

PERSPECTIVES FOR COOPERATION BETWEEN FARMERS IN LANDSCAPE AND
NATURE MANAGEMENT - MODELING THE ESTABLISHMENT OF THE DUTCH
ENVIRONMENTAL COOPERATIVE IN THE UNITED STATES

By

MARIE FERRE

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LIST OF ABBREVIATIONS

BLWR	Illinois Bureau of Land and Water resources
CCPI	Cooperative Conservation Partnership Initiative Program
CRP	Conservation reserve Program
CSA	Community Supported Agriculture
CSP	The conservation Stewardship Program
CTIC	Conservation Technology Information center
EC	environmental cooperative
EQIP	Environmental Quality Incentives Program
GRP	Grassland Reserve Program
IEPA	Illinois Environmental Protection Agency
IFB	Illinois Farm Bureau
IRAP	Illinois Recreational Access Program
ISWCD	Illinois Soil and Water Conservation District
M2P	Mud to Parks
MCP	Milieucooperatie de Peel
NASS	National Agriculture Statistical Service
NCFC	National Council of Farmers' Cooperatives
NGC	New generation Cooperative
OLM	Ordered Logit Model
PFC	Partners for Conservation
USDA	United States Department of Agriculture
VEL & VALNA	The Vereniging Eastermar's Lânsdouwe and the Vereniging Agrarisch Natuur en Landschapsbeheer Achtkarspelen (VANLA)

WHIP Wildlife Habitat Incentives Program

WRP Wetlands Reserve Program

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Marie Ferré

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This research is aimed at studying the agricultural environmental cooperative structure which exists in the Netherlands, and analyzing how this structure could be applicable in a certain area in the United States. As part of the specific objectives, the study determined the variables – at the human, organizational, and policy levels – that have enabled the farmers to build this form of cooperation in the Netherlands. The study extracted the predominant variables identified as factors of success of cooperation (economically and contributing to the rural development of the area). The identified factors of success were then modeled on how they would match within a U.S. agricultural system. This study was descriptive research – based on a cross-sectional design – and targeted a sample of U.S. farmers in the state of Illinois. Two data sets were used in this research study. Secondary data from previous studies were used to analyze the environmental cooperatives existing in the Netherlands. Secondary data from previous studies and primary data collected using questionnaires were used to investigate the applicability of this environmental cooperation institution among farmers in Illinois. The data were managed and analyzed with the Statistical Package – R; the

Ordered Logit Model and Principal Component Analysis were applied. During the analysis, the study compared the Dutch versus U.S. and Illinois social, economic and legislative contexts within which the farmers' organizations are working. The research study concluded that most of the factors which had been extracted from the Dutch literature were present in the Illinois sample, although differently and to a different extent. Moreover, other factors, specific to the U.S. context were discovered, and were also identified as potential factors for the development of an environmental cooperative. From the correlation-results, farmers' typologies were designed according to a certain dimension of being either favorable or not to the development of an environmental cooperative. Combinations of farmers' and farms' characteristics were determined and were associated with a specific typology. Obstacles and constraints to the development of an Illinois environmental cooperative were suggested by the results. Finally, predictions about the future of an environmental cooperative in the Illinois-U.S. and further recommendations were given.

CHAPTER 1 INTRODUCTION

Context Setting

Place of the Study within Emerging Issues and Global Shifts

Global challenges and shifts in agricultural patterns

The past few decades of modernization and intensification of the agricultural sector were associated with changes in food production and food consumption, which led to various short- and long-term consequences. The form of food production generally adopted in the industrialized countries demonstrated its limits through the diverse types of pollution, environmental damages, and negative human externalities. The existing multiple and inter-dependent global challenges call for a change in the production pattern and for the development of alternatives to the agricultural system, especially considering that the largest part of the world population lives in developing countries and relies on agriculture as the primary economic sector (UNDP, 2007). Besides, this form of agricultural production has been generating disconnections between the farming system and its social and natural environment, reinforcing environmental problems, animal welfare issues, and other debated practices (VAN DER PLOEG, 2001).

