in order to develop a theory from the study and the analysis of the reality. The researcher, instead of starting from a theoretical assumption to be verified on the field, he/she started from the fieldworks, in order to observe the most relevant elements that emerge from the study of the reality, with the main objective of developing a theory on the topic he/she is studying.

The development of a theory is the result of a scrupulous process that involves the researcher moving in and out of the data collection and analysis processes, a movement that is usually called 'iteration'.

This 'iteration' allows developing a theory with regard to the research questions and, above all, it allows the analyst engaging in theoretical sampling process. As described by Glaser and Strauss (1967, p. 45) 'theoretical sampling is the process of data collection for generating theory whereby the researcher jointly collects data, and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges'.

Indeed, in the framework of GT, the collection, coding and analysis of data are three processes that are always interrelated: while the researcher is active in collecting data at the same time he/she is also active in coding and interpreting them. This continuous process of asking questions and comparing data is functional to understand the main unexplored issues as well as the main weakness of the analysis, and it allows the researcher to obtain a deep knowledge of the phenomena under study.

This comparative process involving joint data collection and analysis continues until the researcher reaches saturation, the point at which there are no new ideas and insights emerging from the new data.

With regard the analytic phase, the most relevant action is the data *coding*, which is the process of defining what the data are all about. As observed by Charmaz (1995): ‘unlike quantitative coding, that means applying preconceived codes to the data, qualitative grounded theory coding means *creating* the codes as you study your data. Since codes emerge from the research, this process may take the researcher to unforeseen and unexpected areas and questions’.

More in details, this process involves three levels or types of coding:

- *Open coding* - the data are segmented or divided into similar groupings and forms. Preliminary categories of information about the phenomenon are developed;
- *Axial coding* - after the open coding, the identified categories are brought into groupings. These groupings resemble themes and are generally new ways of seeing and understanding the phenomenon under study;
- *Selective coding* - the categories and themes are organised and integrated in a way that articulates a coherent understanding or theory of the phenomenon of study.

The process of data collection and coding must be accompanied by the writing of informal analytical notes, commonly called *memos*. Memo-writing constitutes a crucial method in GT for the following reasons: (i) it prompts researchers to analyse and code data and early in the research process and (ii) it keeps the researcher involved in the analysis, by helping to increase the level of abstraction of the ideas (Charmaz, 1996).

In this study memos resulted particularly useful for making comparison between data and data, data and codes, codes and categories, and new ideas were articulated from these comparisons.

Moreover, in the context of the present research, as result of the coding and memo-writing processes, data were sorted and organised in a hierarchical structure, where the different categories and sub-categories were organised in index trees. This *sorting*

process was carried out separately for each case study and two index trees were developed (see Annex 2).

The final stage of the analysis of qualitative data collected through the interviews was the writing of the results, by following the structures of categories and subcategories resulted by the sorting process.

The table below summarises the different stages of the GT and their utilisation in this study.

Table 4.3 – The use of Grounded Theory in the research

Stages of Grounded Theory	
Data collection	Semi-structured interviews, transcription
Coding (open-axial-selective)	Data have been coded and then organised in a set of categories and subcategories. The process of data collection and coding continued until the point of theoretical saturation was reached
Memos	Writing of memos about the various categories and properties that emerged from the data as a result of the coding process. This process allowed the identification of links between the various themes/categories.
Sorting	All the codified data and memos were organised in categories and subcategories forming two index trees (one for each case study – see Annex 2)
Writing	The structure of the case study writing has been guided by the sorting of data above

4.6 Strengths and limitations of the proposed methodology

In spite of the appropriateness of the method of case study in this research, this approach can also represent several limitations. Indeed, the validity of this study, as with any research, is determined by the extent to which its findings can be generalised. Case studies may be used as the basis for generalisation, but this generalisation is theoretical, and not empirical in nature (Sharp, 1998, p. 788). In order to evaluate the possibility of generalising findings, the research has followed Mitchell’s (1983) approach. Mitchell illustrates how explanations can be generated without the need for empirical typicality and emphasises the role of atypical cases in the generation of theoretical explanations. For this reason, a likely limitation of this dissertation can be viewed also as an important strength: the role of atypical cases is discovering the logical and necessary relationships among variables and they can generate theories that can be generalised (Sharp, 1998, p. 788).

With regard to the methodologies used, the qualitative nature of the research approach has represented another important limitation of the study. In fact, while the methodology adopted focused especially on the social process leading to collective action and to new form of governance in rural areas, it is necessary to emphasise that

demonstrating that collective actions that arise to address agro-environmental issues does not mean that automatically such actions lead to environmental improvements and to effective agri-environmental public goods provision.

In fact, the approach of the study, by focusing on social construction of reality, has been limited in evaluating the material 'reality' of progress towards public goods provision (the outcomes of collective action). Since public goods provision is a function of quality as well as quantity (Meinzen-Dick, 2004), the qualitative data collected on the fields were also integrated with quantitative data collected through the analysis of policy and technical document. Indeed, when trying to assess the rank of quality of different services through interviews it is clear that respondents have different 'reference' points for assessing quality and for this reason it is necessary to integrate the data collected with quantitative data regarding the outcomes in terms of natural resource management (agricultural and environmental practices) as well as in provision of public goods (pollution, landscape, etc.).

At the same time, the research focuses mainly both on the individual incentives and motivations of local groups to participate into collective action and on how the motivation for action can be shaped at group level (through social networks, organisations, etc.) by showing little evidence on the related bargaining powers and roles of the main actors involved in the process.

Nevertheless, in order to achieve the research objectives, the methodology tools proposed were considered flexible and appropriate to fit the local situations and to explore such issues. Indeed, the qualitative methods described above were considered particularly suitable to establish direct rapports with the respondents, with the objective of having the insider's views and understanding of the local actors involved in the collective action.

In particular, semi-structured interviews were particularly useful to understand relevant institutions as well as the rules, norms and attitudes involved in the processes under study, also allowing a cross check on information and data collected. The guide line of the questionnaire for the semi structured interviews was particularly useful in this regard, since the focus of interviews in many cases shifted rapidly and in many cases it was difficult to compare the answers from different interviews.

The other Rapid Rural Appraisal (RRA) techniques such as sketch maps and transect walks were particularly useful for identifying and analysing more in depth the practical problems of the collective actions on the field, with a deeper learning which allowed to reduce the gap between theory and practice.

5 The project “Custodians of the Territory”

5.1 Overview of the case study

During the last decade, it has been observed an increasing frequency of flood events in large parts of Europe, also as result of climate change. Nevertheless, the estimates of changes in flood frequency and magnitude remain uncertain (EEA, 2008). Extreme weather events impact to a different extent different rural areas across Europe, but it may be argued that risks are exacerbated in those areas where, also as results of agricultural intensification, rivers and other watercourses have been straightened, which increases the speed of the water’s flow, where riparian vegetation has been removed, and on highly compacted soils leading to fast rainfall run-off (LUC, 2009). Agriculture, however, can also form part of a mitigation strategy, with certain forms of land management improving the water storage capacity of the land and hence, the resilience of the broader landscape to these risks (Cooper *et al.*, 2009).

In Italy, with regard to the magnitude of the hydro-geological risks, a study released by the national council of geologist (CNG, 2010) highlights that 6 million of inhabitants (about 10 per cent of the national population) live in the 29.500 kilometres squares that are considered at ‘high risk’, where 1,2 million of building are considered at ‘high risk’ of landslides and flooding.

Tuscany is one of the Italian regions that during the last decade has been increasingly subjected to extreme weather events and flooding. According to the data released by Legambiente in 2011, the 98% of Tuscan municipalities are interested by phenomena of hydro-geological risks, which comprise the 90% of the regional houses and infrastructures.

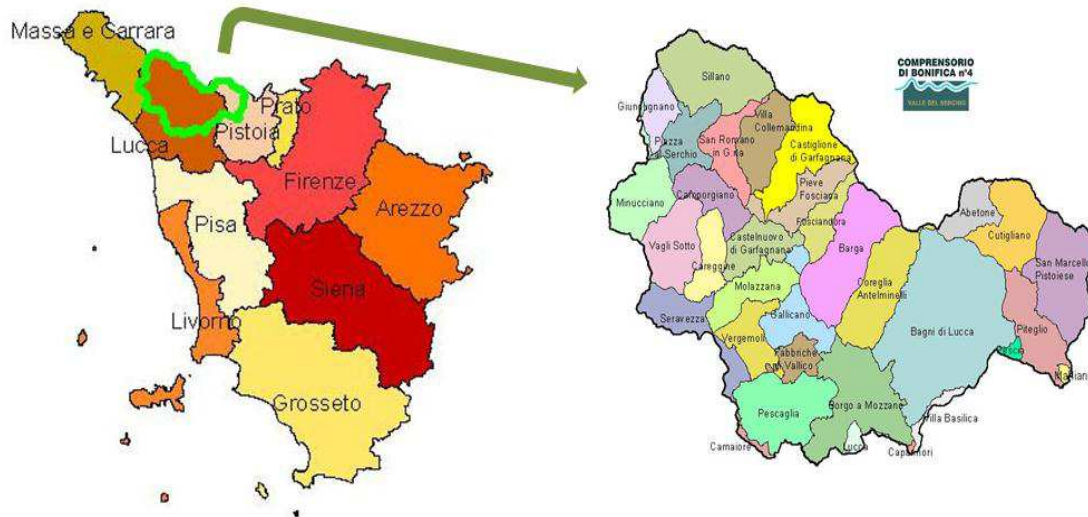
Thus, the hydro-geological management of the territory is increasingly recognised as a regional priority, especially in relation the improvement of the resilience to flooding and the role of farmers and other rural stakeholders may improve flood prevention management.

This is particularly true in mountain areas, where the management that farmers can undertake to reduce the risk of flooding on their own land may also reduce the risk of flooding at landscape level. Nevertheless, in many mountain areas of the country it has been observed an increasing abandonment of farming activities, that resulted in increasing difficulties for the local institutions to ensure an adequate hydro-geological management of the territory.

The case study analysed here refers to a local project in the Reclamation District No. 4 “Serchio Valley”, a mountain area of over 115,000 hectares in the drainage basin of the

Serchio River, in Lucca and Pistoia provinces of Tuscany region, comprising 35 municipalities.

Figure 5.1 – The Reclamation District ‘Media Valle del Serchio’ Valley, in Tuscany



From a socio-economic point of view, the area is characterised by low population density, mainly as result of a significant process of abandonment of the most marginal and remote areas, especially in the mountains. This phenomenon resulted in a higher urbanization process in the plains, which are characterised by high population density and high presence of infrastructures. It is then possible to observe a strong dualism between the areas of the plains, where the industrial and residential activities are concentrated and the mountain areas, where agricultural and forestry activities still play an important role (fig. 5.2).

For these reasons, in this district the hydro-geological management of the territory is increasingly recognised as one of the main environmental priorities, also as result of the numerous extreme weather events during the last years that have increased the perception, amongst the local citizens and politicians, that the area needs a stronger resilience to flooding.

The high risks of over flooding are related to the strong development of residential, industrial and manufacturing activities in the plains as well as to the high hydro-geological fragility of the local mountain areas, due to the characteristics of the soils and the high level of yearly rainfall, but also to the lack landscape and environmental maintenance activities.

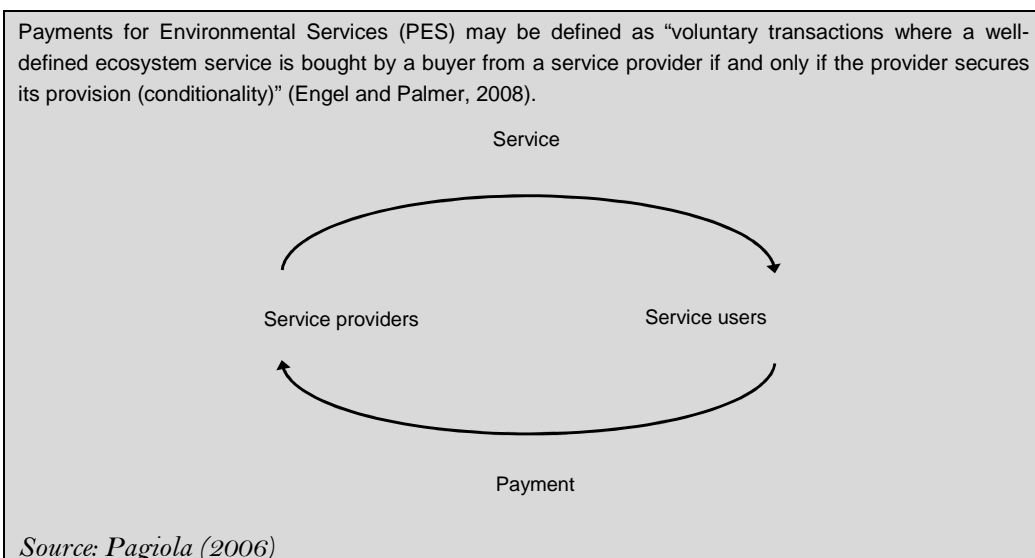
Figure 5.2 – The increasing urbanisation in the plain areas of the district



In this district, the main reclamation activities are managed by a local agency, the Mountain Community “Media Valle del Serchio”, which is in charge of ensuring the hydro-geological management of the territory (the agency is in charge of cleaning up and restoring the riverbeds, as well as maintaining the 2,500 hydraulic structures of the areas, mainly dikes).

This local government agency, due to difficulties in managing over 115,000 ha of mountain areas and about 1,500 km of streams and torrents, has decided to set a Payment for Environmental Services (see box 5.1) with the local farmers, with the main objective of increasing the resilience to flooding by improving the landscape and hydro-geological management of the territory.

Box 5.1 - Payments for Environmental Services



The PES for the local farmers settled by the local agency in Media Valle del Serchio is articulated into two types of activities:

- Monitoring activities: periodical on site controls of torrents and streams, with report and pictures;
- First maintenance intervention: execution of simple maintenance works such as removal of trees, woods and debris from riverbeds and dikes to avoid overflowing, together with the management of riparian vegetation.

The idea beyond this strategy is that this type of activities, which have been increasingly depending on the activities of specialised firms, could be carried out more efficiently by local farmers living and working in the district.

The assignment of this type of environmental services by the local agency usually is the result of the monitoring carried out by farmers, who prepare a detailed report on the canals needing the intervention works, with their location as well as with a short explanation of the needed works and some pictures. If the service to be provided can be carried out by the farmers (cleaning up riverbeds and other simple operations) who have signalled it, the local agency assigns directly the environmental services to the farmers.

The PES includes a fixed payment (€ 6,000 per year during the initial phase and € 4,000 per year during the following years) for the monitoring activities, and a variable payment for the first maintenance intervention, based on the extent of the work to be done. The maintenance activities, according to the Italian law on multifunctional agriculture and diversification activities (national Legislative Decree n. 228/2001), cannot exceed € 50,000 per year for professional farmers and € 300,000 for specialized cooperatives.

During the initial phase of the project (years 2007-2008), the initiative has received great interest from farmers: there were 63 expressions of interest that have resulted in the activation of 20 contracts with 'farmers custodians'. In this phase the activities were mainly related to the monitoring (report writing and pictures), since it was necessary to develop a data-base of the main environmental needs of the area and of the environmental services to be carried out by farmers.

During the second phase (years 2009-2010), some organizational aspects of the project were modified, and some farmers custodians were replaced for the exigencies of the local agency in terms of territory to be covered by the agreement (and in some cases for the lack of farmers' professionalism which adhered in the first phase), which interested 13 new farms. In this phase the budget was decreased for the monitoring activities that, logically, had been carried out extensively during the first phase.

parameters, but also on the basis of the location of their farms and on the basis of their knowledge of the territory.

Indeed, the first phase of the project was a mapping activity, carried out by the local agency in cooperation with the municipalities of the district, aimed at identifying the areas 'covered' by the presence of farmers. This mapping activity was supplemented by a direct survey among local farmers through interviews, with the objective of understanding their knowledge of the territory and, above all, their 'range of competence'. As put it by one of the initiator of the project:

We did not investigate only farmers' knowledge, but also their "range of knowledge". We asked to local farmers the following questions: even though your farm is only 15 ha of forest and arable land, in reality how do you move around? Where do you go usually? How far do you feel that you the knowledge of the territory? How often do you go in these areas? They explained to us their displacements and above all their knowledge of the areas surrounding their farms and this was crucial to settle the agreement for the environmental services that they could provide (INTERVIEW n. 1).

After the identification of possible farmers to be involved, the local agency made a recognition and a mapping of the environmental priorities for the hydro-geological maintenance of the territory and then drawn the first agreement, in consultation with the local farmers' organization (Coldiretti and CIA).

This sound, context specific socio-ecological research prior to the implementation of the project is based on the assumption that the design of a PES schemes should be context-specific, due to the uneven information of socio-ecological systems (Muradian *et al.*, 2010).

According to respondents, the real added value of the environmental services which are provided by the farmers is linked to their local knowledge in terms of places (location and conditions of canals, streams and hydraulic structures) but also in a more broadly knowledge of the territory in terms of local people, places, traditions and history.

According to the stakeholders interviewed, the type of local knowledge that plays a crucial role in the project is related to the folk memory of farmers regarding the environmental dynamics of the territory. This folk memory is usually passed down orally over the years and it involves, for example, the knowledge about the extraordinary meteorological events of the past, the seasonal (and annual) water level of rivers and streams, the diversion of water flows, the flow of water in times of flood, the access points to streams and rivers.

The local knowledge of farmers, related to the spatial and temporal dimensions of environmental priorities (i.e. the risk of flooding) was considered crucial to identify the main environmental risks, as well as the timing and the location of the interventions.

From this perspective, the project was encouraging preventive actions, especially in the most remote and inaccessible areas of the district. This was possible through the daily monitoring and local knowledge of local farmers. Indeed, the economic incentive to monitoring allowed creating a knowledge network of farmers that keep under control the areas surrounding their farms, an area of expertise based on their location and on their commitment to resolve the emerging environmental problems of these areas. Indeed, one of the most innovative aspects of this project was involving local farmers to carry out the monitoring and maintenance works not only within the farms' boundaries but also on an area surrounding their farms. This widened the spatial perspective of many farmers, by increasing their perceptions on the territory where they operate in terms of landscape and hydro-geological problems. This aspect was well synthesised by a farmer involved in the project:

I believe that the fact that the project pushes us to go out from our farms is very important, because when we deal with canals and streams we cannot think about farms boundaries. The hydro-geological management of the territory is not a business problem, is a common good and this project allows us to better understand that maintaining common goods is an important opportunity. The main goal is increasing the participation of local farmers, who should also demonstrate to be keen and active for this activity. With regard to my feeling, I have to say that I feel this as my territory, where I was born and I have my roots. I carry out the monitoring activities and the intervention works also for these reasons, for my territory and not just for my farm (INTERVIEW n. 11).

The monitoring activity that may be considered the most innovative aspect of the project, it is intrinsically linked to the local knowledge of the area. In fact, according to the stakeholders interviewed, only people living in the territory are able to provide fruitful indications about the exact location of the environmental problems, and of the flooding risks. The initial phase of the project for each farmer involved is based on recognition of this knowledge, which has been considered crucial to identify the types of issues to be solved and their location, in order to increase their efficiency and effectiveness of the collective action.

Moreover, the data collected show that the local knowledge of farmers is also useful to deal with the administrative aspects. For example, the direct knowledge of landowners by farmers was a crucial step in planning interventions, since it has demonstrated to play an important role in facilitating administrative procedures, by reducing the red tape and by avoiding possible contestations or other legal problems.

It may be argued that, while in many cases professional and government representatives fail to recognize the different contribution that local knowledge can make to problem solving, through the 'Custodians of the territory' project the local decision makers aimed at re-valuing and re-building different forms of knowledge that before were excluded from the main strategies regarding the management of the territory, by pushing them to identify risks and to set the early intervention on the canals and streams in order to prevent flooding.

This approach, according to the local stakeholders interviewed, promotes the spread of best practices among farmers, recovering the daily actions of prevention and maintenance that in many cases had been lost. Interviewees highlighted that, since in the past the territory almost entirely occupied by farms, the correct hydro-geological management ensured an effective delivering of environmental services at landscape level. As pointed out by a member of a local municipality:

The abandonment of farming determined many environmental problems, especially in relation to the landscape maintenance works, which in the past were naturally carried out by all the farmers that were settled here, who by maintaining their land in good conditions also maintained the whole territory. Nowadays the problem is different, the main challenge for local authorities is encouraging farmers to provide services outside their farms and this also implies to act on motivation and attitudes of farmers, in order to recover their knowledge and their competencies in providing environmental services which are not only functional to their business (INTERVIEW n. 3).

5.3 Motivations and attitudes: building the identity of 'farmers custodians'

The data collected in the field have allowed exploring how farmers perceive the environmental services that they carry out, how such services fit in their farming strategies and which are the main motivations of farmers to adhere to the project.

The results of the research confirm what several economists have already demonstrated: in many cases the participation into PES is strongly motivated by private benefits. Indeed, farmers adhered to the proposed scheme because they believed that they would gain from participation both directly, by having access to the specific funding for monitoring and for carrying out the first maintenance works and indirectly, by increasing the opportunities to collaborate also with other government agencies.

According to the coordinator of the project, since the possibility of first intervention works is led by the monitoring activities, in some cases farmers tend to exceed in signalling the need of intervention in order to increase the possibility to carry out the first intervention works.

In fact, in some cases, farmers may decrease the monitoring activities when the local agency does not assign the first intervention works to them, either for lack of available funding, either because the work is of higher entity (in terms of machinery available and competencies) and is to be assigned to specialized companies or cooperatives.

Farmers perceived this type of PES as an efficient way to optimize and rationalize farms activities (use of labour, machineries and spare time) but also to increased visibility in their areas. Indeed, many farmers perceive the project as a good opportunity to make further collaboration with other public agencies.

Farmers during the interviews have highlighted that monitoring is an activity that they usually carry out mainly during the idle time, and it represents an interesting complement to productive activities. The monitoring also helps to engage employees at a time when there is a lack of activity in the farms. In many cases this activity fits well with the hobby activities of farmers such as hunting and fishing and mushroom picking. Similarly, the first intervention works were considered important income integration in periods of scarce activities in the farms (i.e. during the winter and in raining days).

As showed by Muradian *et al.* (2010), the economic incentives are just one of the main drivers that may influence farmers' behaviour and farmers' willingness to adhere to the PES. The data collected on the field confirmed that, and allowed to identify farmers' motivations and attitudes which go well beyond the private and economic interests, but which are more related to the personal sphere and to their identities.

For many farmers the reasons for joining the project are related to their personal passions, skills and ideas and, above all, emphasised how the project contributed to renovate their identity of farmers, which in many cases is closely linked to the social and institutional recognition of their role as 'custodians' of the territory.

Many farmers expressed their concerns about the increasing farming abandonment of those marginal and mountain areas and they perceived the project as an opportunity to increase the recognition for their role of landscape stewards. As put it by a farmer:

There is also some pride in participating in this project. We can change something in people conscience and awareness. When people see a farmers working outside the farms for preventing hydro-geological disasters and flooding they may think that there is something important to think about, the environment, and maybe farmers may help us to increase the safety and the beauty of our territory (INTERVIEW n. 13).

Some farmers have emphasized that their participation into the project makes them feeling directly involved in the management of the territory and this is view also as a social role, since the services provided may increase local people awareness on the importance of the farmers' stewardship in mountain areas.

Another interesting issue that emerged during the interviews, it was the qualitative aspect of the activities that may ensure the local farmers, compared to other local actors who potentially could be involved into the PES. Indeed, the approach of farmers in delivering the environmental services was described by the representative of the local agency as 'different in qualitative terms' compared to the approach of the local agency workers of specialised cooperatives workers. The technicians working for the local agency have emphasized that in many cases, in delivering the environmental services, farmers put the same commitment and dedication of their farming activities.

While the approach to the work of public or private employees are mainly regulated by the contract of employment (with annual leave, work permits and other types of permits), farmers who have joined the project consider the environmental services activities as one of their daily work activities within their farms. For example, respondents noted that, compared to the other types of workers, farmers are used to complete the works as soon as possible, also in bad weather conditions and after working hours.

This different approach in delivering environmental services by farmers also resulted in a different length and quality of the works, as emphasized by the municipal authorities interviewed who have benefited by the environmental services carried out by the farmers in their municipalities.

Furthermore, the data collected suggest that this approach, especially in the case of the most active farmers in the project, as favoured the building of a new identity of the 'farmers custodians'.

Indeed, according to the local agency technicians, the recognition of farmers as 'custodians of the territory' was interpreted by them such a sort of 'right' to make the monitoring and maintenance activities in their assigned area. This institutional recognition led the farmer to express the local needs in terms of flood prevention and landscape management activities and, more broadly, to be an example also for the other local land managers and land owners.

This new identity was built, on one side, through the institutional recognition of their role and, on the other side through a social acknowledgement, which increases the recognition of local communities on the role of local farmers in the management of the territory.

This recognition of the activities of 'farmers custodians' was led to an increasing involvement of farmers in the project decision-making, since the building of trust and cooperation amongst the farmers, the technicians and the responsible of the local agency.

This role and this recognitions in some cases pushed farmers to increase the range of environmental services provided, even though these environmental services that are not included in the agreement with the local agency (and so without remuneration) such as removal of illegal dumps in riverbeds and in adjacent areas.

Finally, in many cases the most pro-active farmers became a point of reference for local people and, above all, represented a reliable information network as well as an efficient early warning system for the public administrations in charge of the environmental management of the district.

Table 5.1 – Farmers’ motivation to participate into the collective action in Media Valle del Serchio

Individual/economic reasons	Social/environmental reasons
Payments for monitoring and first intervention works	Enthusiasm and keenness for the environmental services to be provided
Interesting complement to productive activities	Contributing to the environmental management of their territory
Engagements of employees when there is lack of activities in the farms	Social and institutional recognition of farmers as landscape stewards
Integration in periods of scarce activities in the farms (i.e. during the winter and in raining days)	Building a new identity of 'farmers custodians'
Increasing visibility and networking (opportunities to collaborate with other government agencies)	Involvement of farmers in decision-making process

5.4 Co-production of knowledge and learning opportunities

As showed before, the settlement of PES in Serchio Valley area is a collective action led by a local agency to achieve joint goals, such as reducing the costs for the landscape maintenance works, but also to increase their effectiveness. These objectives were pursued by ‘re-building’ the technical knowledge of farmers related to the environmental management activities. Regarding the technical aspects concerning the monitoring and intervention methods, respondents argued that the value added of the project is the exchange of knowledge and the learning experiences that have been activated.

Indeed, the project aimed at recovering this knowledge through the interactions and the exchanges between different actors (institutions, technicians and farmers), in order to increase the effectiveness of the services performed. Instead of implementing the traditional hierarchical approach of learning transmission (manager to technicians to workers), the involvement of farmers led to a constructive exchange and to a learning process that have involved representative of local institutions, technicians and local farmers.

More specifically, the interaction amongst farmers and the local agency technicians resulted in a process of learning and co-production of knowledge, which represented,

on one side, an efficient early warning system for the risk of flooding and on the other side, ensured the provision cost-effective environmental services.

Before the assignment of the environmental services, the technicians working for the local agency and the farmers carry out a joint inspection, which is a crucial moment of exchange of knowledge between farmers and technicians.

Regarding the type of knowledge exchanged, the evaluation of the environmental services to be provided, the type of works necessary and the time and budget issues are the result of a negotiation process amongst the technicians and the farmers. According to the farmers and technicians interviewed, the modalities regarding the provision of environmental services are the result of a useful integration amongst local knowledge and technical knowledge.

On one side, technicians' knowledge and experience were mainly used for the intervention works, since this knowledge is necessary to evaluate the costs, the time and machineries necessary to carry out the services. On the other side, the farmers' knowledge was particularly useful for the identification of the environmental priorities, for the localisation of the points of the canals and streams to be controlled, and, above all, to have the perception of the environmental risks. Local stakeholders argue that the integration of these two types of knowledge have created a virtuous circle, a sort of osmosis of knowledge that enabled both technicians and farmers to learn new concept and new issues.

According to the farmers, the environmental services required by the project are not particularly difficult for them, since they are used to carry out similar works for the canals and streams that are within the boundaries of their farms. At the same time, the project coordinator argued that in many cases the approach of farmers in the cleaning were not appropriate, since farmers tend to cutting too much the riparian vegetation. Some farmers do not fully understand that many environmental services are complex operations, and are not simply removal of vegetation and trees but are related to the management of complex and fragile ecosystems.

From this point of view, the project coordinator said that it would be appropriate to provide specific training to farmers in order to carry out more efficiently all the environmental services required. Despite these critical aspects, the coordinator also acknowledged that in many cases the environmental services were done efficiently and at little costs, by cleaning entire sectors of streams and canals that were badly maintained for many years.

The interaction between farmers and technicians, both during the joint inspections and during the execution of the first intervention works are very important moments of exchange, in order to overcome the main technical difficulties encountered by farmers. The integration of local knowledge with the technical knowledge was also the result of

Box 5.2 – Transect walks with the ‘farmers custodians’

Transect walks represented a good integration and continuation of the semi-structured interviews carried out with the ‘farmers custodians’. During the transect walks farmers explained the main hydro-geological problems of the district, with detailed descriptions on the conditions of canals and rivers observed alongside the walks.

The farmers simulated these activities and this allowed to gradually lead to the identification the main problems that otherwise would not have been addressed.

The transects also provided and an opportunity for discussion on the main technical problems encountered by farmers during the monitoring activities and during the intervention works.

The data collected were manly related to the technical knowledge required to carry out the environmental services, for example the technical knowledge required when positioning the wood alongside the rivers and the canals after the cutting operations, since a not adequate positioning could even increase the risk of over flooding (in case of flood the water may wash away the logs and the wood causing damages and over flooding).

The transect walk ended with summarising the information gathered during the walk and this was used as a point of discussion for the following interviews and transect walks, favouring the ‘iteration’ process of the grounded theory approach undertaken in the research (see section 4.5).

During the transect walks farmers also described in details the environmental and topographical features of the area where they operate, the problems of access to the main canals, the machineries and the knowledge needed to carry out the intervention works, the services that have been already provided and those that are plan to provide.



Monitoring activities, in a first phase, served also to make a sort of census of drainage structures (dams, sills, retaining walls) in the various areas of competence of farmers' custodians, and also this information was integrated into the information system of the local agency. The first-hand knowledge that farmers acquired through the monitoring was particularly important in updating - and in some case correcting - the geographical database of the local agency. At the same time this co-produced knowledge was particularly useful in planning the intervention works to be carried out in the district. The first-hand knowledge that the farmers acquired through the monitoring was particularly important in updating - and in some case correcting - the geographical data base of the local agency. At the same time this co-produced knowledge was particularly useful in planning the ES in the district.

5.5 The actors involved

As discussed in section 3.1, a very relevant issue to address when assessing the dynamics of collective action in the context of public goods provision is what type of organisation has addressed the agro-environmental problems. Several studies show the differences, in terms of efficiency, success and outcome, according to the type of organisation involved, for example between an organisation controlled directly by farmers or controlled by a national/regional government. As already showed, the main authority involved in the project is the Mountain Community 'Media Valle del Serchio', the local agency which defined the contracts, coordinated the project and maintained the information system.

At the same time it is possible to recognize the involvement of various institutions and organizations that, to a various extent, have provided the institutional, technical and policy support to the project. Table 5.2 summarises the main actors involved and their role into the project.

It is possible to recognise different levels of involvements into the project. The first level is related to international (European Commission) and national (Ministry of Agriculture, Regional Government of Tuscany) levels that are indirectly involved through the development of the necessary supporting policies (rural development policies, agro-environmental measures) and through the national and regional legislative framework enhancing the multifunctional role of agriculture.

The project was developed thanks to the national and regional legislative framework on multifunctional agriculture that has been developed during the last decade. A very important step is the 2001 national Legislative Decree n. 228, which redefined the role of farmers, through an acknowledgment of the environmental services that farmers may provide in rural areas. This decree (art. 15) allows 'local institutions to draw up

agreements with farmers in order to facilitate ecosystem services, the preservation of forest and agricultural landscape, the hydro-geological management of the land’.

Table 5.2 – The actors involved in the “Custodians of the Territory” project

EU and national level	Role
European Commission	Approval and design of Rural Development Policies
Ministry of Agriculture	Legislation on Multifunctional Agriculture and National Strategic Plan for RD
Regional government	Design and management of RDP
District level	
Pistoia and Lucca Provincial authorities	Local implementation of RDP (LRDP)
Mountain Community Media Valle del Serchio	Setting and managing the PES scheme
Other Mountain Communities	Technical assistance
Farmers’ organisations	Administrative assistance
Local level	
Municipalities	Results dissemination, direct contact with farmers and technicians
Farmers, technicians, local communities	Environmental services delivery (implementation rules, social norms)

During the interviews, the representatives of local institutions involved into the project have emphasized the importance of this legal instrument, since the legal acknowledgment of the multifunctionality of agriculture has allowed local government agencies setting different types of agreements with the farmers. Indeed, the legislative Decree n. 228 allowed to broad the spectrum of activities and services that farmers could provide, translating the academic and institutional debate on multifunctionality into agreements that before could not rely on a coherent legislative framework. Nevertheless, the representative of the local agency argued that there are several important issues that are not yet sufficiently regulated by the existing legislation. This is the case of the monitoring activities: it is not clear whether the law includes this ‘immaterial service’, which is difficult to quantify in terms of economic return for farmers. Although the difficulties in regulating and supporting this service, the local agency included it into the PES schemes and this service is unanimously considered the most innovative aspect of the project.

Indeed, the monitoring activities allowed developing a knowledge-based flooding prevention strategy, since the monitoring allowed identifying the areas prone to particular risks and it was an important tool for the local authority in planning its activities. According to the local stakeholders, the national legislation on multifunctional agriculture was interpreted by the local agency in very broad terms, and this resulted in a very innovative approach on the services provided by farmers,

since the payment was addressed not only to physical goods, but also to the prevention activities, primarily through the monitoring.

According to the local stakeholders, also the regional RDP should include the specific support for monitoring activities, since to date the project managers have failed to find a set of RDP measures which could financing the project in its entirety:

In the regional RDP we could not find a set of measures that could exactly fit for the project. The RDP philosophy is based on investments, works and interventions that have a beginning and an end. Our project is based on prevention, on continuous monitoring activities and in small interventions that are not possible to finance through the inflexible instruments of the RDP (INTERVIEW n. 4).

From this perspective, the project coordinator has emphasized how this approach, namely favouring the involvement of farmers living in less accessible areas, has been a strong political choice which has brought about several complains, especially from the specialized cooperative and firms that traditionally carried out the environmental services included into the agreement with the local farmers. At the same time, the coordinator of the project recognized that this choice was crucial to achieve the primary objective of the project, which is acknowledging, through the institutional and the economic support, the added value of local farmers in providing environmental goods and services in the areas surrounding their farms.

With regard to the support to the PES into the Rural Development Policies, the case study shows that the effective implementation of local strategies also depends on the development of coherent supporting policies. The regional implementation of the RDP in Italy results in a very broad differentiation at the national level, since every Regional government set a Regional Development Programme and a Regional implementation document. Local programming is articulated on the basis of the Regional implementation document and it is based on two types of strategies: Local Rural Development Plans (LRDP), which are provincial programmes and Integrated Local Development Strategies (ILDS), which are the programming activities related to the Local Action Groups (LAGs).

With regard to the financing support to the activities related to the project, the role of Provincial authorities is particularly relevant, since Provincial governments in Tuscany are in charge of the local implementation of the rural development policies (through Local Rural Development Plans, LRDP). At the same time this devolution may lead to differentiated results according to the different priorities of the provincial administrations. This is the case of the provinces involved into the project 'Custodians of the Territory', which have set different priorities for the implementation of the LRDP: while Pistoia province has focused the action on reclamation issues and on the Mountain Communities activities, in Lucca province the priorities are more related to

the development of municipal projects. According to the project coordinator this difference was one of the causes of the different effectiveness of the project observed between the two territories (higher amount of funding for the hydro-geological activities in Pistoia province compared to Lucca province).

At the district level, according to the stakeholders interviewed, in many cases the municipalities have played a significant role to maximize the effectiveness of the project, by disseminating of results and by encouraging direct contact between the technicians working for the municipalities and the farmers, and in some cases also by involving directly the 'farmers custodians' into the early intervention works. At the same time, the project coordinators agree that a greater involvement of the municipalities could provide a further improvement in the management of the project, since this could result in a greater involvement of local communities.

Among the actors who have played an important role in the project, respondents also cited the farmers organisations, which in many cases have played a very important role in motivating farmers to participate into the project, by explaining to them the innovative approach of this initiative as well as the opportunity to diversify their income and to improve the specialisation towards the environmental services as a strategic investment for the future. Moreover, during the early stages of the project farmers organisations also have supported the farmers for the administrative tasks of the initiative and in some cases gave some advice and information to the local agency during the selection of farmers, providing some information about their reliability and their professionalism.

The analysis of the institutional arrangements of the project, also provided some insights on the management of rural development policies at the local level, especially with regard to coordination mechanisms needed for a more effective provision of environmental services at territorial scale. One issue that all representatives of the local agencies have highlighted is the lack of coordination amongst the local institutions that, at different levels, are involved in the hydro-geological management of the territory.

The local representatives interviewed have emphasised how the landscape management activities would need a coherent and homogenous approach at river basin level, since the territorial needs often do not coincide with the administrative boundaries (regions and provinces). While the hydro-geological management of the territory and the resilience to flooding are highly dependent to the correct management of rivers, canals and streams, the environmental priorities are usually addressed on the basis of the different administrative levels (municipalities, provinces and regions). In some cases inflexible policy tools and institutional arrangements based on the administrative borders hindered a more effective approach to the broad range of environmental services to be provided at landscape level.

While the success of initiatives such as ‘Custodians of the Territory’ is closely related to the coordination of local institutions and local agencies, especially in terms of management of duties amongst river basin authorities, municipalities, mountain communities, provinces and municipalities unions, according to the respondents a more effective coordination amongst these authorities would have favoured a more efficient support to this collective action, by providing a wider spectrum of services carried out by local farmers, such as maintenance of mountain path, fire services prevention, etc.

5.6 Information, communication and joint learning

The role of communication and information regarding agro-environmental strategies is usually an issue that economists fail to address or not address adequately, but it plays a very crucial role in determining their success or failure, and this is particularly true where grass root collective actions are involved (Ayer, 1997).

From this perspective, it is interesting to explore the use of the new communication technologies in ‘Custodians of the Territory’ project, where the development of specific technological tools have demonstrated to have a strong potential in coordinating the different stakeholders, with the objective of increasing the effectiveness of the environmental services to be provided.

Indeed, during the second phase of the project the responsible of the local agency decided to standardise the procedures for the monitoring activities (report and pictures provided by the farmers) with the main objective of collecting all this information in a single database. Thus, an information system based on *google maps* was created, named IDRAMAP. This is a web site where it is possible to access from the home page of the local agency and it was developed as an on-line information system. This system was also developed with the objective of expanding the monitoring activities to the local inhabitants.

Local farmers and citizens, by accessing to IDRAMAP, can signal the need of intervention on a specific location of the area simply by clicking on the map. When clicking on the corresponding point of the map, IDRAMAP opens a menu that allows the user to select the type of environmental problem detected.

According to the responsible of the project, the role of this on-line information system is twofold. On the one hand, by extending the monitoring activities to the local population, it represents a very effective tool for communicating critical situations and problems of various kinds; on the other hand, IDRAMAP was developed to make public the activities carried out by the local agency, in order to increase the transparency of the use of revenues generated from local reclamation tax. However, the responsible of the project have pointed out that this increased visibility may also

expose the local agency to some risks, since its activities may be checked out by the local citizens, who can challenge the local agency in case of retard of intervention and in case to an high number of warnings would not correspond an adequate number of intervention works.

Figure 5.5 - IDRAMAP



Nevertheless, the coordinator of this information system recognised that IDRAMAP is an important management tool for the agency, since it allows to rationalise the activities and to reduce the costs by avoiding double warnings, by planning joint inspections and maintenance activities in specific areas.

From the point of view of the procedure, IDRAMAP is structured in four steps: (1) warning (2) acceptance (3) attribution to the institution in charge (4) acceptance.

Figure 5.6 - The four steps of IDRAMAP



One of the most critical aspects of IDRAMAP is related to step (3) attribution to the institution in charge. Indeed, according to the representative of the mountain community 'Media Valle del Serchio', the lack of coordination amongst local agencies and local institutions described above do not allow to make full use of IDRAMAP,

which potentially could assign the type of intervention signalled directly to the agency in charge to solve the problem. A better coordination amongst the various institutions could lead to an higher recognition and use of IDRAMAP by the all the local agencies involved into the management of the territory at district level (river authorities, provincial authorities, municipalities, etc.).

Nevertheless, the development of this innovative learning/information system, based on co-production, emphasises the importance of negotiation amongst the different local stakeholders and, above all, the importance of joint learning processes and knowledge generation. Indeed, an approach to PES which stimulates the formal and informal interaction amongst several rural stakeholders may facilitate the increase of social capital and institutional capital, by increasing the co-operation and coordination at territorial level.

From this perspective, it may be argued that effective PES are based on a knowledge system as well as a system of rules, but also on an effective information and communication system which codifies those knowledge and rules and favours the interactions amongst the local stakeholders.

5.7 Factors affecting collective action in “Custodians of the Territory”

As described in the conceptual framework (section 1.2), the main factors that influence collective action may be comprised in four groups: (1) resource system characteristics, (2) group characteristics, (3) institutional arrangement and (4) external environment.

Based on this classification, table 5.3 summarises the key successful factors in Custodians of the Territory project.

Table 5.3 - Factors affecting collective action in ‘Custodians of the territory’ project

1) Resource system characteristics	2) Group characteristics
Lack of hydro-geological management Lack landscape management due to abandonment of mountain areas High risk of flooding, especially in urbanised areas of the plains	Social capital: trust and mutuality Involvement of marginal and isolated farmers Participatory events: involvement of local community Interdependences local agency-farmers
3) Institutional arrangements	4) External environment
Simple rules Different rural stakeholders involved Information/early warning system: IDRAMAP Co-production of knowledge: joint inspections	Payments for Environmental Services settled by Mountain Community National and Regional legislation on multifunctional agriculture Measure 226 of the Regional RDP

In the area involved the risk of hydro-geological disorders is very high, and farmers were aware that a lack of correct management of rivers and riverbanks could have important negative effects (such flooding and bad landscape) for their business. At the same time the single farmers were not able to implement individual solution to this problem, and a reduction of flooding risk was clearly the most important joint product of this collective action. At the same time also more immaterial joint outputs were produced, such as an increasing sense of community amongst the farmers of the same areas, an acknowledgment (even though not everywhere at the same level) by the local community of the important social and common functions carried out by the farmers.

One of the responsible of the project well synthesised this innovation as follow:

The project was developed to contribute to the prevention of hydro-geological problems and increasing the resilience of flooding in the area through continuous monitoring and early intervention of local farmers. It's a completely different philosophy compared to the traditional PES, here the main issue is recognizing, developing and financing all those small preventing actions and the first maintenance works which local farmers carry out in those territories (INTERVIEW n. 5).

The approach adopted in this collective action was mainly developed by the local agency, which set a payment for environmental services aimed at providing flooding prevention, mainly through information and an early warning system based on local communities and local farmers, who can identify and tackle problems before the environmental disasters such a flooding take place. The information system also aimed at building social networks that could enhance the formal and informal exchanges amongst local institutions, advisors and farmers, with the main objective of increasing the efficiency of the environmental services provided.