Based on the expected long-term and diverse impacts of the current food production system, the concept of sustainable development applied to the agricultural sector was introduced, although, hardly debated. The concept of sustainable development can be applied to various fields of society, although it is difficult to give it a clear and explicit definition, especially because it is different depending on the perspective adopted (economic, ecological, and ethical). Basically, sustainable

development implies a change in the content of growth to maintain the stock of ecological capital, to improve the distribution of incomes and to reduce the degree of vulnerability to economic crisis. It refers to the optimal level of interaction between the biological, economic and social systems, “through a dynamic and adaptive process of trade-offs” (ROMANO, 2003). The concept is better explained through the policy instruments, means, and organizational principles taking part to its creation, and it can be conceived “as a comprehensive process of searching, learning and gaining experience” (HAGEDORN, 2002, p.13). According to Hagedorn (2002) the achievement of sustainable development can be represented by several strategies. They are described as the improvement of reflexivity from the concerned actors to reinforce their sensitivity regarding their behavior in terms of ecological, economic and social side effects. This would then allow them to be able to suggest institutional and policy reforms, which reinforces self-organization and participation to re-connect the political processes with the citizens. The second main strategy is the harmonization of the interests to build constructive solutions regarding conflicts between different interests and values. A final strategy would be the development of innovation to create new opportunities for actions in society (HAGEDORN, 2002).

Emergence of the concept of diversification of agriculture. To deal with sustainable development in the field of agriculture and from the approach of the rural and local economy, the phenomenon of diversification of the farming system has been more and more developed. Diversification within the farm is defined by the combination of different economic activities (e.g. food production and tourism) within the same management unit (VAN HUYLENBROECK et al., 2007). On-farm activities are seen as a

possible answer to the economic difficulties of certain rural areas, and to the increasing urbanization. Diversification of the farm through, for instance, agro-tourism, on-farm selling, education, environmental conservation, and maintenance of cultural heritage and local values are associated with new opportunities for the farmer, new streams of incomes, and new potentials for the area (GROOT et al., 2010). Just as in Europe, the phenomenon of diversification of the farm has also been on the increase in the U.S. during the last decades with the U.S. Farm Bill's rural development programs, which aim at keeping small family farms and their rural areas alive (USDA, 2013).

Emergence of the concept of multi-functionality of agriculture. The notion of multi-functionality of agriculture can also be a factor in the sustainable development of agriculture, as corresponding to the first and second strategies mentioned by Hagedorn (2002). This concept of multi-functionality of agriculture will be an important focus during the current study. In this concept, beside food production, farming system provides non-trade benefits [or “non-marketable goods” (POLMAN, 2002, p.12)] such as landscape shaping, natural resources management, biodiversity preservation, and contributions to the socio-economic viability of the rural area (VAN HUYLENBROECK et al., 2007). This concept can more or less be emphasized and developed according to the farm, the desires, and the possibilities of the farmer. Multi-functionality in agriculture is a determinant concept for the link between the farmers and the consumers (the local people). In both Europe and the United States, there is a growing interest among farmers in reconnecting agriculture with the consumers and adopting alternative production practices that are more concerned about the natural environment and the preservation of natural resources. Multi-functionality of agriculture in this sense holds

the potential of being the reason for the creation of new forms of cooperation between farmers themselves and new interactions within the community at large. Its aspects could indeed have a higher potential at a collective level than at an individual level. This is linked to the fourth strategy described by Hagedorn (2002); innovating in forms of collective action in order to enhance the multi-functionality of the agriculture and to ensure the sustainable development of the collective actions. The co-operative approach is an example of such innovation, which has the potential to promote and enhance the non-trade benefits provided by agriculture, especially in terms of environment.

This study focused on the green part of multi-functionality of farming and more specifically on innovations towards the enhancement of landscape and nature management, and environmental conservation practices as part of the farming system, and approached from the perspective of collective action.