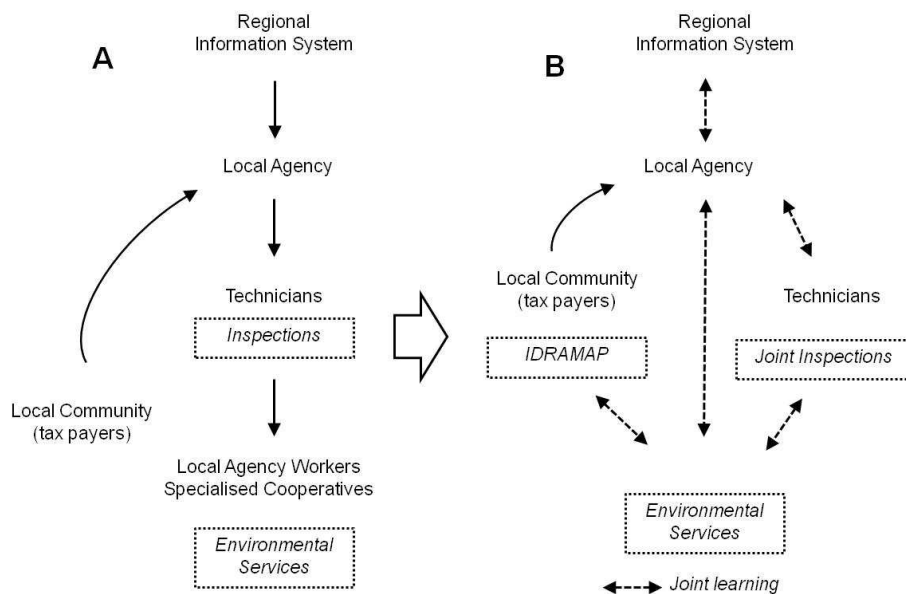
Thus, the project, together with the provisions of the environmental public goods such as the 'hydro-geological equilibrium' and the 'resilience to flooding' has aimed at increasing the institutional and social capital through the provision of relational goods, which may be considered the real innovation of this initiative.

This set of objective was pursued by encouraging the direct involvement of farmers into the project, by selecting and training them not only on the basis of their technical capacity (ownership of machineries) but also on the basis of their location and on their knowledge of the territory. From this perspective, farmers interviewed have emphasized that they have strongly appreciated this approach and that they feel that it makes them feel the main actors and the management and maintenance of the area that they monitor.

This system, which aims at creating and spreading awareness among the local actors on the role that farmers may play in the delivering of important public goods, favoured

the co-production of environmental services by the local agency, the advisory system and the local communities.

Figure 5.7 - The development of a new information/learning system



A: The hierarchical approach in place before

B: The information/learning system developed through the project

Thus, the co-production approach on PES emphasises the importance of negotiation amongst the different local stakeholders and, above all, the importance of joint learning processes and knowledge generation. The case study shows that also collective action led by local agencies may stimulate the formal and informal interaction amongst several rural stakeholders and that may facilitate the increase of social capital and institutional capital, by increasing the co-operation and coordination.

Indeed, the payments and the support received by farmers are not only an economic incentive to deliver environmental services, but are structured as an incentive to actively participate in the environmental management of the territory, by increasing the relations and interdependences amongst farmers, local institutions, advisory system and local communities.

The representatives of the local institutions interviewed (local agency, provinces, municipalities) argued that an important strength of the project is its simplicity: both in terms of measure design and in terms of their implementation. Indeed, the management of this collective action is based on a daily relationship between the coordinator of the project, the technicians and the farmers. This strong collaboration has favoured the development of trust and willingness to cooperate and this facilitated the implementation of a very simple agreement without excessive regulation or

bureaucratic tape. This simplicity was stressed especially in contrast to the RDP measures, which were described as ‘cumbersome and rigid’, since these measures usually required a deep knowledge of the administrative procedures that in many cases discourages their adoption by the farmers. On the opposite, the agreement experienced in the project shows how a direct relationship between a local authority and the farmers may facilitate the adhesion to the collective action, also by increasing their effectiveness.

5.8 Benefits and barriers

Data collected in the field have allowed to identify a series of opportunities for the project, in terms of territorial expansion, increasing the range of environmental services to be provided but also several constraints that have to be overcome in order to scaling up and building new experiences by using the same approach.

In general terms, the representatives of the local agency have stressed their satisfaction with the effectiveness of this collective action, considered strategic for their activities, even from an economic standpoint, with an undoubted saving in terms of labour, equipment and monitoring activities. Indeed, all respondents confirmed that one of the main strengths of the project was its cost-effectiveness.

Indeed, the project coordinator is highly satisfied with the work carried out by the farmers involved, since they have demonstrated suitable actors to carry out the required hydro-geological management activities.

The main strengths of the project, according to the farmers interviewed, are related to the creation of a new identity of local farmers as ‘custodians’, which implies a strong commitment for the environmental management of the area. The most pro-active farmers are becoming point of reference for local people and, above all, are an information network and an efficient early warning system for the public administrations in charge of the environmental management of the district.

The main opportunities of the project which have arisen through the interviews with farmers also concern the increase of their knowledge of the areas surrounding their farms as well as an increase of their reputation within the local community. This also increased their visibility and for some of the farmers involved it allowed establishing new contacts with other farmers.

The analysis of the institutional arrangements of the projects provides some insights to the management of rural development policies at the local level, especially with regard to coordination mechanisms, which can result in a more effective provision of environmental services. Indeed, one issue that all the local institution representatives have highlighted is the lack of coordination amongst the local institutions that, at different levels, are involved in the hydro-geological management of the territory.

Moreover, the responsible of the local agency has also highlighted how the effectiveness of this collective action, both in terms of environmental services provided and in terms of involvement of local farmers is not homogenous on the territory.

The project coordinator pointed out how the initiative is more efficient when the environmental services are provided by the more structured and large farms, while the small farmers often demonstrate some difficulties to simple procedures and administrative tasks of the project. To some extent these difficulties are due to the lack of experience of small farming in working for the public administration and, more in general, the lack of experience for works that required different administrative tasks from those that they are used to carry out. The administrative burdens of the project are mainly related to the different ownerships of the land, which require different types of administrative tasks (decrees, orders, and specific authorizations).

Another barrier to the further development of the initiative is the planning of the interventions, since the coordinator before assigning the PES to farmers must take into account availability of machineries and the competencies to carry out the works. While the larger farms usually have the necessary equipment to perform almost all operations, in some cases, small farmers tend to overestimate their ability to intervene, both in terms of equipment and of technical knowledge.

The difficult task of the managing body is balancing the need of improving the management of the project, focusing on the farmers that have demonstrated to be able to cope with the task required and maintain its main objective, which is selecting local farmers according to their location and to incentive their environmental action.

Finally, the most critical element of the project lies in the difficulty in scaling up and becoming the dominant approach of ES delivery in the district, as pointed out by a representative of the local agency:

The local agency should increase the visibility of the project at regional level, in order to increase its scope, broadening its action and obtaining specific funding; on the opposite, so far this project has failed to expand and to link to other similar initiatives and actually it may can be considered simply an 'experimental proof' that adds to the other initiatives related to the reclamation activities (INTERVIEW n. 1).

Indeed, the project could have resulted, for example, in a reduction in the tax local tax for reclamation, and this could have increased the awareness of local population on the minor costs thanks to this type of initiative.

It is clear that to increase the scope of the project it would be necessary to include it in the regional agri-environmental strategies, in order to experiment similar actions in other regional districts also through the development and implementation of specific regulations and of specific financial resources. This is hindered by several political and

administrative barriers, but also to the financial mechanisms for the environmental action. As put it by a promoter of the initiative:

Large financial resources for mountain areas are available only in case of environmental disasters such as flooding, and it is evident that in many cases the public and private interests are primarily focused in intercepting these funds; the approach experimented in this project is completely revolutionary because is based on prevention rather than on maintenance and it has not been developed to obtain funding, because it does not need much funding; for this reason local politicians and local entrepreneurs are not very interested, because it is based on a conception of the environment is not business oriented (INTERVIEW n. 1).

Finally, as already described, one of the main barriers of the project is related to lack of coordination between local institutions (river basin authorities, province, region, CM, etc..) that so far has prevented the scaling up of the project, that could be adopted at larger scale.

Table 5.4 – Benefits and barriers of collective action in ‘Custodians of the Territory’

Benefits	Barriers
Cost effectiveness (saving in terms of labour, equipments and monitoring activities) Creation of a new identity for ‘farmers custodians’ Increasing commitment of farmers for the environmental management of the area Knowledge generation and learning Institutional capital and capacity-building Increased reputation of farmers Building up of a network of local farmers	Lack of coordination amongst local institutions Environmental services to be provided do not correspond to the administrative boundaries Lack of equipment and of technical knowledge (especially for small farmers) Lack of specific training Difficulties in scaling up and expanding the collective action

5.9 An innovative model of delivering environmental services

The project ‘Custodians of the Territory’ was created in order to provide and protect a large set of environmental goods and services closely linked to agricultural activities, such as landscape, soil protection, resilience to flooding, but also non-environmental public goods, such as social capital, institutional capital and new knowledge. This approach was promoted by a local agency by involving local farmers in the delivering through a re-organisation of institutional and social settings that facilitate the mechanisms of the co-production mechanisms.

This collective approach is quite innovative. Indeed, traditionally PES are settled on a simple mechanism, based on a voluntary participation of farmers, where the payments are conditional to the environmental services effectively provided: farmers provide environmental services and get paid for doing so (‘provider gets’) while those who benefit from environmental services pay for their provision (‘user pays’) (see box 5.1).

As showed by Engel and Palmer (2008), the efficiency of the PES is related to the following conditions (i) clear relationships between the type of land use being promoted and the provision of the environmental service to be provided; ii) the possibility for the stakeholders to strictly follow the rules of the contracts and (iii) the presence of an efficient monitoring system, which must ensure that the services are really provided. As discussed by Muradian *et al.* (2010), in the reality it is very difficult that the PES comply strictly with these conditions. On the opposite, when implementing PES, usually it is necessary taking into consideration the collective dimension and the coordination mechanisms, with the main objective of changing individual and collective behaviours that otherwise would lead to excessive deterioration of ecosystems and natural resources.

As highlighted by Vatn (2010), in designing PES, it is really important to distinguish incentives and compensations, since these different approaches involve different relationships between the involved agents.

The case of 'Custodians of the Territory' shows how the local agency has aimed at creating not an instrumental relationship based on compensation, but a more complex system of incentives, rules and knowledge, which is based on reciprocal relationships, trust and engagement.

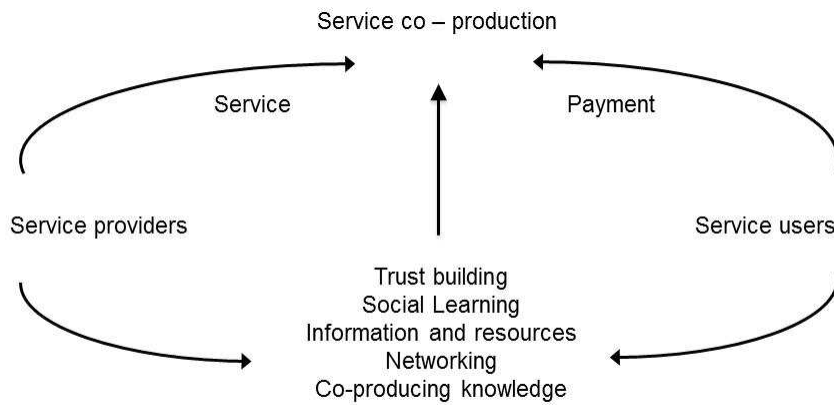
The co-production mechanisms observed in the case study involves a more complex relationship between 'provider gets' and 'user pays', since it requires a more integrated strategy based on the development of a local network of farmers, citizens, advisory system and local institutions.

Through co-production, the PES received by farmers are not only an economic compensation for delivering specific services, but are structured as a set of incentives to push farmers to actively participate in the environmental management of the territory, by increasing the relations and interdependences amongst farmers, local institutions, advisory system and local communities.

The case study shows that the local agency in charge coordinating the project has not only settled the PES, but it has also provided opportunities for personal growth and learning for the advisors and the farmers involved. The learning opportunities have been based on two types of strategies, one addressed to the broad involvement of the local communities and the other on the exchange between professionals (technicians) and farmers. In the first case a specific website (IDRAMAP) was created in order to implement an early warning system and to rely on a common data base. This tool allows blurring the distinction between services providers and service users, facilitating co-production of knowledge. Indeed, IDRAMAP was implemented to reconfigure the ways in which environmental services are developed and delivered:

local communities are not only the service users but, by signalling the environmental problems are, to some extent, also services providers.

Figure 5.8 – A new model of PES, based on co-production



The distinction between services providers and services users were reduced even more in case of farmers, since the local agency offered to farmers a range of incentives in order to transfer their knowledge and capabilities into its strategy. The local agency became then a catalyst and a facilitator for the development of a network of local farmers, by encouraging co-production of knowledge, reciprocity and mutuality in the environmental services to be provided.

The application of the concept of co-production on PES implies a different approach to the *jointness* amongst agricultural activities and the services provided by farmers. Indeed, while the neo-classical approach focuses mainly on the remuneration of the externalities and of the countryside goods provided by farmers, a co-production approach broadens the scope of *jointness*, by pointing to the ways to reinvigorate farmers' motivations and attitudes, to rebuild their knowledge in order to realize their full potential in delivering environmental services. This broad conceptualization of PES implies a greater involvement of farmers into the decision making processes, by encouraging them to use their human and professional skills to deliver the required services.

To summarise, this initiative shows the potential for developing a new management model of environmental services, which allows maximizing the effectiveness of control activities on the territory, by reducing the flooding risks through prevention and through early intervention works ensured by a network of local farmers.

6 Valdaso agri-environmental agreement

6.1 Overview of the case study

In Valdaso area (Marche region), a group of local farmers specialised in fruit production started a grass root initiative to adopt integrated management techniques at territorial scale, with the objective of protecting water and soils from pesticide and nitrate pollution. This initiative has been supported by the regional and provincial governments, which settled a specific territorial agri-environmental agreement (TAEA), mainly financed by the regional RDP.

A territorial agri-environmental agreement (TAEA) may be defined as ‘a set of commitments for farmers in a limited area, supported through a mix of RDP measures that can be activated to reach specific environmental goals. Based on a territorial approach and by involving public and private actors in the context of a shared project, TAEAs are aimed at implementing collective and coordinated actions for the management and improvement of the environment’ (Marche Region, 2007).

The TAEA implemented in the area is part of a wider project, called ‘Valdaso project’, which is an integrated project involving different actions related to the rural vitality of the area, the renovation of the small town centres and the cleaning and management of the Aso river. This project is related to the sustainability of the area and it is an attempt to harmonise the different policy tools for the sustainable development of Aso Valley, by integrating the rural development strategies with the planning activities and the management of the natural resources.

The area covered by the Valdaso TAEA is the Aso Valley, in Marche Region (Italy), a territory alongside the boundary between Ascoli Piceno and Fermo Provinces, which follows the path of Aso river. Valdaso is a well preserved valley with a very attractive landscape, but the environmental quality of the river has suffered from various types of anthropogenic pressures, especially derived from intensive agricultural production.

Indeed, the local agriculture is highly specialised in fruit production (peaches, plums, apples and pears) and the valley concentrates almost 60 per cent of the regional production and transformation of fruits. The valley traditionally was intensively cultivated through a high use of chemical inputs, with negative consequences on the river’s water quality, on agricultural soils and also on the operators’ health. Nevertheless, in this area, during the last decade, it has been observed an increasing awareness, among the local communities and the local farmers, of the negative impacts of this intensive and highly specialised type of farming. Thus, in 2007, a small group of farmers (allied in a local farmers association *Nuova Agricoltura* – ‘New Agriculture’) started a grass root initiative to adopt integrated management techniques at territorial

scale. This initiative has been supported by the regional and provincial governments, which settled a specific agri-environmental agreement, financed by the regional RDP.

The agreement established specific targets, to be achieved in a period from five to seven years, such as the reduction of 30 per cent in macronutrients (nitrogen, phosphorus and potassium) used in the territory and the substitution of agri-chemical inputs, characterised by acute or chronic toxicity, respectively by 90 and 85 per cent. To achieve these results, the TAEA was structured as an integrated package of measures of the regional RDP, with the aim of financing a set of initiatives that could support the adoption of more sustainable agricultural practices at territorial level. The package of measures comprises the measure 111 on training activities and information actions and the following sub-measures of the agro-environmental schemes (214): integrated pest management (IPM) techniques, mating disruption², organic farming and protection and improvement of soil through green cover.

Together with the actions specifically implemented to reach environmental objectives (measure 214), the measure 111 was included into the agreement with the objective of rising farmers' awareness on the impacts of their farming practices on the environment, as well as on the role of farming in protecting the environment and enhancing the rural landscape. Indeed, through this RDP measure, a capacity building programme for farmers was established, with a specific training regarding the technical guidelines on integrated agriculture, with in-farms visit and specific workshops which were organised to increase information sharing among local farmers regarding the environmental, economic and health effects of IPM techniques.

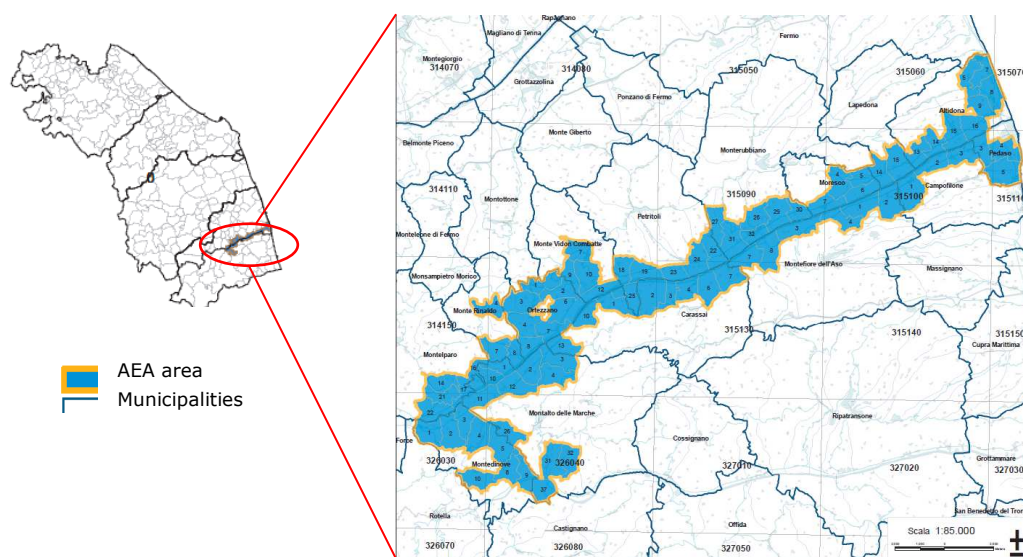
As prescribed by the regional RDP, the area covered by the TAEA should be an unbroken piece of land belonging, for more than 50%, to the Nitrate Vulnerable Zones (NVZ). The total area under the TAEA should be at least of 1,000 hectares and the UAA (Utilised Agricultural Area) cultivated with fruit trees (peach, plum, apple and pear) must represent at least 5% of this area (Marche Region, 2008). The designated area of Valdaso TAEA encompasses 50.4% of NVZ areas (figure 6.1).

In the first year of the agreement 82 farms were involved, corresponding to 257 ha cultivated with Integrated Pest Management (IPM) techniques. In the following years, other farmers joined the TAEA, but in a smaller number, also because a condition for

² Mating Disruption (MD) is a technique used for advanced integrated crop management. The aim of MD is confusing the male insects by masking the natural pheromones, emitted by female insects. These natural pheromones are detected by the males, assisting them in locating unfertilized females for mating. Pheromones of many species have been identified and are synthetically produced for use in IPM programs to mimic the sex pheromone produced by the female insect. Consequently, the male population experiences a reduced probability of successfully locating and mating with females, which leads to the eventual cessation of breeding and collapse of the insect infestation.

access to the agreement is that area involved should be in a NVZ. In the last tender (2011), however, further fourteen farmers have applied to join the Valdaso TAEA, and at the beginning of 2012 about 100 farmers were involved in the agreement.

Figure 6.1 – The designed area of Valdaso TAEA



Source: Ascoli Piceno Province (2009)

6.2 The development of a collective agri-environmental action

According to the local stakeholders, Valdaso TAEA was implemented to reduce the environmental and social risks related to the high uses of chemical inputs for fruit production (pesticides). Especially farmers have emphasised how they have increasingly perceived the need of minimising the negative impact of local agriculture on the river's water and air quality, soil functionality and, above all, people health and food safety. As put it by a farmer involved into the agreement:

Historically the main environmental problem of the area is the very high use of pesticides, and maybe we have realised too late that we have heavily altered the ecosystem; in my opinion it is not so easy to get back to the right equilibrium... I remember that twenty years ago during the winter the soil in the valley was almost yellow and white and it smelled badly, due to the impressive use of pesticides used by local farmers (INTERVIEW n. 28).

Thus, the most motivated and younger farmers created *Nuova Agricoltura*, a spontaneous and informal association (which gathers no more than 20 farmers), where the associates share a common view on the need of adopting more sustainable farming practices at territorial level, in order to reduce the negative environmental impacts described above.

The birth of the New Agriculture dates back to 1995, when it was planned to build a gas plant and the passage of a pipeline in the valley. Some farmers, particularly concerned about the expropriations but also for environmental and landscape impacts of these new infrastructures in the area, joined into this association, in order to increase their lobbying power and to organise some information campaigns.

Nuova Agricoltura was also created in order to address in a more effective way the technical, economic and social issues related to the transition towards sustainable agriculture that, according the farmers interviewed, official farmers' organisations failed to address. Indeed, according to the local farmers, the success of this association is based on its informal character, since it is based on the direct knowledge of people, on relationship of friendship, reciprocity and trust. As put it by one of the pioneer of *Nuova Agricoltura*:

We are used to meet up at the bar every night, everything was born there, and from there we started to organise some meetings at the old school of the town in Montalto, where we discuss about our projects and where we share our opinions and ideas. However we also are in touch by telephone, and we meet often, since we live all in this valley. Few of us who have created very close, friends, we trust each other (INTERVIEW n. 25).

Farmers believed that an informal association could have important positive effects, since the aggregation of farmers could potentially have a higher 'lobbying power' than individuals, by increasing the credibility and the legitimacy of the joined action to be undertaken.

According to the local stakeholders, the development and the implementation of the TAEA has been possible because of the activities of this informal association but also as result of the experiences that almost all local farmers have had in the past as associates to a cooperative. The technician responsible of the TAEA (project leader) working for ASSAM (Agenzia Servizi Settore Agroalimentare delle Marche, the regional agricultural advice agency) has emphasized both the positive and negative impacts of this cooperative for the new project as follow:

Putting them together was not difficult because I knew them all, we started to have meetings, in the past they were already associated in a cooperative and this helped a lots. I have started my professional carrier in this cooperative 20 years ago and this cooperative was the first one adopting integrated pest management production in the area. At the same time the cooperative went to bankrupt, and farmers, even though recognised the need of work together, they were scared by this bad past experience (INTERVIEW n. 14).

Indeed, even though the previous experience in this cooperative has been positive from the point of view of the habitude of local farmers to collaborate, for some of them the bankrupt of previous cooperative that has been a major barrier to a new type of

aggregation. *Nuova Agricoltura* played a crucial role in creating the conditions to aggregate the farmers and to convince the most hesitant ones to work together again. Indeed, this association was also created to promote exchanges and collaborations for many initiatives such as the TAEA but also additional projects in the future, for example regarding the joint supply and marketing of local products.

With regard to the development of the TAEA, farmers who decided to create the association were already testing IPM techniques in their farms and they realised that this type of technique would have implied some level of farms aggregation to be more effective. Especially mating disruption is more successful where large areas are treated with pheromones and, since in Marche Region the average size of farms is quite small (10,2 ha. ISTAT, 2010), a collective approach is needed to make the technique effective.

The experimental phase with the IPM techniques began in 2007 with a small group of farmers associated to *Nuova Agricoltura*, but the agreement was made in 2009. During these two years the most motivate farmers, also because the results in terms of production were very encouraging, they succeeded to involve a very large number of local farmers (almost eighty).

This was considered a very good result, also because the techniques introduced are very innovative, especially for people used to the traditional methods of crop protection. At the same time the farmers who experienced the techniques were also pushed to involve other farmers since, especially mating disruption, is effective only whether a large piece of unbroken land is involved.

To increase the land interested by mating disruption, some farmers have also installed dispensers in the orchards of the neighbours who do not use this technique, in order to cover a larger area and thus maximize the efficiency of the IPM, as described by this farmer:

I started to use the IPM two years ago; the first year went so well, but the second year it did not work so well. The ASSAM technicians and I realised that one of the main problem was the presence of the insects on the nuts tree around my farm. So I bought the dispensers to be installed in these nuts tree around my farm. Fortunately the owner was happy ... of course, I have protected his trees at my expenses But fortunately it was a good idea, because this year it works well. (INTERVIEW n. 28).

All respondents argue that one of the most interesting and innovative aspects of the TAEA was to stimulate and test this collective approach, where farmers were concentrated to the territorial effects of this agro-environmental strategy, also as result of the characteristics of the new farming practices adopted. These aspects have been well synthesised by ASSAM project leader:

To obtain important results on the field farmers must change the mentality, and to obtain this also institutions and advisors must stop thinking in terms of a single measure, it is necessary to have a project/integrated approach, in order to involve people in more innovative things. Farmers are usually considered ignorant, but if you will involve them you realised that they can give you impressive feedbacks. They are not ignorant, but isolated. It is then necessary to involve them and to make use of their unbelievable enthusiasm (INTERVIEW n. 14).

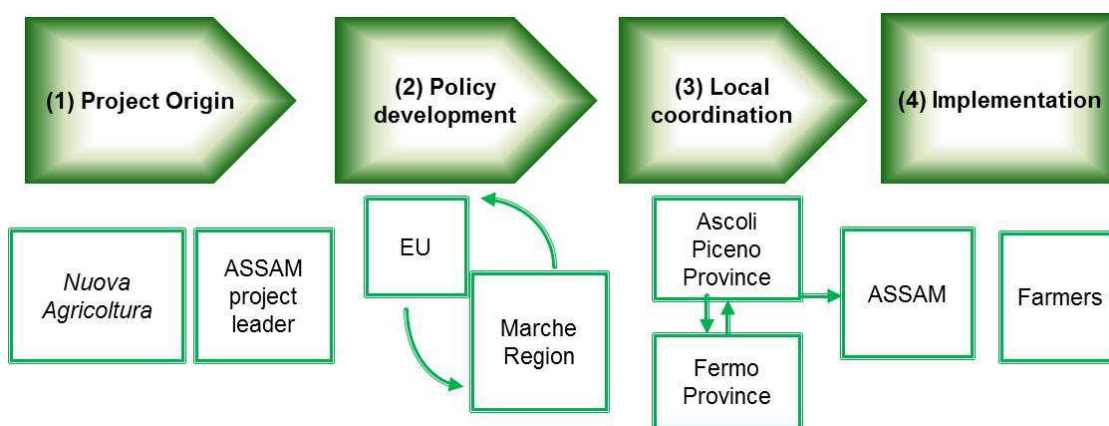
According to the farmers, the project leader herself played a leading role in reinvigorating farmers' enthusiasm and in favouring their aggregation. Many farmers have also recognised an important role of leadership to two or three farmers 'pioneers', who according to them was equally important in developing this initiative.

Although in Valdaso area the development of this collective strategy is mainly due to the Association *Nuova Agricoltura*, other local institutions and organisations have played a crucial role in the settlement and the implementation of the TAEA.

The Regional and Provincial authorities, in particular, aware of the inefficacy of an approach focused on individual farmers, were able to institutionalise and support to specific needs of local farmers related to agricultural practices and public goods protection. In other words, the bottom-up approach experienced through the activities of *Nuova Agricoltura* and of the project leader has been supported and coordinated by the regional and provincial authorities, in order to design and implement a mix of measures targeted to the local needs (Figure 6.2).

During the initial phase of the project (1) *Nuova Agricoltura* developed the idea of adopting IPM techniques at territorial scale in collaboration with ASSAM, in particular with the project leader, who was one of the key drivers of the development of this collective agri-environmental action.

Figure 6.2 - Overview of the development of Valdaso TAEA



In the second phase the support provided by the Regional administration was crucial, by setting the environmental goals to be achieved and by proposing the specific package of measures to be integrated into the Regional Development Programme. In the regional RDP the possibility of concluding TAEA was already foreseen but there were no farmers interested in that kind of agreement. So, as the provincial authority of Ascoli Piceno came with the request for a TAEA, the regional administration has managed to embed this request in a viable agreement, by setting operational rules in the RDP, after the approval of the EU.

As highlighted by an official of the Marche regional government, the request was made explicitly by a group of local farmers associated to *Nuova Agricoltura*:

We had a request from a group of local farmers who wanted to experience this innovative technique. ASSAM played an important role of technical assistance and contributes to disseminate the good results of the experimenting phase. When many farmers were convinced to act collectively, the Region, through the provincial authority, was quite happy to help them and to find a specific support for this action (INTERVIEW n.18).

Then, in the coordination phase (3), the Provincial authorities involved (initially Ascoli Piceno provincial authority and in a second phase also Fermo provincial authority) have been very important to build the local partnership of farmers and institutions and, above all, in translating the general guidelines of the regional RDP into local strategies as well as in coordinating the TAEA at territorial level.

As described by the responsible of Valdaso TAEA of Ascoli Piceno provincial authority, the coordinated strategy of *Nuova Agricoltura* and the local provincial authorities resulted in an inclusive decision-making system, where the farmers could also participate in the definition of the technical requirements of the measures to be applied:

The project was born as result of a strong determination of local farmers, who have asked to the provincial authority to act as intermediary with the Marche regional government to add value to their collective action. From them and from their strong desire was born the whole process, we act as a bridge with the region. (INTERVIEW n. 15).

The provincial authority of Ascoli Piceno was involved in the project by the farmers' association and by the project leader, since this institutional level was considered the most appropriate in dealing with the local needs. Local stakeholders agree that the provincial authority represents the most suitable institution to translate these needs into an agreement funded by the regional RDP. As it will be further discussed later, respondents argued that the problems that emerged during the implementation of the TAEA was due to the lack of formalisation of the role of the Provincial authorities, since these institutions in Marche region are not in charge of the agricultural policies but they have been involved specifically for implementing this agreement.

Finally, during the implementation of the agreement at farm level (4), ASSAM played an important role, by giving advice about IPM techniques and for the development and transmission of new knowledge among farmers.

The project leader emphasised the role of the local network, which was crucial to develop a collective project, and she defined the agreement as the result of a co-creation process:

The agreement is the result of a co-creation process, where each actor involved has built something. It was a synergy of forces, a group of work (INTERVIEW n. 14).

6.3 The co-management of the agri-environmental agreement

The territorial approach experimented in Valdaso involve a broad involvement of local actors not only during the development of the agreement, but also in managing the technical and administrative tasks of the project.

Table 6.1 summarises all the actors that, at different levels and for different tasks, have been involved in the design, implementation and management of Valdaso TAEA.

Table 6.1 – The actors involved in Valdaso TAEA and their role

EU and national level	
European Commission	Approval and design of Rural Development Programme for Marche region
Regional government	Introduction of the TAEA into the regional RDP
District level	
Ascoli Provincial Administration	Promoting and managing authority of the TAEA
Fermo Provincial Administration	Managing authority (with Ascoli provincial authority) since 2009
ASSAM	Technical assistance, chemical analysis, information system
Crop protection products companies	Technical assistance
Farmers' organisations	Administrative assistance
Local level	
<i>Nuova Agricoltura</i>	Development of the initiative, involvement of local farmers
Project Leader	Development of the local network of farmers, bridge with the local institutions
Local farmers	Experimentation of techniques and adoption at territorial scale

From the point of view of the policy design, a central role has been played by the regional government, which has tried to set the regulatory framework for the territorial agreements into the regional RDP. It must be also observed that the Marche regional government in the past had already experienced a number of pilot environmental projects with a territorial/collective approach, including an agri-environmental project to reduce soil erosion. For several reasons these pilot projects have not been translated into operational projects effectively implemented, but they

have been a strong basis on which to build the regulatory framework for the following territorial and area-based agreements. As highlighted by the responsible of the TAEA at the Marche region, this strong methodological basis represented an important prerequisite to translate the requests coming from the Association *Nuova Agricoltura* and from the provincial authority of Ascoli Piceno.

With regard the effective implementation of the TAEA, the provincial authority of Ascoli Piceno has been identified as the most appropriate local authority for several reasons. Indeed, according to the responsible of the agreement, the provincial authority is able to act as a bridge between the local dimension (farmers) and the regional dimension, namely between the design of the policies and the beneficiaries of the payments. Thus, according the majority of the stakeholders interviewed the provincial level was the most appropriate to manage a collective agri-environmental strategy:

A collective approach for the agri-environment must involve a direct contact with the territory and with the people involved. The regional administration is too far from the local dynamics, does not have the right proximity to the needs of the territory. The innovation of this agreement is related to the territorial governance, since the provincial authority was able to promote a process of aggregation at territorial level. Even the municipalities cannot do it, since they do not have a district perspective of the actions needed; they are mainly focused on isolated and very local examples (INTERVIEW n. 17)

At the same time, a few problems have been highlighted related to the local management of the project.

Firstly, there is a problem related the lack of devolution in the managing of the RDP in Marche Region. Indeed, in some regions such as Tuscany and Emilia Romagna, provincial administrations are in charge of implementing the Local Rural Development Plan but it is not the case for Marche Region, and this had some important negative effects. As put it by an official of provincial authority of Ascoli Piceno:

The TAEA is managed by the province but we are not in charge of implementing agricultural policies, so we carried out several tasks for this agreement but officially we do not have the authority to do it. It would have been better if we could be involved to a large extent into the agreement, by following it step by step and to be a bit more present with the farmers, who usually call us to solve problems that we cannot face because the RDP is fully managed at regional level (INTERVIEW n.15).

As result of this, the provincial officers have emphasised that the activities carried out by the provincial administration does not have the financial resources for what concern the organisation and management of the TAEA, and some farmers have expressed

some discontent of not being adequately trained and monitored by the institutions in the ways prescribed by the agreement.

Secondly, a barrier that was highlighted by the local stakeholders was the recent division of the territory covered by the agreement in two provinces: Ascoli Piceno and Fermo provinces. Indeed the Fermo provincial authority was established in 2004 but started its activities in 2009. Currently the river Aso is the natural boundary between the two provinces and this subdivision has created some problems in the management of the TAEA.

Amongst the other actors involved in the management of the TAEA, farmers and representatives of local authorities have also underlined that there has been an important support from professional organisations (CIA, COPAGRI, CUPA and COLDIRETTI), especially for what concerns the administrative support (farmers' files and applications):

The province set up a so-called 'green table', where, together with Nuova Agricoltura, also the official farmers' organisations were involved. These organisations were important especially in providing helpful data on the farmers involved and in helping farmers to make the applications for the agreement (INTERVIEW n. 17).

Nevertheless, some respondents have emphasised that, while organisations have supported the project when it was already in place, they were unable to give a push in during the early phases, where they did not support adequately the initiative of *Nuova Agricoltura*.

The co-creation of the agreement also saw the active participation of ASSAM that played a central role for what concerned the technical assistance the information system. Moreover, as it will be further discussed, the ASSAM centre of Jesi carried out the analysis of the residues on the products in order to evaluate the effects of the TAEA in terms of food safety.

In some cases the technical assistance provided by ASSAM was integrated with the advice provided by some companies specialised in crop protection products (BASF and BAYER) which were increasingly interested in commercialising products for the mating disruption. This interest is also due to the EU directive on sustainable use of pesticides that is setting increasing restrictions regarding the use of conventional products. This interest led to an involvement of these companies also in the communication and training activities foreseen in the context of the TAEA, which were also an important occasion for them to show their products that can be used for IPM.

This involvement has been reported after implementation of the agreement, while in an initial phase of the attitude of these companies was different, as described by a technician working for ASSAM:

At the beginning these companies were not interested at all, since they had the convenience that farmers continued to use the conventional methods, because they were used to buy a lot of chemical products. The development of this agreement, together with the EU Directive, has been the main drivers that changed their approach and they have been increasingly involved in spreading the IPM techniques amongst local farmers (INTERVIEW n. 20).

With regard to the local dimension of the agreement, namely the interaction of the institutional and technical actors with the single farmers, all the interviewed have underlined the crucial role that has been played by the project leader:

She has a strong capacity aggregation and she was crucial to enhance the cohesion and the cooperation amongst all the people involved in the agreement and she represented a key factor in convincing the most sceptical farmers to participate in this collective action. She has a direct relationship with everybody, she is very capable and professional person and, above all, everybody trusts her (INTERVIEW n. 15).

This was confirmed by the project leader herself:

I tried to convince everybody since the beginning and I was involved in first person. I tried to change the farmers' attitude to innovation as much as possible, and I made a strong effort to convince them to try the mating disruption, at least for one year; fortunately the first year the technique worked well for almost everybody, thus they were convinced to keep going with this project (INTERVIEW n. 14).

As already discussed, the project leader was also crucial for the administrative aspects, representing the contact between local farmers and institutions and she was definitely the most important actor that made the co-management of the TAEA working.

6.4 Farmers' motivations and attitudes

Among the factors that may strongly influence the adoption of an innovation in agriculture, the impact of innovation on production risks is very important (Ghadim Abadi *et al.*, 2005, Marra *et al.*, 2003) and, according to the farmers and technicians interviewed, the payment received by farmers involved in the TAEA (about 650 euro per hectare) was an important incentive for farmers to adhere to the project and to test innovative farming practices. As put it by two representatives of the provincial authority of Ascoli Piceno:

If I should give some figures, I would say that, especially the first year, almost the 40% of the participants decided to adhere to the agreement because of the payments ... then it is essential training people and teach them that the payment is something that they receive to change their

farming practice and that the objective is also adopting a convenient and profitable practice (INTERVIEW n. 15)

Farmers are sceptical about new techniques, absolutely, but farmers may be persuaded by payments. In some way it is sad, but it works like that. A high payment may convince them, but it is necessary to manage well the payment and above all, to put it in the right place, to associate the payment to the right practice that farmers are ready to adopt (INTERVIEW n. 17).

Thus, with regard to the involvement of farmers, the results of the research confirm what several economists have already demonstrated: the participation into collective action is strongly motivated by private benefits (Ayer, 1997). Indeed, the interviewed not belonging to the Association *Nuova Agricoltura* argued that they participated in this collective action because they believed that they would gain from participation, both by obtaining the payments of the TAEA and by saving in costs, due to the minor use of chemical products and machineries.

Indeed, many farmers have highlighted that a reduction of the treatments with pesticides in the orchards as results of the IPM was good also because this contributed to reduce the production costs, since a smaller quantity of crop protection products was purchased. At the same time, the reduction in the use of crop protection products also resulted in a decrease in the use of tractors and other machineries as well as of the labour.

In addition, another driver which influenced farmers in adhering to the TAEA is the recent EU legislative framework, in particular the Directive on Sustainable Use of Pesticides 2009/128/EC, which aims at reducing the risks and impacts on human health and the environment related to the use of pesticides, by reducing the number of permitted chemical products for crop protection and by promoting the use of alternative pest management methods.

The most reluctant farmers were persuaded by the most motivated farmers of *Nuova Agricoltura* but, as they have highlighted, the efficacy of the new farming practices adopted played a significant role. In many cases local farmers were already looking for alternative methods of cultivation, since they had observed increasing resistance of pathogens to the conventional crop protection products, resulting in higher crop losses.

The bulk of farmers involved in the agreement declared that they were motivated also by reasons which go well beyond the economic incentives, such as the willingness to reduce their health risks and to reduce the environmental impacts of their farming practices.

Table 6.2 – Farmers’ motivation to participate into the collective action in Valdaso

Individual/economic reasons	Social/environmental reasons
CAP payments Effectiveness of integrated agriculture methods Cost reduction (labour, crop protection products, fuel) Positive health effects	Reducing water and air pollution Increasing the tourist attractiveness of the area Positive effects of being involved in a local network of farmers (increasing learning opportunities and lobbying power)

Indeed, the data collected through the interviews show that the birth of the TAEA is also the result of a growing environmentally awareness of local farmers, who have increased their perception that more sustainable farming practices may play a key role for a transition towards to a more sustainable development to more of the all valley:

We have understood that we may contribute to save the valley. It is clear that we can make a lot for the local environment with our role. There are an increasing number of tourists here, they want to stay in agri-tourisms and they want a beautiful landscape and a safe and unpolluted environment. Houses have recently renovated, new campsites have been opened, and we producers we can make to contribute to this is producing in a certain way, and all together (INTERVIEW n. 23).

In addition, the majority of farmers have also emphasised that the issue of health is crucial and that they are adopting more sustainable techniques, also because are they spend a lot of time within the orchards and they want to work in a safer and healthier environment.

According to them, the most critical aspects are related to the fact that the IPM techniques, and especially the mating disruption, are knowledge-intensive techniques, especially during the first years, when producers who have always used conventional methods do not have the knowledge necessary to manage an orchard which is not always ‘protected’ by chemical products.

Farmers have highlighted that these methods require additional organisation and monitoring, both for the purchase of dispensers and as for the monitoring of insects in the field and a careful monitoring of weather conditions.

6.5 Learning opportunities for farmers

The role of communication and information regarding agro-environmental strategies is usually an issue that economists fail to address or not address adequately, but it plays a very crucial role in determining the success of failure of the strategies implemented, and this is particularly true where grass root collective action are involved (Ayer, 1997).

In fact, in the case of Valdaso TAEA, information exchanges and learning processes were central to the success of this collective action to many extents: from the adoption of the IPM techniques, to the dissemination of such techniques to other farmers.

Indeed, one of the most interesting aspects of the agreement is related to training and dissemination to farmers, since the measure 111 was used to finance on-farms visits as well as courses on IPM and on administrative and procedural issues regarding the agreement, with the involvement of institutional representatives, ASSAM advisors as well as some representatives of companies specialised in crop protection products.

For what concerns the adoption of innovations by farmers, it should be stressed that it is a dynamic learning process influenced by a broad range of issues, involving personal, cultural and economic characteristics as well as the characteristics of innovation itself (Pannell *et al.*, 2006).

In case of Valdaso TAEA, the joint role of *Nuova Agricoltura* and ASSAM was crucial in creating a lively learning environment for farmers both through institutional and informal channels.

Firstly, a successful involvement of the local farmers was possible because of the informal meetings organised by *Nuova Agricoltura* with the technical assistance of ASSAM, where, for the first time, local farmers have been aware of the possibilities to change their farming practices towards more sustainable techniques. These meetings also represented significant occasions to discuss technical problems arising from the use of the advanced integrated techniques. Although at the beginning there was some scepticism about Mating Disruption, after the first experiments made by the farmers associated to *Nuova Agricoltura*, with positive results, a sort of *domino* effect was observed, with the involvement into the TAEA of an increasing number of local farmers.

IPM practices have then become part of farmers' knowledge, while dissemination of information by the ASSAM remained fundamental. The main instrument for dissemination of information is the weekly 'bulletin' sent to farms (by emails or fax), which can be also found in the noticeboards of the municipalities involved in the TAEA. The bulletin (see figure 6.3) is divided in agro-climatic zones and indicates to farmers very detailed weather forecasts with some information on the need of making chemical treatments or not, what problems may arise and how they can overcome them. The bulletin is also a mean to inform farmers about additional possibilities (i.e. rural grants and funding) and other initiatives such as meetings with technicians of the ASSAM or other local events (fairs, local markets etc.).