Green practices incentives, conservation programs in the U.S. and in EU

The enhancement of environmental conservation practices in the food production system has followed a different pattern in the U.S. as compared to Europe. However, the effectiveness and efficiency of the measures implemented is still today strongly discussed and can be improved in both regions. The development of concrete incentives towards the conservation and preservation of the environment in Europe has been formulated with the reform of the Common Agricultural Policy (CAP) in 1992 and the creation of its second pillar. In the U.S., conservation programs were born in the 1930s in a climate of high crop prices. The Agricultural Adjustment program (1933) and the Agriculture Conservation Program (1936) led to the retirement of about 40 million acres, combined with cost-sharing and technical support to farmers who adopted

approved land conservation practices (FERRIS AND SIIKAMAKI, 2009). In the 1960s the Soil Bank Program (now referred to as the Conservation Reserve Program) was designed to retire a large amount of productive land as well. However the U.S conservation programs were until the 1980s mostly means for rural investment, income support for farmers and supply control. It is in a second period that these programs had effective objectives oriented to the protection of natural resources.

In the U.S., farm programs that reward production yields over environmental conservation have been very much predominant since the beginning. U.S. programs have been associated with tendencies for uniform planting conditions, large acreages of production, and intensification of the agricultural management. The development of environmental practices as part of the production system is a relatively new trend, and is just beginning to develop. (CTIC, 2002)

A different approach to environmental conservation measures. In both the U.S. and Europe, conservation programs and agro-environmental schemes regulate the effects resulting from agricultural practices. Some of them are part of general regulations and conditions for farmers' eligibility to direct commodity payments, while others are voluntary. However, the approach is very much different in the U.S. as compared to Europe. European countries' agri-environmental policies strongly push towards the increase of positive externalities from agriculture (e.g. the private delivery of public goods such as attractive landscapes produced by agriculture) (BAYLIS et al., 2007). This mainly deals with nature and landscape management perceived as a sustainable way to secure both food production and the development of rural areas. In the contrary, U.S. Farm Bill's conservation programs are more focused on decreasing

negative externalities from agriculture (e.g. soil erosion, non-point source pollution) (BAYLIS et al., 2007).

A link can be drawn, however, between both approaches and “sustainable development” of agriculture. Implementing measures to prevent the negative externalities is necessary to recover the landscape and the natural resources (e.g. soil, atmosphere) which have been negatively affected. However, from a long term perspective, offering incentives and implementing measures towards the increase of positive externalities emerging from agriculture seems to be more beneficial, because this deals more directly with a logic of sustainable development and a focus on alternatives better for the environment, while trying to recover the “mistakes” committed in the past, is less likely to encourage the development of efforts and incentives enhancing the benefits of farming.

Implementation-scales of environmental conservation strategies.

Discussion about the approaches to environmental regulations also raise concerns about the scale-area of its application and implementation. It is especially important for water resources, specifically when water pollution from agriculture is determined to be non-point pollution. Measures towards the improvement of water quality require actions at the scale of the drinking water catchment or at the scale of the watershed, meaning they extend beyond farm boundaries. Therefore, regulations via zoning and designation of areas as “vulnerable zones” only target the scale of management; it is often not connected to the measures implemented at a larger scale, and then a risk of mismatch between the incentives provided on an individual farm basis and the area at larger. Based on this point, a re-evaluation of the measures occurred through the Water

Framework Directive and also nitrate directive in Europe (AMBLARD, 2011). However, questions can be raised concerning the effectiveness and efficiency of a governmental directive aiming at connecting different scales of implementation of a regulation to each other as compared to an incentive born from the people themselves willing to work integrating different scales of the territory in their projects -- as it is the case through the environmental cooperative (EC).