Figure 6.3 - The weekly ASSAM bulletin



Source: ASSAM (2012)

Many farmers involved into the TAEA recognise the bulletin as a very important tool since they usually follow strictly the indications provided by ASSAM:

Farmers are in close contact with us, they usually wait the bulletin to decide what to do, the bulletin gives them the direction, but if they think that it is necessary to make some treatments they ask us directly. We know the results of the traps both in farms that use mating disruption and in farms that don't use it, so we have a clear picture of the need of the area in terms of crop protection. For this farmers strictly follow our advice (INTERVIEW n. 20).

Besides, ASSAM technical staff regularly visits farms involved in the TAEA and monitored them to obtain information about the eventual problems they encounter with the IPM. In some ways, ASSAM changed the traditional top-down approach of the technical advisory system of the area, traditionally based on private consultants working for chemical and pest control companies. The role of a public advisory agency such ASSAM was particularly relevant, since the technicians provided the assistance directly to farmers with the main objective of increasing the spreading of IPM at territorial level. This kind of intermediary actors is very important because in many cases allows building bridges between two different types of actors: the local institutions and the farmers involved in the project (Schneider *et al.*, 2009). Indeed, amongst the several actors involved, ASSAM technicians resulted the most aware that, for the collective action being successful, was necessary that certain types of knowledge would be created and communicated within the farming community.

One of the characteristics of this agreement was facilitating the exchange within the farming community and this was emphasised by the local stakeholders as one the key drivers of its success. Local stakeholders have emphasised that the official meetings foreseen in the context of the agreement in many cases have been an opportunity for

local farmers to meet and to share point of views and experiences on the new techniques adopted. As put it by this farmer:

The agreement has also been a good opportunity to know new people and farmers. During the meeting organised by the provincial authority we had the possibility of meeting several people who I did know before and that I met because have joined the agreement. This has been very good for me, because I had the opportunity to increase the interactions and the exchanges with other farmers of my area. Thus, we can confront each other about the main problems related to the new techniques and the new farming practices (INTERVIEW n. 28).

A particularly important role was played by the pioneer farmers involved in *Nuova Agricoltura*, especially two of them who have a specific education in agronomy have tried to facilitate the exchanges between the most motivated farmers with the most reluctant ones and, in some occasions, have also tried to spread the information on the IPM the techniques also amongst the farmers who have not adhered into the agreement.

Finally, the ASSAM the agro-chemical centre of Jesi carried out the analysis of some samples of products in order to make public the differences, in terms of residues, of dangerous chemicals in fruits cultivated with both conventional and IPM techniques.

The centre has carried out the chemical analysis of the fruits produced by farmers both participating and not participating in the agreement. The selection of farms was based on the geographical location (through GIS) and later the ASSAM technicians have contacted farmers to collect the sample in their orchards. The results have demonstrated that the fruits produced by farmers adhering to the TAEA had much lower residues of pesticides compared to the fruits produced in farms that did not participate into the agreement.

More in details, ASSAM has analysed samples from 37 farms, 24 of them using MD and 13 not using MD. In both cases the residues found in the samples were below the maximum allowed by law, but the farmers not using MD had a higher percentage of samples with trace of residues of pesticides (78%) compared to farms adopting MD (57%). In addition, the products from conventional farms had a higher percentage of samples with multiple residues simultaneously (21% compared to 7% for farms using MD).

These results were presented in an open meeting, which was very successful because showed to the farmers the good results obtained with the IPM techniques, making them aware of the substantial results of their commitment.

This confirmed what it was recently highlighted by the European Court of auditors (2011), namely that the feedbacks on the impacts of agri-environmental schemes may

improve farmers' awareness and understanding of the related environmental effects, especially where farmers have changed their practices.

Indeed, ASSAM representatives have underlined that farmers participated very actively to this event, because they were looking for feedbacks on the efficacy of the technique they had adopted and expressed their willing to make future analysis in their own products:

We did not expect all those presences of farmers and, above all, the farmers who participated at the meeting were well motivated and informed, and this made us very happy. I think because they could see the results of the analysis, and then being aware that IPM is objectively important to harvest healthier products (INTERVIEW n. 19).

The important role of this initiative in motivating farmers, and in spreading the information on the effectiveness of the new techniques, was also confirmed by several farmers:

It was very important to see that here have been some concrete results. Because the ultimate goal of the agreement is having healthier products and the results of ASSAM show that this is the case. In the fruits that I produce there were not residues at all, in my neighbour fruits the residues of pesticides were ten times below the conventional fruits. This is very encouraging ... (INTERVIEW n. 24).

Thus, the communication to farmers of the reduction of the residues of pesticides in their products as result of the IPM techniques was particularly important to increase the motivation of farmers in continuing to adopt the related practices. This confirm what has been showed in several northern European countries, where it was observed as the understating of the benefits of agri-environmental measures usually results in a commit of farmer to undertake the related management and, above all, it is more likely that the outcomes are to be successful and sustained in the long term (see Poláková et al. 2011; Herzon and Mikk, 2007).

Finally, the case of Valdaso shows the success of an integrated strategy, since the provision of advice associated to the agri-environmental strategy was identified as one of the key factors of success. Indeed, the training activities, alongside the advisory system in place related to the adoption of IPM techniques, were particularly effective in increasing the awareness of the local farmers to the environmental priority of Valdaso areas as well as in increasing their skills in adopting more sustainable farming practices.

Box 6.1 – Transect walks with the farmers involved in the TAEA

Transect walks were carried out with five farmers involved in the TAEA. The objective was having a direct (and joint) field observation and exchange, in order to stimulate additional reflections and considerations on the local farming system and on the impact of the TAEA. During the transect walks farmers have extensively discussed their production activities, the main features of their farms (size, location, type of production, irrigation systems etc.) and, above all, the main problems regarding pest management and plant protection.

Compared to the transect walks of the 'Custodia of the Territory' project, where general observation of an entire area was done, in this case study transects were aimed at observing practices at farm level, and they were more focused on the characteristics of the single farms. The discussion covered several environmental aspects of farming, such as soil erosion and soil and water management. Nevertheless, the most detailed descriptions were related to crop protection and more specifically to IPM. These discussions carried out during the transects allowed a deeper understanding of the main technical problems regarding the adoption of this technique, especially regarding its effectiveness for different species and cultivar, in different locations and according to different weather conditions. Farmers demonstrated of having an impressive knowledge on entomology and on plant physiology and a clear perception of the main risks and opportunity derived from the adoption of the new practice, but they also showed their enthusiasm and proud of farming in an healthier and safer environment.



6.6 Communication and marketing strategies

Several communication strategies have been associated to the TAEA in order to increase the visibility of the agreement, which at national level it already acknowledged as one of the most innovative approach to agri-environmental measures. Amongst the various initiatives that have been undertaken at the local level there are: a video on the IPM techniques and the agreement that which was financed by the provincial authority in the framework of a project on food education for the school, a few articles on the regional newspapers and an article on the magazine of the European Network for Rural development (see figure 6.4).

Figure 6.4 - The article on Valdaso TAEA published on the UE Rural Review



Source: ENRD (2010)

Moreover, farmers participating in the agreement have also tried to inform local communities on this initiative during the local fairs and markets where they commercialise their products, also through leaflets and brochures. According to the local stakeholders interviewed, one of the most important initiative which allows them to communicate to many consumers the role of the TAEA and the results of IPM is the yearly agricultural show, which takes place every December in Ascoli Piceno (the show is denominated 'Gioielli della terra picena' - Jewels of the Picena area). In the context of this event, together with the market of local products, several conferences and seminars are organised on several topics related to the agriculture and rural

development of provinces affected by the Agreement (Fermo and Ascoli Piceno provinces). Some visibility was also offered by several professional organisations, for example, through the initiative *Campagna Amica* of Coldiretti.

Moreover, a series of informal initiatives were observed: in several local stores it is possible to find signs with the writing: ‘peaches produced with mating disruption’ and, similarly, in several farmers have installed ad hoc signs in their farms (especially farmers who do the direct selling on farm), in order to show that they adhere in Valdaso TAEA (see figure 6.5).

Figure 6.5 - The signs indicating farmers’ adherence to the TAEA



In spite of these initiatives, all the farmers and the other stakeholders interviewed have highlighted that one of the weaknesses of the agreement was the lack of a coherent and comprehensive communication strategy, since farmers involved into the agreement were not able to differentiate their products on the market.

Indeed, the most cited problem by farmers when they talk about the agreement was the fact that the collective agri-environmental action was not complemented with an effective marketing initiative, which could involve a specific brand on the fruit produced with IPM. Farmers are aware that consumers cannot appreciate, together with quality of the products, also the fact that they have use using low-impact techniques, since they are currently selling their products as conventional ones. As highlighted it by these farmers:

I think that the main problem of this agreement is the lack of an official regional recognition that can generate an added value on the market. We are part of this territorial agreement but there is not an official brand that we can display on our products. In this way consumers cannot be aware of our collective action (INTERVIEW n. 26).

The project for me is fine, but the consumers do not know it. In this way consumers buy the products imported from Greece, Spain and we produce locally and sustainable we do not have market opportunity. It is a pity... (INTERVIEW n. 27).

According to the project leader, during the most recent years the supermarkets have expressed an increasing attention for quality products with low residues. Potentially the agreement could be enhanced in the supply chains, also by involving some private actors such as supermarkets, but this would involve a clearer participation of the farmers in the agreement, possibly through a collective brand.

According to other stakeholders interviewed, a suitable solution would be integrating the agreement with the regional strategy for food labelling: the '*QM-Qualità garantita dalle Marche*' (Guaranteed quality of Marche Region), since the adoption of specific production requirements and the adoption of the QM label would enable local farmers to attract more attention by consumers and at the same time to ensure greater food security, in light of the principles adopted by the European Commission.

Nevertheless, it was also argued that more efficient marketing opportunities based on environmental performance goes well beyond the scope of the TAEA, since it was considered a more structural problem of local farmers, who are too dependent on large chain operations.

6.7 Factors affecting collective action in Valdaso TAEA

The territorial agreement in Valdaso described above represents a quite innovative strategy, at least at the national level, where the collective dimension of public goods protection has been addressed at territorial level, by implementing innovative policy tools and institutional arrangements which favoured the support and the institutionalisation of a grass root collective action undertaken by a group of local farmers.

Table 6.3 summarises the key factors which have determined the success of this collective according to the four categories described in section 1.2: (1) the characteristics of resources, (2) the nature and characteristics of the group of local stakeholders involved, (3) the local institutional arrangements and (3) the external forces (in terms of policies and authorities).

The increased awareness of local farmers regarding the severe air and water pollution of the area was identified as one of the main drivers of this collective action. This is particularly interesting also because the farmers who promoted the collective action are highly specialised in fruit production and in the past they admitted to make a very high use of fertilisers and pesticides.

At the same time a deeper analysis of the collective action allowed to identify the internal issues of the initiative, such as the important role of a group of highly motivated farmers (associated in *Nuova Agricoltura*) and the crucial role of the project leader, who ensured the required bridge between farmers and local institutions, by setting both the technical and administrative requirements for collective agri-

environmental schemes. As observed by Ingram (2008), the role individual facilitators may be crucial in empowering, enabling, re-skilling and re-orienting farmers, in order to help them to think through they want and how to achieve it.

Table 6.3 - Factors affecting collective action in Valdaso TAEA

1) Resource system characteristics	2) Group characteristics
Severe water and air pollution Intensive fruit production High specialisation of farms High use of pesticides	Local leadership (ASSAM technician) Small group of motivated farmers (<i>Nuova Agricoltura</i>) Social capital (traditions of cooperation)
3) Institutional arrangement	4) External environment
Co-management of the TAEA Pre-existence of a local farmers association Involvement of a public extension service (ASSAM)	Pre-existence of a broader territorial project (Valdaso Project) TAEA foreseen in the regional RDP EU Directive on sustainable use of pesticides

Indeed, in many cases local authorities representatives have a clear understanding of the objectives of the schemes and how they should be implemented, but they may have a more limited knowledge on how the actions proposed may fit in the practices adopted by local farmers. In Valdaso area the role of the project leader was twofold. On one side she was able to sensibiliser local institution on the needs of local farmers and to increase the institutional capacity, on the other side she coordinated the collective to carry out the administrative tasks required by the local authorities.

With regard to the main institutional arrangements that allowed supporting and institutionalising this collective action, it is worth to emphasise the effective co-management of the local different actors, as described in section 6.3, as well as the presence of a tradition of cooperation in the areas.

Moreover, both farmers and technicians have emphasised that the success of a collective action implemented to protect agri-environmental public goods is strongly related to the presence of a public advisory service. Indeed, in the case of Valdaso TAEA one of the aspects most emphasised by the interviewed was the fact that the technical assistance provided by ASSAM was of ‘public nature’ and ‘disinterested’ to the selling of crop protection products. This is particularly important since in this area the technical assistance on farm has been traditionally provided by advisors working for private companies. Thus, the role of ASSAM was perceived crucial to obtain advice on sustainable agricultural practices coherent with the public goods objective pursued through the TAEA:

Farmers have perceived that our advices are for the best of the farm and of the environment, because we do not have any private interests related to their business. Private companies cannot

be in favour of reducing treatments or reducing the purchasing of any type of crop protection products (INTERVIEW n 20).

The interest in “public” goals can be only ensured only by a “public” institution such as ASSAM. We can make advice for farmers but without any private interest, for example in selling products. I think that the involvement of our institutions was crucial for the success of this collective action (INTERVIEW n. 21).

The presence of this local (public) advisory system, which provided not only technical guidelines but also learning opportunities for farmers, was very important in facilitating the sharing of information within the farming community.

With regard to the external factors, the presence of a broader project denominated Valdaso project (see section 6.1) was also important, but the most relevant factors are related to the effective coordination mechanisms at institutional level. These mechanisms ensured an effective institutional support to this action bottom-up initiative, also by including a broader network of local actors involved.

Finally, innovative policy tools were implemented, tailored to the specificities of the area but also taking into account the changing legislative and policy scenario (i.e. the EU directive on sustainable use of pesticides). Also thanks to these external inputs, integrated packages of measures included in the RDP were specifically designed with the objective of addressing in a more coherent and coordinated way the environmental, social and economic issues emerging in the area.

6.8 Benefits and barriers

According to the local stakeholders interviewed, compared to the traditional policy tools, such as the cross compliance and the traditional single agri-environmental measures, the collective action of Valdaso area resulted in several positive effects. The observed benefits are of different types, both environmental and socio-economic. All these benefits are in some ways related to the local governance and on the institutional arrangements experienced. Indeed, the joint role of private and public stakeholders, together with the integration of different RDP measures in a territorial agreement, favoured the implementation of a coherent strategy more finely-tuned to the local needs.

In Valdaso the protection of agri-environmental public goods was pursued through a direct involvement of farmers, by translating their willingness to increase the sustainability of the farming practices into an operational project with specific environmental targets to be reached at territorial scale.

This approach was particularly innovative because, as highlighted by the project leader, it was possible to reach not only environmental benefits, but also a transfer of knowledge to the territory:

The main benefits of this project are related to its territorial approach, where the action is not addressed to individual farmers but to an entire area which can benefit both environmentally that in terms of knowledge; can you imagine the amount of knowledge that has been transferred to this area? A wide group of farmers in few years has moved to a new technique... I think it is great (INTERVIEW n. 14).

Thus, an intangible but important public good produced by the collective action is the new knowledge which has been created and disseminated among farmers participating in the agreement. Indeed, as result of this collective action, farmers have emphasised that they have increased their knowledge to a greater extent (i.e. about the phenology of the insect and plant cycles). It may be argued that the development of this new knowledge is essential and it is the foundation upon which to build a new model of policy intervention for the provision of public goods associated to agriculture. The longevity of this strategy is due to the fact that the new knowledge, which has been generated also thanks to the rural development payments, it will be accumulated into social and institutional capital that will stay in place also when the collective action would not be supported anymore by public policies.

Moreover, the set of motivations that have led farmers to join the agreement and the use of new techniques, along with environmental and socio-economic results described above, have also resulted in a change of attitudes of farmers, which was perceived as one of the most important results, also from the point of view of policy development:

I think that this project will go ahead in the future even without the payments, even if we have to carry out it at our own expenses, because I think that people understood that it is possible to obtain important results by cooperating and collaborating (INTERVIEW n. 25)

Another important benefit of the collective action in Valdaso is the fact that this initiative totally reversed the approach of farmers towards the innovation in agriculture. Indeed, the IPM techniques, and especially the MD, require a deeper knowledge of the agro-ecological systems. The collective action allowed farmers to increase their technical knowledge and this result in a more pro-active approach on the management of their activity, while in the past according to the local farmers, it was too much driven by the private advisors of the companies specialised in crop protection products:

Now I can bring my ideas, I'm going to buy a chemical product only when I know what I need it. Now I feel that I can decide for myself, the type of strategy that I wasn't to adopt for the crop protection in my farm. Before it was not like that, the sellers decided everything (INTERVIEW n. 25).

This new approach was spread also thanks to the contribution of ASSAM, which as described above, provided farmers with a public technical assistance and not oriented to the selling of crop protection products.

Table 6.4 – Benefits and barriers of collective action in Valdaso TAEA

Benefits	Barriers
Right scale of public goods protection	Free riding
New farmers' attitudes	Control and monitoring
New farmers' approach to innovation	Unsatisfactory support from institutions (lack of communication and delays on payments)
Knowledge generation and learning	Higher transaction costs
Institutional capital and capacity-building	

With regard to the main barriers of the Valdaso TAEA, the institutional stakeholders involved (representatives of the regional and provincial authorities) have also highlighted the problem of administrative costs in supporting and managing this territorial initiative.

As described in section 3.1, in many cases collective action, compared to individual action may present higher transaction costs related to search costs, bargaining costs and monitoring and enforcement costs. Indeed, whilst the devolution of powers to local institutions is deemed to implement more targeted strategies, in many cases the complexity of the different and interconnected levels of governance involved into territorial agreements may result in an increase of transaction costs.

In table 6.5, these types of transaction costs are associated to the different actors involved. Even though this is not a quantification of the specific costs, the table shows the types of the additional costs associated to this collective action and how they are distributed amongst the main actors involved.

Table 6.5 – The transaction costs in Valdaso TAEA

Transaction Costs	Examples	NA	Farmers	Project leader	ASSAM	Provincial authorities	Regional authority
Search Costs	Costs of identifying relevant stakeholders	√		√		√	
	Costs of gathering information	√		√	√	√	√
	Costs of identifying funding source for collective action			√	√		√
Bargaining Costs	Time spent at meetings	√	√	√	√	√	
	Effort expended in verbal and written communications			√	√	√	√
	Costs of acquiring support from external agencies			√		√	√
Monitoring and Enforcement costs	Time and effort spent monitoring others			√	√		√
	Employment of external monitoring				√		√
	Costs of enforcing sanctions						√

As it will be further discussed, while some of these costs are not currently financed through the RDP, a more effective support to collective approach to agri-environmental measures should try foresee additional funding for the initial capacity building process as well as funding for the coordination, management and group activities, especially for farmers association, but also for local institutions that are currently excluded from this type of funding, such as provincial authorities in the case of Valdaso TAEA.

The barrier of higher transaction costs in Valdaso was overcome thanks to the strong commitment of farmers associated to *Nuova Agricoltura* and of the representative of provincial authorities. Moreover, according to the interviewed, some costs were easily addressed thanks to the relation of trust and reciprocity amongst the majority of farmers, by reducing the costs related to time and effort spent monitoring others, time spent at meetings, as well as the costs of gathering information. Similarly, according to the local stakeholders, the increased social capital deriving from this collective action resulted in a reduction of transaction costs for the local institutions, such as the costs of identifying relevant stakeholders, gathering information and enforcing sanctions.

With regard to the other barriers to this collective action, some interviewed have emphasised the different level of involvement amongst farmers, with some example of opportunistic and free riding behaviours.

Indeed, as described in section 1.2, one of the most important barriers and limits of collective action is free riding, especially when a large group of participants is involved, such as in the case of Valdaso TAEA. According to the representative of local institutions there have been several cases of farmers that adhered to the agreement only to receive the payments, but in reality continued to use chemical products for crop protection.

As a representative of the provincial government pointed out, in this regard the role of social control was important, since the farmers themselves, who know each other, indicated the possible free riders (who joined the TAEA only to receive the payment) also because they were damaged by this opportunistic behaviours (as already observed the effectiveness of the MD is highly dependent on the possibility of using this techniques on an unbroken piece of land).

This social control is the result of to the relationships of trust and reciprocity which were created within the local farmers' community: many farmers have emphasised that one of the most the positive effects of the TAEA was the fact that they learnt to collaborate and cooperate to achieve common goals. Indeed, IPM requires stronger analytical skills and deeper understanding of agro-ecological principles as well as a higher cooperation between farmers, and these aspects may result in the creation of social and human capital (Pretty and Ward, 2001).

Additional barriers related to this collective action are related to the process of institutionalisation and to public support to the initiative and, more broadly, to the difficulties that could be encountered when trying to scale up or extend this initiative to other areas.

The responsible of the agreement for the regional administration emphasised the problem of controls and monitoring, especially in relation to the environmental impacts of the project. Indeed, the ecological processes involved may result in positive environmental effects (reduction of air and water pollution) only in the medium-long term and it is very difficult to associate the provision of agri-environmental public goods to the results of the TAEA.

Indeed, the methodologies currently used for monitoring and evaluating the effects of RDP measures are largely inefficient and this is particularly true when a more complex strategies are implemented, where several interlinked effects are provided, which in many cases are multidimensional (environmental effects as well as social and cultural effects).

With regard to the institutional support to the TAEA, this agreement has certainly provided a good opportunity to increase the capacity building within the local institutions, since it was an opportunity to explore and experiment a new approach in designing and delivering rural development policy measures. At the same time, in many cases the problems such as the division of the area involved into the agreement into two provinces and the lack of authority of provincial administration on agriculture, resulted in a poor communication and valorisation of the results, and some farmers participating in the agreement express did not feel adequately supported and informed by the institutions.