The top-down approach. On a third dimension related to the application of environmental regulations in the agricultural sector, the process of allocation and guidance of the environmental measures through “command and control approach” have been criticized (HARRISON, 1999), especially in Europe. The top-down approach used by the government to impose rules and regulations has been largely contested in the last decade because of likely low effectiveness and low efficiency in reaching the results targeted. The delivery of unilateral directives about environmental regulations from the State to the farmers and the citizens at large has been shown to have some limits in the European context. (AGRAWAL & GIBSON, 1999)

The present study dealt with the eventual possibility of designing initiatives towards first, the promotion and the development of positive externalities from agriculture in the United States, secondly, towards the collaboration of farmers and other actors around environmental issues by considering the territory at large (rather than the individual level), and thirdly, towards the creation of new contracts and new interactions with the local and governmental authorities. The study focused on this vision considering the environment and the conservation practices within the farming system.

Willingness for new forms of institutional framework within the agricultural sector

From the points discussed above and the existing deficiencies of the general schemes and environmental regulations (e.g. lack of local characteristics considerations), it can be argued that there is a need for other forms of agricultural structures, new forms of governance and new forms of collaboration between key players (e.g. farmers), associated with a likely further development of the functions of agriculture other than just food production. One of the alternatives is the combination of the agricultural system to actions oriented towards natural environment and landscape, and this, as part of a cooperation between actors concerned (e.g. environmental agencies and groups of farmers) (AMBLARD, 2011).

The structure of a cooperative offers a framework which can deal with this issue: through the existence of a common framework among its members, the sharing of marketing goods, the possible entrance of external stakeholders, and its special position vis-à-vis the government and its influence on the area and on the local consumers, and its interactions with various institutions in agriculture and environment can be more effective. Its particular position in the region and its specific legal functioning make the farmers' cooperative a model which has the potential to answer the demand for alternatives combining the preservation of the environment with the farming system.

The environmental cooperatives existing in the Netherlands are a result of the willingness for changes in the nature and implementation of the environmental regulations for farmers. The mechanism of collective action, common responsibility, and risk sharing offered by the cooperative seemed the most suitable to Dutch farmers' desires related to environment, nature, and landscape management. Besides, it was

appropriate to the implementation of a rewards system, and the elaboration of strategies among the farmers and other stakeholders.

The main point of the environmental cooperatives is the creation of an innovative institutional framework (described in the next Chapter 2).

Object of the Study

The study focused on the structure of environmental cooperatives (ECs) existing in the Netherlands. They are considered as novelties because they represent a new practice, a new insight, a new vision, and an unexpected but effective result. Novelties can be defined as “deviations from the rule” which “defy the conventional understanding” (VAN DER PLOEG, 2006, p.2). They usually promise results, but at the same time are not fully understood in the beginning. The novelty represented by ECs is a step towards a pattern of co-production. They were born in the Netherlands from the incentives of some farmers who wanted to share another vision of conservation practices and landscape and nature management with the farming system. They are still today very little developed outside the Netherlands under this form. ECs are associated as a new look at the endogenous development of agriculture (VAN DER PLOEG et al., 2006).

Cooperation is the main feature of the environmental cooperative and the basis of its functioning. Nevertheless, negative assumptions about an incompatibility between communities and resource management have often been formulated. People were indeed considered as an obstacle to an efficient and rational organization of resource use because of the goals of conservation versus the interests of local communities assumed to be in opposition (AGRAWAL & GIBSON, 1999). ECs prove that cooperation

between people who are users of the natural resources can benefit their management and conservation as well.

In brief, the object of the study was on one hand the analysis of the potential for incentives related to nature, landscape and environment in Europe versus in the U.S. As a basis, this study used the structure of EC existing in the Netherlands. On the other hand the object of the study was the analysis of the potential of cooperation between farmers and others actors at large to deal with this issue.