Moreover, in many cases the delay of payments was perceived as a strong barrier, especially for less motivated farmers who decide to experiment the new techniques and the public support was crucial in the initial phase as insurance against the related risks.

According to the local stakeholders, it would be necessary to overcome all these limitations related to the institutional support to this initiative, in order to broaden and extend this approach and to develop such as developing a more coherent regulatory and institutional framework which could support more effectively this kind of agreements.

6.9 A collective approach to agri-environmental measures

Valdaso TAEA was designed to protect soil and water from pesticides and nitrates pollution at river catchment level, through methods of production with low environmental impact. The project represents an innovative strategy to pursue multiple agri-environmental objectives, since an integrated suite of measures was

implemented to increase the provision of agri-environmental public goods (water and soil quality, cleaner farming practices and healthier products) but also for reframing farmers' behaviours, attitudes and knowledge through a set of capacity-building initiatives and learning opportunities.

This case study shows that a bottom-up strategy developed by informal and local associations may have the potential of being formalised and institutionalised into the mainstream policy framework.

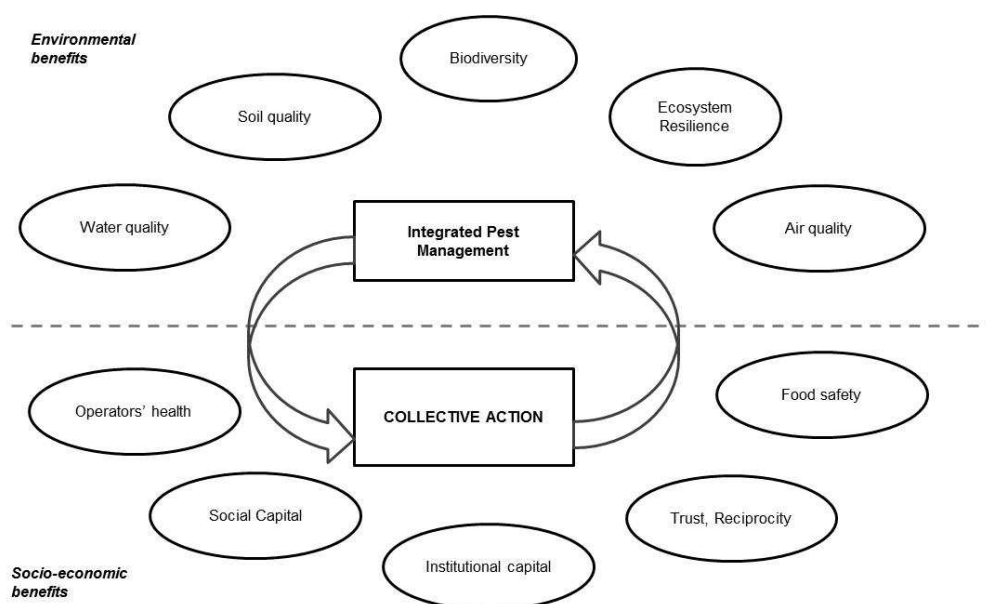
The current debate on the future CAP is highly concentrated on the *greening* of the first pillar European Commission (2011b), since the approach of cross-compliance is considered the most cost-effective strategy in delivering environmental goods at large scale, especially in areas characterised by intensive and productive agricultural systems. The TAEA implemented in Valdaso shows the possibility of exploring bottom-up and collective approaches which, through innovative institutional arrangements and integrated policies, may protect public goods at landscape level also in areas characterised by intensive agricultural production.

Indeed, as showed by the case of Valdaso, also intensive farming systems may be re-oriented to the provision of public goods through decentralised strategies based on innovative policy tools and institutional arrangements which may result more effective in addressing local needs and environmental priorities. Unlike cross-compliance, which set a series of compulsory requirements that must be followed to receive direct payments, an collective approach to agri-environmental action, such as the integrated delivery analysed here, it focus more on a pro-active engagement of farmers in the provision of public goods. The case study demonstrated that also in the most productive areas, in many cases, farmers perceive the need of adopting innovative farming practices, in order to decrease the impacts of their activities on the environment.

The farmers' sense of belonging to their own community and trust relationships were developed also as response to IPM, since these techniques require a territorial scale to be applied, but also to the collective approach to agri-environmental measures experimented by the local institutions. Moreover, as highlighted by Mantino (2011), through a territorial approach for public goods provision it is possible to provide not only environmental goods, but also a combination of economic and social effects, which would be difficult to achieve with a more traditional approach focused on land management practices adopted at farm level. Thus, in Valdaso area a 'virtuous circle' between IPM and collective action was observed: the effectiveness of IPM was enhanced by the collective action but at the same time the adoption of IPM techniques encouraged farmers to aggregate themselves to get effective results. In this 'virtuous circle' both environmental and socio-economic benefits were produced (figure 6.6).

The main policy innovation of the TAEA is related to the package of RDP measures involved, since the provincial authority of Ascoli Piceno acted as intermediary to push the regional government of setting eligible measures featured in the local strategy for promoting integrated agriculture. This package of measures was then transformed in a territorial agreement which could take into account the technical requirements for integrated agriculture but also the main requirements of the local farmers in terms of advisory, learning and networking.

Figure 6.6 - The environmental and socio-economic benefits provided through the Valdaso TAEA



The integration of RDP measures into a territorial agreement experienced in Valdaso was facilitated from some kind of ‘devolution’ to local institutions to elaborate integrated strategies for their territories. As suggested by the experiences in other countries (ENRD, 2011), the creation of an attractive mix of measures (with training, technical assistance, compensations) in a project for farmers, is vital to promote participation. This experience, being the first of the 2007-2013 programming period, provided an opportunity for the Region to test innovative administrative procedures, by facilitating the implementation of collective strategies for agri-environmental public goods in other territories, such as the Area Programme for biodiversity, which was launched in 2011 (see box 6.2).

At the same time, the local stakeholders have also highlighted several barriers related to the possibility of better integrate this collective approach into the policy framework of the CAP, which are mainly related to the local institutional arrangements and to the policy instruments currently in place.

Box 6.2 - Area programme for Biodiversity in Marche Region

The Area Programme for Biodiversity (launched in 2011) is led by Natura 2000 payments with the support of additional RDP measures and developed by large consultation and participation of local farmers living in the protected area and Local Authorities. The programme was funded under the measure 213 but it includes the coordination of measures 125, 211, 214 and 216.

The main actors involved are the Marche regional authority (in charge of RDP planning and implementation), the bodies managing Natura 2000, farmers and local authorities (such as Provincial authorities and Municipalities)

In the Area programme for Biodiversity Communication aspects played a major role, because many dissemination initiatives were undertaken at local level by the Regional government, other local bodies and farmers' associations, in order to promote and discuss the new approach, before and during the launch of the Call for Proposal.

The main expected benefits are the possibility of implementing a series of integrated interventions within a given Natura 2000, agreed between Public and private operators. In this way, their implementation should prove easier, and their impact a more significant one, not just on biodiversity conservation, but also for the safeguard of soil fertility, for the safeguard of water courses and of ground water, and for landscape conservation.

The new approach required a large amount of administrative work for the two involved Departments (Agriculture and Environment) of Marche Regional authority, to design, for the first time the new type of "Area Programme" and fit it into the standard RDP rules. It likely involved some additional burden for interested farmers, because they needed to attend meetings and agree on a set of interventions with many other actors.

To summarise, in the context of rural development policies the success of collective strategies seems related to the development of specific institutional arrangements as well as to an integrated approach to delivery, where different RDP measures are used in combination to achieve broader and more effective results.

At the same time, the experiences of the Integrated Territorial Projects in Italy, quite widespread during the 2000-2006 programming period, revealed several shortcomings, such as lack of robust selection of participants, lack of integration amongst different operation, insufficient multi-sector approach, inadequate partnerships (Formez, 2009). According to Mantino (2010, p. 11), these limitations derive for two main factors:

- The resistance of the public administration to abandon the traditional method based on the single measures delivery. In fact single operations were selected within ITPs on the basis of separate and timely differentiated calls;
- A series of local coalitions did not act accordingly to an integrated plan, but simply following the principle of capturing financial resources from public programmes. These can be considered only as instrumental coalitions.

The Valdaso TAEA represents an interesting case where these limitations were, at least in part, successfully addressed.

With regard to the first limitation, in Valdaso the public administration has tried to set innovative procedures which takes into account farmers' needs and, above all, has tried to incorporate the capacity building measures with agri-environmental measures also for the procedural and administrative aspects. At the same time, the local stakeholders

have also highlighted the same problem of the differentiated calls for the single operations as underlined above.

With regard to the second limitation, the agreement was the result of a grass roots action adopted for a more effective delivery of public goods and not the result not of an instrumental coalition aimed at capturing financial resources.

From a policy development perspective, the main limitations highlighted by the representatives of the local authorities responsible for the implementation of the RDP in Marche Region were mainly the lack of flexibility and autonomy in managing the RDP funds at the local level. This is particularly evident in relation to the integration of funding amongst the agri-environmental measures and the coordination and management activities necessary for territorial agreements (i.e. design, implementation and monitoring costs of the TAEAs cannot be financed through the RDP, but must be financed by the local agency in charge of the coordinating the agreement). As observed by Mills *at el.* (2010), usually the development of collective strategies at territorial level requires additional funding for the initial capacity building process as well as funding for the coordination, management and group activities.

Finally, according to the local stakeholders, RD policies usually lack in flexibility to efficiently support spontaneous and endogenous initiatives, also because policies implemented for public goods in many cases are focused on administrative borders and are not tailored to specific territories. From this perspective, while in Marche Region the RDP is directly implemented by the regional government, according to the local stakeholders interviewed, a sub-regional level implementation could have facilitated a more effective coordination at territorial scale, with higher environmental and socio-economic benefits.

7 Discussion

The conceptual framework (chapter 1) has been developed through a literature review and theoretical approach to public goods and collective action (chapter 2 and chapter 3) and, through the methodology proposed in chapter 4, has been applied to case studies (chapters 5 and 6).

In this chapter the different insights deriving from the analytical framework and from the fieldwork are developed together, in order to address the objectives and research questions described in section 1.3.

More in details, section 7.1 describes the conditions under which collective action may emerge as well as the factors necessary for successful collective action; section 7.2 explores the drivers that affect farmers' participation in collective action; in section 7.3 the role of collective action in the provision of agri-environmental public goods is described. The chapter concludes with a discussion (7.4) on the types of government intervention and policies necessary to promote successful collective action for public goods provision.

7.1 The determinants of successful collective action

The present research aims firstly at providing some insights on the internal dynamics of collective action for the provision of public goods through agriculture. More in details, the study aims at exploring the main determinants and drivers that allow collective action of effectively providing agri-environmental public goods at landscape scale.

The two case studies analysed here differ to large extent in terms of the type of collective action involved, since in the first case study (Custodians of the Territory) the local action was mainly developed and coordinated by a local public agency (*coordination*), whilst in the second case study (Valdaso TAEA) the collective action was directly led by farmers and later institutionalised and supported by the local institutions (*cooperation*). Moreover, there are also several differences between the two territorial contexts and, above all, between the agri-environmental issues addressed and the strategies implemented.

The main difference is related to the different institutional arrangements of the two initiatives but also to the different agri-environmental issues addressed. 'Custodians of the Territory' is a project led by a local public body that has set incentives and supported a collective approach to the hydro-geological management of the district. This approach has resulted highly dependent on the institutional role of the local agency (Mountain Community Media Valle del Serchio) and in its capacity of setting and managing efficacy the PES with farmers. This institutional role, together with the

increasing use of IT tools (i.e. IDRAMAP) has resulted in a more technocratic approach to the delivery of environmental services, with great efforts of implementing a structured and efficient information and communication system.

On the opposite, in the case of Valdaso, public institutions have been indirectly involved in a farmer-led collective action, by supporting a bottom-up approach in order to facilitate the adoption of integrated agriculture at territorial scale.

Nevertheless, it is possible also to recognise several common points between the two case studies, such as the strong focus on the knowledge and learning dimensions and the efforts of the local institutions in involving farmers in the decision making process.

Table 7.1 synthesises the key determinants for the two collective actions analysed in the study.

Table 7.1 – The determinants of success of the collective action in the two case studies

Factors	Custodians of the Territory	Valdaso TAEA
Social Capital	Strong <i>bonding</i> social capital, weak <i>bridging</i> and weak <i>linking</i> social capital	Strong <i>bonding</i> , <i>bridging</i> and <i>linking</i> social capital
Leadership	Re-skilling farmers, intermediary person between local and regional institutions	Coordinating activities, creating learning opportunities for farmers
Right scale	Action implemented to provide environmental services at district level	Action implemented to protect environmental public goods at territorial level (NVZ)
Institutional arrangements	Co-production of knowledge and services	Coordination mechanisms and learning opportunities for the actors involved. Role of <i>Nuova Agricoltura</i> and project leader
Information and communication	2.0 web tools and meetings, participatory events with local communities	Emails, meetings, bulletin

As described in section 3.4, social capital is a crucial factor for successful grass roots initiatives. Indeed, social capital can help to overcome several problems associated to the implementation of collective action, especially in initiative where a large and heterogeneous number of stakeholders is involved (Paavola and Adger, 2005; Pretty, 2003). The present research shows that a collective approach may foster trust and reciprocity amongst the local stakeholders and how this, in some cases, may result in reducing transaction costs and increasingly the effectiveness of the agri-environmental strategies.

In particular, in Media Valle del Serchio (Tuscany), through the project Custodians of the Territory, the local agency strengthened the *bonding* social capital amongst the farmers, technicians and the local community but, as observed in section 5.8, in some ways failed to increase the *bridging* and *linking* social capital, and this resulted in a

weaker scaling up of the project, which did not emerge as model of intervention in the surrounding areas and it was not replicated in other areas.

On the opposite, in Valdaso area the association *Nuova Agricoltura* encouraged both *bonding* as well as *bridging* and *linking* social capital and this determined a broader transition to more sustainable agricultural practices at territorial level. This confirms what has been observed by Berkes (2009), namely that there is a potential for producers organisations to play a role as bridging organisations, by facilitating open dialogue between producers at the farms level and policy makers at the government level. The case of Valdaso also highlights that with an appropriate capacity building programme also the less formal and structured organisation may provide platforms for information exchange and, above all may enable self-organisation and collective action among local producers.

The cases studies also show that the cultivation of trust and reciprocity amongst the participants of the collective action is usually the results of a *strong leadership*. The key role of a leader was especially observed in the case of Valdaso TAEA, where the project leader (the ASSAM technician) acted not only as an extensionist who promotes new technologies but also a key actor who was able to bringing about the environmental re-skilling of farmers and, above all, acted as intermediary between farmers and local institutions. This crucial role of the project leader enhanced farmers' confidence on the possibilities to undertake a collective action for adopting sustainable practices at territorial level. Similarly, the role of the project coordinator in 'Custodians of the Territory' was crucial in managing the advisory system of the project, as well as in coordinating the collective action and in enabling the technicians of the local agency to provide technical and administrative advices to local farmers for the delivery of environmental services.

Another important key factor that determines the success of collective action is the issue of *right scale*. Indeed, the effectiveness of the environmental action usually depends on the achievement of sufficient scale, such as the size of the areas interested and the continuity of the action across the territory. Since single landholders cannot satisfy these two conditions, in many cases a collective and a territorial approach is needed. The case studies analysed here demonstrate that the success of collective action is due to an approach which go beyond not only to the boundaries of single farms, but also to the administrative boundaries of the territory where the collective action take place. Indeed, in order to provide public goods through collective action it is necessary to adopt a landscape approach, where the coordinated action is tailored to the natural resources to be managed and to the agri-environmental public goods to be provided and not to the administrative boundaries and to the administrative roles of the different public bodies. It should be observed that this condition was not fully achieved in the two case studies for several reasons, related to the lack of efficient

coordination mechanisms amongst local institutions, to the high transaction costs that would have incurred in an increasing monitoring and enforcing as well as to the lack of flexibility of the policy tools used to support the collective actions.

In spite of these limitations, the case studies show that successful collective actions for public goods may be supported by innovative *institutional arrangements*. Indeed, as described in section 3.2, the success of collective action is usually based on co-management and co-production, where the allocation problem of public goods is not totally left to the market or to the government, but mixed solutions are experimented.

From this perspective, the Custodians of the Territory project shows that innovative PES schemes, based on co-production, may represent an example of mixed public-private arrangements which may deliver environmental services more efficiently. This approach is aimed at developing a pro-active role amongst farmers, by changing the logic of the PES by developing a system based on co-production that was perceived as a more effective way to deal with the flooding risks problems rather than systems based on centralised information systems and on pricing.

In the case of Valdaso TAEA, on the opposite, the participation of a broad set of rural stakeholders determined a territorial strategy for public goods protection, based on shared responsibility and co-management amongst private and public actors.

The coordination and the cooperation between the actors involved in collective action are particularly important also with regard to generation, validation and exchange of information. Indeed, as highlighted through the case studies, the success of collective action is usually related to an *efficient information* and communication system specifically addressed to increase the effectiveness of the collective action concerned. This system must make clear the innovation needed, the new practices to be adopted as well as the distinction between private and public goals and the way such actions are coordinated and financed at territorial level.

Table 7.2 - The information systems in place in the two case studies

	Custodians of the Territory	Valdaso TAEA
Communication local institutions/farmers	Meetings and IT tools (IDRAMAP)	Meetings and IT tools (bulletins, newsletters)
Communication within the farmers communities	Meetings, workshops	Meetings, in-farm visits
Advisory system	Public agency technicians: joint inspections. IDRAMAP	Specific technical assistance (ASSAM)
Involvement local communities	Participatory events	Newspapers articles, panels

It may be argued that an efficient exchange of information and innovative communication system allows mobilising the intelligence and the creativity of the rural stakeholders, by determining an increased provision of public goods. From this perspective new information technologies (IT tools such as 2.0 web sites, social networks, emails, etc.) may facilitate the information exchanges, new forms of education and training and, above all, increasing the transparency and the effectiveness of the strategies specifically implemented for increasing the provision of agri-environmental public goods at landscape level. Indeed, the case studies show that IT tools may provide farmers and citizens with clear information regarding the action undertaken.

Finally, as will be discussed in next section, an important factor that determines the success of collective action is also related to the capacity of the involved actors of making better use of the knowledge and the experience of farmers for policy design and implementation.

7.2 A pro-active engagement of farmers

The second objective of the study was exploring the drivers that affect farmers' participation in collective action, by analysing the main behavioural factors as well as the implication in terms of technical and social and innovation that should be generated in order to increase the participation of farmers into collective strategies for public goods provision.

The research shows that the delivering of agri-environmental public goods at territorial scale is a very complex challenge, which involves a relevant shift related to farmers' attitudes motivations and norms, which must be translated in new farmers' behaviours.

Indeed, as observed in the case studies, financial incentives are not the only drivers to be considered when analysing farmers' behavioural drivers, but motivation (psychological factors, such as attitudes) and norms also play a very relevant role.

From this perspective, while findings from behavioural studies (see section 3.3) could play an important role in exploring how increase the participation of individuals to collective action for public goods provision, these new theoretical and empirical findings on behaviours so far have been largely ignored in applied works and policy application (Gowdy and Erickson, 2005).

The data collected in the field shows that in order to influence farmers' behaviours it is necessary to overcome the traditional linear 'top-down' transfer of technology. Indeed, more complex and 'landscape' problems, as those involved in delivering of environmental services or integrated pest management, usually require integrated suites of practices to be approached in an innovative and collective way.

A collective approach to agri-environmental issues required a new pool of skills and knowledge that is usually the results of a wider spectrum of ideas and of points of view, and usually it is necessary to integrate information from various sources. As showed in the case studies, the knowledge and the skills are the products of joint learning deriving from the interactions of several stakeholders who are directly involved into the collective action, but also who are external to the projects.

The difficult challenge of spreading new technology and new knowledge, in case of collective action for agri-environmental public goods, it is related to the extent to which a system is able to translated recommendations that derive from a 'landscape' environmental problem to suitable and attractive recommendation at farm scale level.

From this perspective, the case studies analysed allowed exploring how it would be necessary to reconfigure the approach to knowledge and innovation to implement successful collective action for public goods provision. The main elements for a pro-active engagement of farmers in collective action, which were identified through the case studies, are synthesised in table 7.3.

Table 7.3 – The determinants of a pro-active engagement of farmers in collective action

	Custodians of the Territory	Valdaso TAEA
An efficient public advisory system	Re-orientation of farmers' skills, joint learning farmers-technicians	Non-profit oriented advisors Bridges between local institutions and farmers
Valorisation and re-building of farmers' local knowledge	Valorisation of local knowledge regarding the environmental priorities, the location and conditions of the natural resources	Valorisation of technical knowledge of farmers on the local habitats and on the techniques more suitable for the local conditions
Learning opportunities	Co-production of knowledge, social learning on technical and procedural/administrative issues	Social learning and increased exchanges within the farmers' communities
Building new identities for farmers	Farmers as custodians: landscape stewards and early intervention networks	Landscape stewards, enhanced role in ensuring water and air quality
Involvement of farmers into the decision making process	Involvement of farmers in planning the environmental services, public intervention driven to the environmental priorities identified by farmers	Involvement of farmers in designing collective agri-environmental strategies (required practices and related costs)

The case studies show that one of the key determinants for a pro-active engagement of farmers into collective agri-environmental actions is the presence of an *efficient public advisory system*. Indeed, the technical experts of ASSAM involved in the collective action in Valdaso TAEA were particularly relevant as intermediary persons who can build bridges between two different types of actors: the local institutions and the

farmers involved in the projects. At the same times the advice provided by technicians of a public institution, compared to those provided by private companies, resulted more oriented to the effective adoption of sustainable practices at territorial level compared to private advisory services, which usually provided profit-oriented advice to farmers (i.e. companies specialised in crop protection are mainly interested in selling products to farmers).