Historic Environmental Cooperation in the Netherlands

In the Netherlands, farmers manage wildlife and landscape through two main contractual arrangements: 1) a direct contractual arrangement established between the farmer and an entity such as a governmental agency or an environmental preservation organization, and 2) a indirect contract offered by the EC which contracts with both farmers and external entities (POLMAN, 2002). In the Netherlands, there is a tradition of farmers working together for nature and landscape management in the countryside (VAN DER PLOEG, 2001). The so-called “environmental cooperatives” were first established in the Netherlands. The type of cooperation involved in the EC consists in making the environment, nature, and the landscape as a priority in the daily functioning and management of the agricultural operations (WISKERKE, 2003). They work as traditional farmers’ cooperatives designed to help farmers in obtain inputs (seed, fertilizers) and also to obtain better prices for their products (WALZER & MERRETT, 2002). What differentiates ECs is that they integrate other functions and an environmental and/or nature dimension. It is a unique innovation in this regard.

The U.S. Context

In the U.S., environmental cooperative concepts are not as developed as it is in the Netherlands, and in some areas possibly even nonexistent. However the Conservation “Title” (section) of the U.S. Farm Bill is second in terms of USDA (United States Department of Agriculture) budget behind only wheat, soybeans and corn subsidies (USDA, 2010). This is calculated without taking into account the spending devoted to the nutrition Title (70% of the USDA spending). The Conservation Title offers several programs which aim at giving incentives to farmers to fully integrate the protection of the environment within their agricultural practices. These programs are classified according to three main categories: the land-retirement programs [i.e. the Conservation Reserve Program (CRP) and the Wetland Reserve Program (WRP)] which basically puts land out of production in exchange of a rental payment; the working land programs which help farmers implementing conservation practices on their lands; and the easements programs which purchase rights to farmers in order to implement conservation activities on the land acreages (USDA, 2002).

The U.S. produces the largest part of the world food relative to the other countries, and provided in 2006 more than \$2.2 billion (€1.63 billion) of food aid to 82 developing countries, including both emergency programs and development programs (USAID, 2006). Due to the vast investment in agricultural sector, plus the global challenges we are currently facing in the future in the form of degradation of environment, nature and changes in the global climatic conditions, there is an urgent need to create other innovative forms of agricultural production that promote environmental, natural and landscape conservation.

This research study aimed to study the application of the model of the Dutch EC in the North American setting. The study analyzed how this form of cooperation could be applicable in the U.S., considering the different political, legal, social, economic and environmental framework.

Problem Statement

Justification of the Research Study

Despite the relative success of the U.S. conservation programs, future threats exist to their successes. As U.S. conservation programs are mostly voluntary-based, the current high commodity prices are not encouraging the farmers to apply to these programs. Indeed they are not willing to put land aside from production for conservation purposes because they would get higher revenues from production rather than conservation (SULLIVAN et al., 2004). Besides, the rental payments provided by the federal government for the Conservation Reserve Programs (CRP) are not likely to be increased and the overall conservation budget will be significantly decreased in the next farm Bill (HELLERSTEIN et al., 2011). These facts reflect the importance of other forms of incentives for farmers towards conservation practices.

However, some suggestions exist to promote environmental conservation. They mainly aim to put value, or more value, on the conservation practices initiated by the farmers and on their benefits for the environment. There are, for instance, ecosystem and carbon markets (MARSHALL, 2012), and auctions which allocate payments by prioritizing the conservation incentives and by targeting the most relevant and most efficient conservation projects (CLASSEN, 2012.).

Cooperation among farmers has over the time proved its positive results as being efficient and effective in terms of farms' economic viability and its contributions to rural

development. The ECs in the Netherlands showed what is possible and profitable for the partners, to be an integral part of what is good for the environment, when the environment is considered as an essential part of the cooperative's functioning (WISKERKE, 2003; VAN DIJK, 1998, GLASBERGEN, 2000; FRANKS, 2010).

The current U.S. environmental policies can be viewed as lacking in sustainability because they often depend on external variable factors such as the prices of the commodities. What if environmental conservation considerations and practices integrated into the agricultural system came - to some extent - from the willingness and mutual motivation of the farmers and among the farmers themselves? It is likely that a form of cooperation and collaboration based more strongly on these motives, and less tied to the authorities' "control," can contribute to the sustainability of agricultural production as well as to conservation of the environment, nature, and landscape.

Research Questions

The research problems were summarized by three main research questions. First of all, the research was interested in determining the extent to which the predominant variables enabling the creation of environmental cooperatives in the Netherlands exist in the U.S., second, in the extent and how could the environmental cooperative model of the Netherlands be applicable in an U.S. setting. Thirdly, the research dealt with predicting the consequences (in the short and long-run), the benefits and the pitfalls of this form of environmental cooperative for the different actors involved and the community as a whole in the U.S.

Hypothesis

Several hypotheses were formulated out of the expected results from the U.S. analysis. First, the study assumed that in the U.S., there are similar values and interests

like the ones represented through the Dutch environmental cooperatives. Secondly, Farmers would be willing to implement this kind of structure. The current trend is an increase in preference of local or organic food and the care of the environment. Farmers would thus be willing to respond to the current demands and to contribute to environmental conservation issues by forming environmental cooperation. The study assumed then that there is a possibility, in the U.S., for facilitating the conservation practice implementations, which could likely reduce transaction costs of the U.S. farmers and other organizations. The last hypothesis concerned the obstacles and constraints to the implementation of environmental cooperatives in the U.S., which would certainly be linked to current policies (lack of means or stimulation from the farmers' environment in initiating this process), types of farms, customs etc.

Objectives

The study aimed at modeling the structure of ECs in the Netherlands in an U.S. setting. The study also aimed at analyzing the eventual implementation of this form of cooperation in the U.S., or to address the factors that would obstruct this implementation.

The specific objectives were detailed as following:

1. To study the agricultural environmental cooperation in the Netherlands and identify the variables – at the human, organizational, and policy levels - enabling the farmers to build this form of cooperation
2. To determine the predominant variables identified as factors of success of environmental cooperation towards nature and landscape management
3. To establish the “success” of this structure. This includes the economic success (the benefits of the structure for the farmers and for the functioning of the cooperative itself), the environmental success (the benefits for the environment, the effectiveness of the conservation activities towards nature), and in a larger

extent in terms of positive impacts of the environmental cooperation on the community itself (the contribution to the rural development of the area).

4. To choose an appropriate area/State in the U.S. where it would be appropriate to model this structure
5. To study and analyze the existing context in which agricultural cooperatives are functioning in the U.S. and more particularly in the selected State. The study will focus on their legislative (authorities, policies, and regulations), economical (sales, gains, importance) and social contexts, and the internal functioning of the cooperatives
6. To compare the Dutch and American social, economic and legislative contexts within which the farmers' organizations are working
7. To analyze how the predominant variables of the environmental cooperative model would match with a U.S. agricultural system in order to predict how this form of environmental cooperation is conceivable in the U.S. This specific objective could be categorized into two phases which were developed further in the later stages of the research. The first phase concerns the study of the U.S. factors which could affect the decision-making process of the farmers in implementing conservation practices through the ECs. In particular, it deals with observing whether the factors which have affected the decision of the Dutch farmers in deciding to create the ECs are present in Illinois and in which proportions. The second phase concerns the analysis of the means or the potential for developing these means in the U.S., which would enable the development of ECs and which would be likely to ensure their viability and sustainability.
8. To identify the obstacles, constraints, and negative externalities in implementing this type of cooperative model in the U.S. and suggesting way to overcome them based on the results of this research study.

Methodology

This study was descriptive research – a cross-sectional design – and targeted a sample of U.S. farmers at one point in time. Two data sets were used in this research study. Secondary data from previous studies carried out at the University of Wageningen (the Netherlands) were used to analyze the ECs existing in the Netherlands. Secondary data from previous studies and primary data were collected using questionnaires to investigate the applicability of this environmental cooperation

among farmers in the U.S. The U.S. area of investigation was the State of Illinois because of the presence of an intensive agricultural system combined with incentives towards the enhancement of connections between producers, the local population and the development of alternative food production, so a potential for new trends which could be compatible with the development of an eventual EC. The data were managed and analyzed with the Statistical Package – R.