Similarly, in the collective action in Tuscany the public profile of the local agency was determinant as advisor system, which aimed at re-orienting farmers' skills towards the delivery of environmental services.

Moreover, both case studies show that an efficient advisory system based on social learning and farmer-to-farmer interactions may positively influence co-operative behaviour, and may help to re-design institutions and policies based on collective action. Indeed, as discussed in section 3.5, in order to increase the effectiveness of collective action for public goods provision through agriculture, the innovation system must be reformed accordingly, and social learning and co-production may represent important approaches to shift from private goals (such a productivity increase) to public goals (such as environmental care).

From this perspective, it has been observed that a stronger engagement of farmers into collective action is possible by *valorising and re-building of farmers' local knowledge*. The results of the research emphasise the need of increasing the farmers' awareness of the environmental issues in rural areas that in some cases means favouring the recognition by farmers of the relation between farming practices and environmental outputs. To achieve this objective it is necessary to overcome the top-down approach of technological transfer from technicians to farmers, by increasing the participation of farmers on the basis of their local and context-specific knowledge.

The research also shows that the local knowledge of farmers in many cases should be the basis on which building new knowledge, oriented to the provision of public goods and services. Thus, as argued by Vanclay and Lawrence (1995, p. 125): 'farmers' local knowledge to solve problems that are new to their experience, such as many environmental problems, is unlikely to be successful. The insidious nature of such problems means that farmers may still not recognise them - even after extensive damage might have occurred. While it is possible that many traditional problems may be solved with new extension methods, new problems, particularly environmental problems, may be best dealt with through a combination of new and traditional extension'. Indeed, while a traditional approach to innovation usually fails to address in a coherent way the collective dimension of emerging environmental needs, participatory and bottom-up strategies may also fails in balancing community and personal needs. As argued by Black (2000, p. 496), 'while participatory and group-based approaches to agricultural extension have various advantages when they are

well implemented, they should not be regarded as the one and only strategy that can or should be used to facilitate the adoption of sustainable farming systems. Belief in a 'participation fix' may be just as naive as belief in a 'technology fix'.

Thus, with regard to the provision/protection of agri-environmental public goods, the main challenge for the Agriculture Innovation System is combining the new technologies with the traditional and local practices. The challenge is finding solution that may be increasingly recognised by the farmers' communities and may have positive effects in the medium-long terms. To achieve this objective is then necessary to create *learning opportunities* for farmers, which, as observed in the case studies could be based on joint learning and co-production of knowledge.

Indeed, as argued by Berkes (2009, p. 1695) when managing environmental resources through a collective approach, the different actors need to work and think together, and deliberate to generate new knowledge or make sense of knowledge from different sources. In the case studies analysed in this research, the learning opportunities for farmers were not related just on the technical requirements and on the innovative (and more sustainable) farming practices. On the opposite, such learning opportunities were also designed to increase the knowledge in terms of administrative procedures, scientific data, information systems and policies. Moreover, the research shows that in many cases local technicians and advisors are the most aware that for the collective action being successful it is necessary that certain types of knowledge would be created and communicated only within the farmers' communities. At the same time the research also shows that the process of innovation is not limited at the farm level, but it is open to the interactions of farmers with wider networks, where collective learning at territorial scale are crucial issues for an effective provision of public goods.

Indeed, the provision of agri-environmental goods usually involves complex mechanisms of delivery that may be learnt jointly through the interaction amongst public bodies, private actors, farmers and farmers' associations. This integration of different types of knowledge (farmers, experts and academic) is not only better for dissemination, but also may bring better solutions on the field. In terms of public goods and environmental services provided by farmers, social learning and co-production of knowledge are necessary process to overcome the contradictions between sectoralised forms of knowledge, especially between the private/public goods provision through farming activities.

The adoption of innovative practices by farmers as well as their involvement in delivering public services (e.g. landscape management practice), are strongly related to the production of new knowledge and the spreading of innovation. As argued by Deuffic and Candau (2006, p. 565), the achievement of new environmental objectives will involve significant changes in farmer's practices: a technical change but also a more structural shift regarding their professional identity and their role in the

management of the territory. The present research confirms this statement and it underlines that an innovative perception of farmers on their activities as well as their role in provision/protection of agri-environmental public goods it is an important prerequisite for successful engagement of farmers into collective action.

Finally, as it will be further detailed in the following section, a more pro-active engagement of farmers into collective action is also the results of an increasing involvement of farmers in the decision making process, both regarding the design and the implementation of the agri-environmental strategies to be undertaken.

7.3 The public goods provided through collective action

The third research question of the study is related to the mechanisms that lead provision of public goods through collective action and to the cost-effectiveness of a collective approach to delivery compared to individual action.

As described in chapter 2, the current debate on the re-orientation of the CAP towards the provision of public goods and services is largely rooted the conventional conceptual framework, based on neo-classical economics, where the public goods provision is strongly related to the concept of *jointness* of production and of externalities.

According to this approach, in case of ‘market failure’, public intervention is needed to avoid the under provision of goods which present a high level of non-excludability and non-rivalry.

By carrying out their analysis on public goods provision through an institutional approach, some authors have showed that this conventional approach presents several conceptual and operational limitations, mainly related to the narrow definition of private/public goods (Kaul and Mendoza, 2003; Hagedorn, 2008).

According these scholars, while the definition of public goods based on (non)excludability and the (non)rivalry is based solely on market criteria, the private and public domains of goods are also determined by the general public and by the political process. Thus, it is necessary to consider goods not only in their original forms, but also as social constructs and as results of deliberative policy choices (Kaul and Mendoza, 2003). Indeed, together with the evolution of social institutions, many goods have developed into mixed cases, showing that exclusive and non-exclusive proprieties have a temporary dimension, since they may change, for example, as result of the development of new technologies and according to the different policies and regulations that are implemented.

As highlighted by Paavola and Adger (2005, p. 364), ‘the economic approach has been silent on implementation because it conflates all policy concerns to the choice of the

policy instruments. By contrast, the institutional approach sheds light on the compatibility of governance solutions and patterns of interdependence as well as on the transaction cost implications of the institutional design of governance solutions’.

Indeed, even though the need of state intervention is inevitable in a lot of cases, the present research shows that rural stakeholders can be also encouraged to create innovative institutional arrangements and innovative territorial strategies themselves, in order to develop new possibilities to remunerate the farmers for the provision of non-commodity outputs.

As described in section 2.1, the triangle of publicness provides an interesting analytical framework, since it allows assessing the publicness of goods according to their social construction and to the related policy tools and the decision-making mechanisms.

Indeed, the main assumption of this research is that agri-environmental issues and their solutions are ‘socially built’: they do not exist a priori but the participants involved in defining the problems construct them. Thus, in order to assess the role of collective action in public goods provision, multiple units of observation were considered, including farmers, public and private farmers’ advisors, representative of local and regional agencies and independent experts.

In the two case studies analysed here, different public goods were involved and above all, different dynamics for their provision were observed, based on the different institutional and territorial contexts where collective action was implemented.

At the same time, the analysis of the two examples of collective action could improve the knowledge of the territorial dimension of the agri-environmental public goods involved, by giving some insights on the institutional and social mechanisms involved in the delivering of agri-environmental public goods, as well as on the adequacy of the policy tools currently implemented.

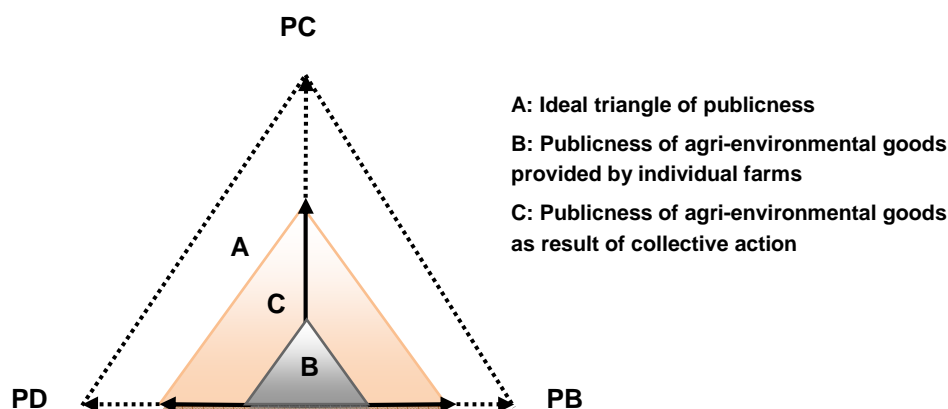
Although the data collected in this research do not allow to assess directly the provision of the agri-environmental public goods provided, the in depth analysis of the local initiatives allowed exploring the process beyond the provision of public goods through collective action. Here it is argued that top-down strategies (usually based on command and control measure) are based on a narrow definition of public goods (see section 2.5), which usually results in a strong focus on the policy tools necessary to provide/protect the public goods.

On the opposite, the provision and protection of the public goods associated to the two case studies (namely the resilience to flooding and the increasing hydro-geological management in one case and soil, air and water quality in the other case) through an institutional approach shows that collective action may increase the level of publicness of such goods (see figure 7.1).

As described in section 2.1, the triangle of publicness provides a theoretical support to assess the level publicness of goods according the following three dimensions: publicness in decision making (PD), publicness in distribution of benefits (PB) and publicness in consumption (PC). The triangle A of figure 7.1 is an ideal type, representing a good that is public in consumption, based on decision-making that fully meets the condition of the generalised equivalence principle, with net benefits evenly distributed across diverse population groups. As highlighted by Kaul and Mendoza (2003), in the reality, is very unlikely that the public goods provision would meet exactly these conditions and, also public goods associated to agriculture are likely to differ from this ideal triangle.

At the same time, to assess the level of publicness of goods it would involve defining clear indicators and reliable measurement methodologies for each case, and doing so is beyond the scope of this research. Nevertheless, while an increasing amount of literature shows that level of publicness of environmental public goods which are provided by individual farms usually is low (triangle B), the present research shows how this may be increased as result of collective action.

Figure 7.1 - The increased “publicness” of goods as result of collective action



Indeed, the case studies analysed here, together with the main literature on the topic, show that, unlike the mainstream and top-down strategies, collective action allow increasing:

- The publicness of decision-making (PD), since collective action increases the participation of the local stakeholders in the decision-making process. Through collective action, rural stakeholders can take part in the development of territorial strategies aimed at placing goods in the public domain and in participating in the debate regarding the implementation of those strategies;
- The publicness in distribution of benefits (PB), since the participatory nature of collective action (with concerted and negotiated conditions) in many cases

enables local stakeholders to derive higher benefits from the public goods provided;

- The publicness of consumption (PC), since in many cases collective action, by broadening the spatial and temporal dimension public goods provision, enables larger group of users and consumers to enjoy the benefits from these public goods.

The institutional approach adopted here considers the provision of agri-environmental public goods as a multiactor activity, which involves social and institutional processes that go well beyond the assessment and the evaluation of public goods provided. Indeed, it may be argued that a stronger involvement of local actors in the decision-making process, in the distribution of benefits and in the ‘consumption’ of public goods brings to a reconfiguration of the modalities of implementing agri-environmental policies. More in details, the present research shows that, compared to the conventional policy tools broadly implemented for the provision of public goods through agriculture (incentives, control and sanctions), collective action may broaden the scope of the agri-environmental action, by facilitating a process of joint learning amongst rural stakeholders. Indeed, by focusing on specific territories rather than on single farm units, collective action involves coordination mechanisms at different levels, where new knowledge regarding agri-environmental public goods is produced, exchanged and diffused.

Table 7.4 – The public goods provided through the collective actions

Public goods	Custodians of the Territory	Valdaso TAEA
Environmental goods	Hydro-geological management, Landscape, resilience to flooding	Increased air, soil and water quality
Socio-economical goods	Social capital, Institutional capital	Social capital, Institutional capital
Cultural and relational goods	New knowledge, capacity building, new networks	Capacity building at institutional level

This dimension of joint learning is crucial also to expand the scope of the strategies implemented, by broadening the scope of the action from the agri-environmental sphere to a process that usually result in innovative institutional arrangements and in a stronger involvement of local communities. In this research has been observed how a collective approach for the provision of the environmental goods (resilience to flooding, air and water quality, etc.) has also the potential of increasing the provision of immaterial benefits and goods, such as new knowledge, social capital, institutional capital and capacity building (table 7.4).

7.4 Policy innovation to support collective action

The fourth research objective was exploring the type of government intervention, both in terms of policy tools and institutional support, it is necessary to promote successful collective action for the provision of agri-environmental public goods.

As discussed in chapter 2, the combined action of the instruments actually implemented in the framework of the CAP (cross compliance and agri-environmental measures) in many cases has been largely inefficient and, above all, resulted inadequate to improve the provision of such goods on the scale that is required (Cooper *et al.*, 2009).

It may be argued that the approach currently adopted, focused on single measures addressed to single farms, do not take into account the territorial dimensions where farmers operate, the local environmental features and the different decision making processes regarding the agri-environmental public goods associated to agriculture.

As argued by Polman *et al.* (2010a), in many cases agricultural innovation policies are too much focused on farms, with the main objective of improving farmer's income, while these policies lack for a clear strategy in creating and managing Common Pool Resources. The results of this research confirm that the territorial dimension of several public goods and services provided by farmers should involve an approach less based on public goods provided by single economic actors, and more on the local and regional management of public goods.

Thus, as showed by the case studies analysed in this research, an effective provision of public goods in rural areas should focus not only the policy tools to be implemented, but also on the social and institutional arrangements and on the collective dimensions of the decision making processes.

From this perspective, agricultural and rural development policies should give more attention to dimensions of knowledge and learning, in order to activate a virtuous circle where farmers may play a pro-active role in delivering agri-environmental goods and services. Indeed, as observed in the case studies, in many cases appropriate land management strategies depend not just on the economic incentives to land managers, but also on other factors, more related to farmers' motivations, attitudes and skills.

When analysing the agri-environmental strategies implemented in the framework of the CAP, the difficulties of implementing collective and territorial strategies are evident (cfr. Chapter 2). In the framework of UE agri-environmental policies, for example, the different institutional levels involved, the complexity of the strategies and the differences amongst territories and farming systems have prevented an extensive adoption of territorial and collective strategies for public goods provision.

Moreover, a collective approach to agri-environmental strategies has not been so far widely applied also because the current legal basis for rural development in many cases is not setting the necessary pre-requisite for a successful implementation of collective methods. The main reasons are related to the characteristics of collective actions, which are dynamic processes, difficult to measure directly, with performance and outputs highly dependent on local institutional settings and on the social and human capital present in the different contexts.

Since collective action are targeted to the local conditions both in terms of farming systems and local institutional settings, the main barriers are related to design of a common framework which allows to integrate collective strategies into the mainstream policies.

From this perspective, public policies should be specifically designed and implemented to take effects on the collective dimensions, both by helping collective and territorial strategies to be developed and by supporting and enhancing collective actions where are already in place. The case studies analysed here, as well as in some examples described in the literature (see for example Poláková et al. 2011) emphasised how these challenging objectives may at least partially addressed through the engagement of a range of local stakeholders in the design process of the collective agri-environmental strategies. The involvement of the key local actors is important for increasing the effectiveness of the designed schemes, since it allows designing measures tailored to the local needs and, above all, with effective environmental outcomes.

Moreover, a fruitful interaction amongst farmers, local authorities, private sectors, advisors and local communities is also important for an effective implementation of the measures on the ground, by making the delivery of the policy measures more effective (Poláková et al. 2011).

This engagement in both the design and in the implementation of the schemes can help to increase the transfer and the sharing of knowledge across different individuals and groups, and this may result in the longevity of the strategies proposed.

As described in the first chapter, the initiatives under study in this research are related to two different approaches to delivery: a holistic approach in the case of Custodians of the Territory project and an approach based on integrated delivery in Valdaso TAEA.

Even though these initiatives are related to specific social, economic and environmental dimensions, they may provide useful insights on the potentialities and barriers to further support collective action for agri-environmental goods provision through agricultural and rural development policies. Table 7.5 summarises the main policy implications that have been observed through the analysis of these two types of approach.

Table 7.5 - Policies implications: lessons from the two case studies

Policies implications	Custodians of the Territory <i>Holistic approach</i>	Valdaso TAEA <i>Integrated delivery</i>
Type of funding	Local financial resources, integrated with some support from the RDP	Project financed through coordinated set of RDP measures
Objective reached	Provision of environmental services as well as additional benefits, social and institutional capital, knowledge generation	Protection of agri-environmental public goods at territorial scale, knowledge generation
Areas	Reclamation district, wide area with farmers with different characteristics: differentiated effects of the project	Delimited geographical area with well-defined farming systems (similar structure and specialisation)
Coordination	Engagement of a wide group of institutions, individuals and sectors: problems of coordination	High level of coordination amongst local stakeholders that implement the agreement
RDP support	Lack of specific funding and lack of flexibility of the RDP (i.e. monitoring activities to prevent flooding could not be financed)	Increased administrative burdens and higher transaction costs
Other support needed	Further investments (time, labour and funding) for communication and advice activities	Initial capacity building process as well as funding for the coordination, management and group activities
Potentialities	This approach can bring small farmers, currently excluded from CAP support, into the system	This approach may have a strong impacts on farmers knowledge and farmers' approach on innovation and training

In the case of ‘Custodians of the Territory’, the local agency has tried to finance a local and integrated strategy through local funding with the aim of improving the hydro-geological management of the district but also to support local farmers and to reduce the abandonment of the most marginal and isolated areas.

This strategy was mainly financed through local funding coming from the local reclamation tax and, for larger intervention works, through the regional RDP (measure 226). With regard to the EU policy support, it has been observed a lack of flexibility of RDP, especially regarding the possibility of focusing the intervention on immaterial services, such as the monitoring activities, compared to the intervention based on investments. Moreover, the bureaucratic and administrative barriers in place have halted this initiative to be efficiently managed at broader scale, since a more effective coordination mechanisms and a stronger and more coordinated devolution to local agencies regarding the implementation of RDP, would have been necessary.

The integrated delivery in Valdaso TAEA on the opposite is based on a package of measures from the regional RDP was used, namely the agri-environmental measure (214) and, as accompanying measure, vocational training and advice (111).

Through the analysis of the two case studies it was also observed a lack of flexibility and autonomy in managing the RDP funds at the local level were identified as the

main constraints, since a sub-regional level implementation of the RDP could have facilitated a more effective coordination at territorial scale. Another important constraint in the case of Valdaso TAEA is related to the higher transaction costs associated to this collective strategy, related to the financing of the initial capacity building process as well as funding for the coordination, management and group activities.

RD policies usually also lack in flexibility to efficiently support spontaneous and endogenous initiatives also because they are focused on administrative borders and are not tailored to territorial provision of agri-environmental public goods, that usually involve a better tailoring to the natural boundaries of territories.

The research highlights the role of local public bodies and institutions as key promoters and coordinators of specific projects related to agri-environmental public goods provision and the need, for implementing successful collective initiatives, of a stronger devolution of power and responsibilities.

The devolution of powers to local bodies is discussed as a crucial aspect not only in relation to the collective strategies, but also more generally for increasing the effectiveness of rural development policies on the ground. As argued by Mantino (2010, p. 15) 'better targeting and policy effectiveness are often connected with a process of devolution to local bodies and partnership and [at the same time] ... devolution of RDP does not always represent a step forward in the improvement of policy delivery. In fact, devolution is in some cases only partial, due to the fact that marginal financial resources are devolved to sub-national bodies'.

It may be argued that this devolution, with the corresponding increasing financial resources and responsibilities, is particularly important when complex and integrated policies are implemented, such as territorial and collective action.

In the case of Custodians of Territory project, for example, the Mountain Community for Garfagnana area was not in charge of the implementation of this the Regional RDP. But this is also the case of Valdaso TAEA, where the provincial authority acted as intermediary between the local stakeholders and the regional government without adequate financial resources to carry out this task. A stronger involvement of those local institutions in the regional RDPs probably would have enabled local actors to elaborate more complex and articulated strategies for their territories.

This programming approach to rural development could be reinforced in order to set a strategic vision more focused on specific priorities and quantified objectives, also through a stronger involvement of regional and sub-regional actors both in the design and delivery of projects (Mantino, 2011).

From this perspective, according to the proposal on rural development policies of European Commission (2011a) for the programming period 2014-2020, it is likely that the policies will be more oriented at supporting territorial priorities, also through collective projects and strategies for agri-environmental public goods. Indeed, the RDP structure in axis will be re-shaped around thematic priorities, with an increasing focus on networks and territorial approach, also to deliver environmental public goods. The article 36 of this proposal, for example, emphasises how ‘support for collective approaches to environmental projects and practices should help to provide greater and more consistent environmental and climate benefits than can be delivered by individual operators acting without reference to others (for example, through practices applied on larger unbroken areas of land)’.

In this new formal position for collective action, the European Commission mentions ‘group of farmers’ as potential applicants and beneficiaries for the agri-environmental part of the proposal for rural development. The proposal also mentions the possibilities of supporting co-operative action, including the organization costs. Even though this may be considered a good starting point to re-orient the agri-environmental policies, the shift towards a greater emphasis on collective action of the policies should not just be aimed at addressing the higher transaction costs that are usually associated to territorial strategies, but it should involve a deeper shift on the way policies are thought, designed and implemented.

The mainstream policies for agri-environmental public goods (such as cross-compliance, greening and agri-environmental measures) are based on excessively ‘schematised’ practices with high standardisation of schemes which result in a tight focus on the management agreement and on the cost-effectiveness of the measures.

On the opposite, policies for agri-environmental public goods through collective action should increase their capacity and to develop learning communities where common interest and common goals play a central role.

Finally, the research calls for more attention to the implementation of multi-goal policy instruments, through the integration of policy tools based on compensation with incentives focused on information, communication, skills and learning. Indeed, while the generation of new knowledge, as well as of social and institutional capital are among the most important positive outcomes of the collective action, such dimensions are often forgotten when planning the delivery of agri-environmental public goods in rural areas.