In the analysis, predominant variables between the U.S. and the Netherlands were compared to determine the degree of feasibility of environmental cooperatives in the U.S. This consisted of correlation analysis (Linear Regression and Principal Component Analysis) and hypothesis testing.

Structure

The study gives first an overview of the Dutch environmental cooperative as it exists in the Netherlands and focuses on the relevant features which will be associated to variables during the time of investigation. The second part deals with the situation in the U.S., considering the U.S. farmers' cooperatives, the existing U.S. programs in line with the study and the other relevant factors which could explain U.S. farmers' behaviors. The third part deals with the research design of the study, the collection of the primary data in the United States, and the analysis. The fourth and last part presents the results of the investigation, interpretations, conclusions and discussion.

Chapter 2 and Chapter 3 respectively related to the Dutch and American situations are similarly structured and use the same kind of approach, from the description of the Dutch context and Dutch EC to the analysis of the U.S. setting. The purpose is to optimize the identification of the variables in the Netherlands and the analysis of their representations in the United States, and to facilitate the identification

of an eventual potential of implementation of an EC in the U.S. Particularly, they focus on descriptive elements on which theoretical backgrounds will be developed, to constitute a support for the interpretations of the results and the answers to the research questions.

CHAPTER 2
DUTCH CONTEXT SETTING – THE ENVIRONMENTAL COOPERATIVES

**Emergence of the Environmental Cooperative in the Netherlands – Reasons
Willingness for a Shift in the Pattern of the Food Production System**

The intensification and modernization of the agricultural system resulted in the increase of volumes of agricultural production, the emergence of corporations – leaders of the food supply chains -- and the need of larger available spaces in the countryside. It led little by little to a disconnection between the agricultural sector and the consumers. Besides, certain agricultural practices resulted in environmental pollution, e.g., nitrate leaching from chemical fertilizers and the spread of pesticides. Intensified agriculture is also linked to phenomena such as soil erosion, ammonia emissions, and biodiversity losses within the flora, as well as other negative externalities such as the reduction of the bees' populations. Alternatives have been sought to deal with the social and environmental consequences of the current food production system. New forms of environmentally-oriented agricultural cooperation have especially been studied. The structure of EC is an example of alternative which integrates environmental conservation practices and nature and landscape management as part of the agricultural system. It was created with a view toward re-inventing farming activities and the food production system to be closer to the consumers and the living environment, thus creating new interactions between producers and consumers. In another perspective and considering the current global challenges such as the climate change, the ECs were created to develop more sustainable forms of agricultural production.

A Structure in Line with the Concept of Rural Development

The motivation of some farmers to change the pattern of the agricultural system has been strengthened by the growing interest of governmental agricultural policies towards the concept of rural development. The definitions given to the notion of “rural development” are diverse and interpreted in different ways in Europe versus the U.S. It depends a lot on the physical, technological, economic, socio-cultural and institutional means developed in a given area which contribute to a specific vision of rural development with its own characteristics. However, qualifying “rural development” as a process that aims at improving the quality of life in the rural areas is commonly adopted by both Europe and the U.S. Non-farm activities are both a factor and a result of the rural development of an area. Farmers, by developing on-farm secondary activities beside farm management (e.g. agro-tourism) participate to increasing the economic value of their local countryside. Over time, European agricultural policies have mainly been driven by a high level of farmers’ protection through subsidies, food supply guarantees (export subsidies), and measures towards the stabilization of food prices guaranteeing consumers’ welfare. During the last decade, these measures have been supplemented by additional policies related to agricultural production and rural development. A new demand for a more sustainable agriculture and more innovative forms of the food production system at the local level emerged and resulted in the development of new institutional frameworks and other types of governances.