On the opposite, collective action may result in a long-term shifting in farmers thinking and action, since the institutional and social dynamics observed allow farmers to learn about and implement environmental management techniques that are accumulated in institutional and social capital.

8 Conclusions

Agriculture provides food as well as environmental public goods such as agricultural landscape, biodiversity, flood and drought control and carbon sequestration. The concept of multifunctionality has represented the main analytical framework, both in the institutional and academic debate, to describe the complex relations between agriculture and the aforementioned public goods.

At the same time agriculture does not only provide public goods, but it also produces negative externalities, such as water pollution and soil erosion as a result of the use of fertilizers and pesticides or unsustainable farming methods.

In order to incentivise the multifunctional role of agriculture and to overcome the market failures caused by public goods and externalities, the main measures adopted in the framework of the CAP are cross compliance and agri-environmental measures.

In this research it is argued that the theoretical foundation of these policy tools, based on neo-classic economics, in many cases fails to take into consideration in adequate way the social construction of the public goods that may be provided by farmers and by other stakeholders in rural areas.

Furthermore, a narrow focus on policy tools that aim at modifying the land management practices at farm level leaves behind the territorial and collective dimensions of the strategies to be implemented, by resulting in an unsatisfactory recognition of the knowledge and competencies needed of the rural stakeholders to effectively implement the policy tools proposed.

These conceptual limitations surrounding the conventional approach were described through the analysis of the most relevant studies that have addressed the provision of public goods through alternative approaches, mainly rooted on institutional economics (Kaul and Mendoza, 2003; Hagedorn, 2008; Ostrom, 1990). These authors have observed how an institutional approach in studying public goods issues may provide a more comprehensive and integrated basis on which developing adequate forms of intervention, based on specific policy tools but also on innovative institutional arrangements and governance patterns that can be effective at the local level.

By applying this approach to the provision of agri-environmental public goods associated to agriculture, the research shows the need of analysing the multifunctionality of agriculture from a more integrated and wider perspective, by taking into better account the territorial, social and economic contexts where farmers operate (Renting *et al.*, 2009).

Indeed, the extent to what agri-environmental public goods may be provided is highly influenced by a wide range of – often interrelated – institutions and policies. For this

reason it is necessary to go beyond the analysis of livelihood strategies, by exploring the institutional arrangements necessary to implement successful strategies which enhance the multifunctional role of agriculture at a broader scale. According to this approach, 'jointness of production' is not defined in relation to the production functions, but regarding the economic and institutional arrangements which may deliver a combination of commodities and non-commodities, private and public goods (Hagedorn et al., 2002).

The research aimed at exploring this new perspective on multifunctional agriculture by analysing the role of collective action in the provision of agri-environmental public goods.

It is increasingly recognised that public goods such as biodiversity and landscape may be provided efficiently only by multiple persons and through collective action of farmers and other stakeholders in rural areas. This approach emphasises the need of widening the action beyond the individual farm, by adopting a more integrated approach towards achieving sustainable solutions in rural areas.

One of the main goals of the research was exploring the internal dynamics of collective action, in order to understand how the problems of public goods provision through agriculture were formulated at the local level, by observing how stakeholders express their views and motivations and by identifying what resources were mobilised during the process. The participatory methods used in the research seemed particularly appropriate to pursue these objectives, since through participatory tools it was possible having a deep understanding of the local collective action under study, by exploring the relationships amongst the different units and identifying the main feedback mechanisms.

Thus, Rapid Rural Appraisal methods were used to carry out two case studies in Central Italy, where two collective actions were promoted to increase the provision of agri-environmental goods and services at territorial level. Through semi-structured interviews with local stakeholders and transect walks with farmers it was possible exploring the main mechanisms related to the decision process as well the attitudes, motivations and social norms beyond these initiatives.

The case study "Custodians of the Territory", by analysing an innovative scheme of Payment for Environmental Services (PES) developed by a local government agency in Tuscany, has highlighted the important role of co-production (of knowledge and services) in collective action. Indeed, the data collected showed that innovative institutional arrangements amongst rural stakeholders focused on co-production might have the potential of enhancing the multifunctional capacities of agriculture and of delivering environmental services in a cost-effective way. Moreover, the results of the analysis show that this holistic approach of delivery adopted by the local agency

has the potential to address in a more coherent and integrated way the social and the environmental needs of mountain areas.

The case study in Valdaso, on the opposite, demonstrated that a territorial approach for public goods provision through integrated delivery may represent an efficient and innovative way to protect environmental goods at territorial scale. This is particularly interesting also because the agreement was implemented in an area characterised by intensive farming production, while a territorial approach to agri-environmental measures is mainly exploited in territories like Natura 2000 areas or regional and national parks, due to the difficulties to push farmers located in intensively cultivated areas to voluntarily join environmental strategies and agreements (Mantino, 2011).

In spite of the main barriers related to the development of collective action (free riding, transaction costs, lack of specific financial and institutional support), these examples show that it is possible creating a different discourse between multifunctional agriculture and the new need of the society, through the achievement of a (institutional and social) transition processes, when new experiences are conceived, designed and legitimated.

To summarise, the research has showed that, in order to favour and support the development of successful collective action for public goods provision, it would be necessary to take into more account the following dimensions: (i) the human dimension, by focusing more on the motivation and attitudes of farmers and of the other stakeholders involved, (ii) the learning dimension, by incentivising a collective approach of public goods provision through knowledge sharing and learning opportunities and (iii) the participatory dimension, by involving more directly the farmers into the local decision making process and by adopting innovative institutional arrangements at the local level, such as co-management and co-production.

With regard to the human development aspects, as argued by Paavola and Adger (2005, p. 362), the theory of collective action makes several contributions to the implications of behavioural goals for collective action and choice, by showing institutional framework and the particular decision rules related to these choices.

From this perspective, the research shows that motivations beyond the participation of farmers to collective action are not only linked to the economic sphere, but also to other dimensions, which are important 'joint products' of collective action (Ayer, 1997). Indeed, in many cases, the sense of belonging to their own community leads farmers to comply with norms that diverged from purely profit-oriented approaches. Farmers' behaviours in many cases are determined by their ideas, values and biases. The case studies show that public institutions, also through incentives, may also contribute to increase this sense of belonging of farmers to their communities and may

reinvigorate their willingness to participate in collective approaches. Moreover, when collective action are affectively supported by institutions, can contribute to reframe farmers' behaviours, by stimulating farmers to adopt new techniques and changing the perception of their own activities and practices.

Moreover, the case studies also show that the success of collective initiatives is highly dependent on the capacities of the local actors (local institutions, farm advisory systems) in influencing collective behaviours, by structuring a range of incentives, capacity building programs and technical assistance which allows to align individual and group objectives and, above all, to overcome the contradictions between the private/public goods provision in farming activities.

With regard to the learning dimensions, the interviews and the transect walks allowed to explore in depth the learning processes involved and the exchanges of information amongst farmers and between farmers and extension services: how decisions were arrived at with regard to particular practices, how farmers responded to advice and whether there had been agreement, conflict, misunderstanding or negotiation about the advices which farmers receive or exchange.

The research highlights how the provision of public goods through agriculture implies new types of knowledge and of learning environments, where the role of innovation is crucial. Such innovation is usually associated to technological innovation but the case studies show that it is also necessary considering other approaches to innovation, such new regulations, new behaviours, cultural change and institutional change.

Thus, it is necessary to explore how innovation may cover many aspects of farming, both at structural level (farm structure, human resources, type of production, farm specialisation), at organisational level (logistics, administration, communication issues) but also at personal level, regarding the attitudes, motivation and learning of new practices by farmers.

From this perspective, as observed by Knickel et al. (2009), more research is needed on institutional arrangements, and factors that support or hinder the diffusion and adoption of innovations: 'the role of organisations facilitating innovation as well as public innovation policies are critically important research questions that have not yet been tackled adequately' (ibid. p. 143).

The research also shows that the integration of different types of knowledge (farmers, experts and academic) is not only better for dissemination, but also may bring better solutions on the field. In terms of public goods and environmental services provided by farmers, social learning and co-production of knowledge are necessary process to overcome the contradictions between sectoralised forms of knowledge, especially between the private/public goods provision through farming activities. Co-production

of knowledge and social learning may determine a pro-active engagement of farmers in the provision of environmental goods and services.

Thus, territorial policies oriented to the provision of public goods should focus more on the implementation of adequate advisory and knowledge systems for farmers, which should be reformed with a shift from private goals (such a productivity increase) to public goals (such as environmental care).

From a policy development perspective, the broader definition of public goods proposed in this study aimed at exploring the innovative institutional arrangements and tools which may be affective on supporting collective strategies for public goods provision.

This underpins a new governance dynamics, more consistent in placing the focus on the emerging agri-environmental problems as are perceived by the local stakeholders. This is a complex and challenging task, since requires a careful weighing up of the interests of all the actors involved, but it is a viable solution to solve complex problems related to the management of environmental resources associated to the agriculture. A new governance philosophy, based on co-management and co-production, may enable local governments and farmers to elaborate effective and long-term strategies. This implies a radical change on the design and implementation of the action for public goods, since the objectives to be achieved should take the local situation as starting point, by incorporating the wishes, ideas and capabilities of local communities, by using persuasive power instead of obligations and, above all, focusing on learning process within the design and the implementation of policies.

From this perspective, it was observed that the approach of agri-environmental measures proposed by the European Commission in the framework of the CAP in many cases does not take into consideration in adequate way the collective dimension of the environmental problems concerned and the decision making processes related to the strategies to be implemented. Indeed, in many cases a narrow focus on policy tools aiming at modifying the land management practices at farm level leaves behind the territorial dynamics, which are highly dependent on the social and human capital. This leads to an unsatisfactory recognition of the role of innovative institutional arrangements may have in provide agri-environmental public goods at territorial scale.

The broader definition of public goods proposed here aimed at exploring the complexities of the problem to be approached by the government at different levels. The innovative strategies analysed, even though cannot be replicated in different contexts, demonstrate that it is possible to experience new types of cooperation between government and farmers and, in some ways, between government and society. Indeed, when government is capable of focusing on society's learning capacity may reach important public objectives. This requires effective governance coordination at

different levels but also a more dynamic approach where fast and continued feedback on the results achieved and the barriers encountered may guarantee the transparency of the all process.

The collective actions described in this research show that it is possible improve the capacity of the rural stakeholders in proving and protecting high valued public goods by creating greater synergy between the action of local citizens and the action of governments, where the development of new social and institutional processes must be stimulated.

From this perspective, even though regulation will remain a crucial instrument for public goods associated to agriculture, policy rules currently implemented in the framework of the CAP in many cases do not stimulate learning. On the opposite agriculture and rural development policies should increase their effectiveness to stimulate learning and take advantage of the new information systems and web tools, as well as the unprecedented learning ability of our society, including citizens living in rural areas. An increasing access to information may stimulate new forms of collaboration between the public and the private sector, by stimulating collective action aimed at delivering public goods and services that the government is unable to deliver itself.

Indeed, while the conventional approach on public goods provision is based on hierarchical administrations, a collective approach claims for an open and horizontal form of governance of public goods provision in rural areas. From this perspective, government does not rely on absolute control, but rather places more emphasis on releasing energy, on learning ability, and on the use of dynamic systems of regulation, at all level, from local to global (Hajer, 2011, p. 43).

The future CAP, in order to provide public goods more efficiently at territorial level, should take more into account innovative agri-environmental strategies focused on specific territories, but should also figure out the modalities of up-scaling and replicating this approach, in order to support to a larger extent these territorial and collective initiatives.

The CAP should have a stronger focus on institutional arrangements and governance structures at local level, especially in order to support more efficiently formal and informal organisations that coordinate collective action for shared interests and public goods. At the same time, it would be necessary to explore more in depth the conditions that may promote successful collective action, the related costs and benefits, and their effectiveness in addressing the different agro-environmental issues.

More exhaustive researches on the role of collective action for public goods provision in agriculture should be carried out, in order to address the same research questions in different territorial contexts across Europe. The successful initiatives studied here

suggest the need to further explore collective action, in order to design and test alternative agri-environmental strategies that allow farmers to engage, to innovate and to use their local knowledge to provide high valued agri-environmental public goods.

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Annex 1: The interviews

Custodians of the Territory (Tuscany region)

Interviews	Place	Date
1. FC: <i>Project ideator</i> . Ex head of Department of the Mountain Community Media Valle del Serchio	Barga (Lucca)	12 th October 2011
2. FB: technician of the Mountain Community Media Valle del Serchio	Limestre (Pistoia)	12 th September 2011
3. LP: Town councillor of Cutigliano Municipality	Cutigliano (Pistoia)	9 th August 2011
4. PG: Project coordinator, technician of the Mountain Community Media Valle del Serchio	Borgo a Mozzano (Lucca)	14 th October 2011
5. MB: Mayor of Barga	Barga (Lucca)	12 th October 2011
6. NB: President of the Mountain Community Media Valle del Serchio	Borgo a Mozzano (LU)	14 th October 2011
7. AP: Person in charge of the agricultural sector of the Mountain Community Media Valle del Serchio	Borgo a Mozzano (Lucca)	14 th October 2011
8. MB: Software developer (IDRAMAP) HT&T Consulting	Pontedera (Pisa)	2 nd September 2011
9. MD: Software developer (IDRAMAP) HT&T Consulting	Pontedera (Pisa)	2 nd September 2011
10. GC: Farmer	Melo, Cutigliano (Pistoia)	28 th March 2011
11. MF: Farmer	Pascoso (Lucca)	1 st December 2010
12. SG: Farmer	Butale, Cutigliano (Pistoia)	9 th August 2011
13. UB: Farmer	Selvapiana Piteglio (Pistoia)	12 th September 2011

Valdaso TAEA (Marche region)

Interviews	Place	Date
1. IF: Technician of ASSAM (Project Leader)	Castel di Lama (Ascoli Piceno)	15 th September 2011
2. EL: Person in charge of the Valdaso TAEA for Ascoli Provincial Government	Ascoli Piceno	15 th September 2011
3. FS: Person in charge of the Valdaso TAEA for Fermo Ascoli Provincial Government	Ascoli Piceno	15 th September 2011
4. AM: Ex Councillor (agricultural sector) of Ascoli Provincial Government	Roma	7 th July 2011
5. LB: Head of Agriculture Department of Marche Regional Government	Ancona	25 th July 2011
6. MC: Technician, in charge of chemical analysis , ASSAM JESI	Jesi	16 th September 2011
7. CG: Technician, ASSAM – Agrometeo Center Ascoli Piceno	Ascoli Piceno	29 th November 2011
8. DR: Technician, ASSAM – Agrometeo Center Ascoli Piceno	Ascoli Piceno	29 th November 2011
9. MC: Technician, ASSAM – Agrometeo Center Ascoli Piceno	Ascoli Piceno	29 th November 2011
10. PG: Farmer, Leader <i>Nuova Agricoltura</i>	Montalto delle Marche (Ascoli Piceno)	15 th September 2011
11. GV: Farmer	Montalto delle Marche (Ascoli Piceno)	15 th September 2011
12. RC: Farmer	Montalto delle Marche (Ascoli Piceno)	29 th November 2011
13. MS: Farmer	Montalto delle Marche (Ascoli Piceno)	29 th November 2011
14. MM: Farmer	Altidona (Ascoli Piceno)	28 th November 2011
15. GT: Farmer	Montedinove (Ascoli Piceno)	28 th November 2011

Annex 2: the Index Trees of the interviews

Index Tree - Custodians of the Territory (Tuscany region)

Categories	Sub-categories 1 st level	Sub-categories 2 nd level	
Territory	Abandonment farming (especially livestock production)	Lack of stewardship and hydro-geological management	
		Lack of small intervention works	
	Abandonment forest management	Lack of stewardship and monitoring	
		Reduction of public forestry works	
History of the project	Pioneering experience in <i>Fabbriche di Vallico</i> Municipality	First attempt to use PES	
		Involvement of local community in services delivery	
		Difficulties in scaling up	
	Custodians of the Territory	Project planning (local authority manager on the basis of the previous experience in <i>Fabbriche di Vallico</i>)	
		Mapping activities	
		Public announcement	
Legislative framework and supporting policies	RDP	Investments vs services	
		Scarce impacts in mountain areas	
		Lack of information and communication	
		Lack of integration with other strategies	
		Use of measure 226 in the project	
	National law on multifunctional agriculture (decree 128/2001)	Coherent legislative framework	
		Difficulties to include monitoring activities	
The environmental services	Monitoring	Time	
		Costs	
		Incentives	
	First intervention works	Availability of machinery	
		Skills and knowledge required	
		Times	
		Type of works	
		Lack of training	
	Role of farmers	Compared to specialised	Costs

	companies and cooperatives	Availability
		Timeliness
		Lengths of works
		Local knowledge
		Pro-active engagement
		Prevention vs Maintenance

Role of other actors	Mountain Community Media Valle del Serchio'	Project management
	Other Mountain Communities	Technical Assistance
	Municipalities	Other environmental services
		Potential role in the project
	Farmers' Organisations	Administrative support
Local communities	Increasing involvement - participatory events	

Farmers motivations and attitudes	Economic incentives	PES
		Rationalisation of time
		Rationalisation of labour
	Personal motivations	Satisfaction
		Passion
		Active role in the territory

Knowledge and learning	Type of knowledge	Historical knowledge
		Knowledge of the territory
		Presence and stewardship
		Knowledge land owners
		Knowledge administrative tasks
	Learning	Joint learning farmers-farmers
		Joint learning farmers-technicians
		Exchanges farmers-citizens
		Exchanges farmers – institutions

IDRAMAP	Functions	Increasing effectiveness monitoring
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		Involvement local communities	
		Increasing learning	
		Temporal and spatial data base	
	Visibility	Logo	
		Risks of high visibility	
	Barriers	Coordination local agencies	
		Overlapping with the old system	
		Difficulties in using IT	
	Future development	Smartphones and apps	
		Training and information in schools and institutions	
	Project results	Involvement of local farmers	Incentives to stewardships
			Build of a new identity of farmers custodians
Incentives to keep the farming activities in mountain areas			
Direct involvement in the decision making process			
Environmental public goods		Increased hydro-geological management	
		Increased resilience to flooding	
Socio-economical public goods		Knowledge generation	
		Network of local farmers	
		New sensitiveness and awareness amongst local farmers and citizens	
		Census of hydraulic structures and canals	
SWOT		Strengths	Timeliness interventions
			Simples rules and enforcement
	Involvement of several rural stakeholders		
	Costs reduction		
	Increasing action and knowledge of local farmers		
	Weaknesses	Differentiated results in different areas	
		Problems of land fragmentation and professional skills for small farmers	
		Difficulties in scaling up	
		Lack of coordination mechanisms at district level	
		Scarce interests of other local public agencies	
	Lack of specific training		

	Opportunities	Additional environmental services provided by farmers
		Support at regional level
		Increasing interests for public goods provided by agriculture
		Increasing focus on collective approach for environmental services delivery
	Threats	Lack of clear and coherent legislation
		Pressures from specialised cooperatives and companies
		Ri-organisation of local institutions in mountain areas
		Lack of financial resources

Index Tree - Valdaso TAEA (Marche region)

Categories	Sub-categories 1 st level	Sub-categories 2 nd level
Territory	Institutional setting	Provinces and coordination
	Environmental characteristics	Well preserved and attractive valley
	Characteristics of farming	High specialisation in fruit production
		Small scale farms
High use of pesticides in the past	Increasing awareness of the negative environmental effects	
	Increasing awareness of the negative health effects	
History of the project	Co-creation	History and role of <i>Nuova Agricoltura</i>
		Experimenting phase
		Role of project leader
		Identification of provincial authority as managing body
TAEA	Collective approach	Cooperation in the past
		Role of pioneers farmers
		Role of project leader in aggregating farmers
	RDP	Development of TAEA in the regional RDP
		Measure 214
		Measure 111
		NVZ
		Adhesions to the TAEA
The actors involved	<i>Nuova Agricoltura</i>	Development of the initiative
	Project leader	Development of local network of farmers
	Companies specialised in Crop protection products	Technical Assistance
	Provincial authority of Ascoli Piceno	Promoting and managing authority
	Provincial authority of Fermo	Managing authority
	Regional government	Design of the TAEA
	ASSAM	Technical assistance, physical/chemical analysis and information system
	Farmers' organisations	Administrative assistance

Farmers' motivations and attitudes	Economic incentives	RDP payments
		Cost reduction (less crop protection products, less labour and time)
		Effectiveness of the techniques adopted
	Personal motivations	Environmental reasons
		Health reasons
		Willingness to contribute to the sustainable development of the valley
	External drivers	EU Directive on sustainable use of pesticides
		Positive results of the other farmers
		Information and communication within the TAEA
Knowledge and learning	TAEA advice and training	Meetings and seminars
		In-farm visits
		ASSAM bulletin
		ASSAM technical assistance
	Informal training	Exchanges farmers-farmers
		Exchanges farmers-technicians
		Role of ASSAM advisors
		Role of project leader
Project results	Environmental outcomes (reduction of externalities)	Reduction in the use of pesticides
		Reduction in the use of fertilisers
	Health outcomes	Reduction of chemical residues
	Socio-economical public goods	Social capital
		New knowledge
		New approach to innovation for farmers
		Capacity building
		Institutional capital
	SWOT	Strengths
Effective coordination mechanisms		
Territorial provision of environmental public goods		
Longevity of the results		
Weaknesses		Farmers feel not adequately supported by the institutions

	Higher transaction costs
	Hidden costs for farmers
	Lack of a coherent marketing strategies
Opportunities	Increasing interests of supermarkets for integrated products
	Regional branding (QM)
	Presence of an integrated project <i>Valdaso</i>
	Integration with short supply chains projects
	Development of other agri-environmental agreement
	Increasing focus of collective approach and integrated delivery in the CAP
Threats	Free riding
	Lack of flexibility RDP measures
	Difficulty in regulating and managing joint projects (joint responsibilities)
	Policies focused on administrative borders rather than on the territorial scale of public goods to be provided