(WISKERKE et al., 2003)

A Wish for More Self-Regulations

Emergence of new forms of governance in Europe

In the 1980s, a movement towards the decentralization of authority developed. It was followed by divergences of EU Member States' policies with the central European authorities, and tensions related to the implementation of laws and regulation between the different levels of authority. It resulted in an attempt to reform the framework of the European governance in order to restructure the institutions, to promote a higher involvement of the citizens, and to initiate a shift in the decision making process of the institutions and in the way they relate to each other. The structures of self-organization are one of the new forms of governance which emerged from this period. (WISKERKE et al., 2003)

A feeling of inadequacy of the environmental regulations with the agricultural system

In the northern part of the Netherlands - Frisian Woodlands - the dominant type of farming used to be small-scale farming conforming more harmoniously to the landscape combined with relatively high levels of labor and high production costs. The application of general ecological and environmental regulations imposed by the government to these areas – and many places with specific features -- was then difficult. The mismatch between the local characteristics of the Dutch territory and the governmental environmental requirements was even considered as a threat for the sustainability of the local agricultural system. The creation of a structure of “environmental cooperative” was viewed as an alternative to comply with and to follow the increasing regulations related to environmental and nature conservation. ECs have therefore been created in the perspective of enabling higher compatibilities between

local agricultural practices and environmental conservation practices, higher levels of self-regulation for the farmers, and possibilities for the farmers and the other territorial actors to develop locally effective means to realize environmental objectives (GLASBERGEN, 2000). (GLASBERGEN, 2000; WISKERKE et al., 2003)

Some of the ECs work on the introduction of alternative practices to reduce nitrogen losses within the farm's cycle, and to enable a mutual monitoring between farmers concerning the improvement of nutrient balances (WISKERKE et al., 2003). The MCP (Milieucooperatie de Peel) is an environmental cooperative located in one of the most polluted areas of the Netherlands due to the presence of intensive livestock farming and greenhouse horticulture. The cooperative works on the accommodation of agriculture in the plans for protecting nature. (GLASBERGEN, 2000)

A wish for more flexibility of the environmental regulations and better understanding with the authorities

Some Dutch farmers believed that most of the governmental environmental measures were too tight, too specialized, and offered too little flexibility for adaptation. The idea of the EC was a way to allow "customized management-solutions on a localized level" (FRANKS, 2010, p.288). Besides, the farmers felt on one hand significant boundaries between their profession, desires, and approaches, and on the other hand the environmental conservation' representatives and governmental officers. The literature mentions "linguistic difficulties" because of the complex situation in which the farmers were engaged with the policy process as they were discussing with experts who are not familiar with agricultural practices. The EC was a way to improve the relationship between the different levels of actors and to increase their level of understanding. (FRANKS, 2010)

The creation of the EC provided answers mainly to a contestation against the general environmental regulations vis-à-vis the traditional and local farming practices and the features of the territory. An EC is basically an organization born from a collective human interest whose members voluntarily agree on “action-oriented projects” (GLASBERGEN, 2000).

A Willingness to Improve the Integration of Environmental Conservation Practices in the Agricultural System

From a survey carried out in 2005 on seven Dutch ECs (created between 1992 and 2004), the reasons highlighted by farmers to create an EC were concerns about the environment within the farming system and concerns about acknowledging and giving more value to the benefits of the farming practices on natural resources and the landscape. In addition, ECs were seen as a potential vehicle to involve non-farmers, to keep traditional conservation techniques, to increase the access to environmental management funds, to generate additional income streams, to increase farmers negotiating's strength, to promote cooperation between farmers around environment and landscape management, and to improve public relations and communication between interested parties. (FRANKS, 2010)

The Environmental Cooperative – Description and Purposes

History of the Environmental Cooperative

ECs were born in the Netherlands in 1992. The Vereniging Eastermar's Lânsdouwe (VEL) and the Vereniging Agrarisch Natuur en Landschapsbeheer Achtkarspelen (VANLA) were the first two cooperatives (WISKERKE et al., 2003). Their creation was part of the context of new Dutch agricultural policies that aimed at renewing rural areas. Many regional cooperative arrangements oriented towards

environmental conservation were developed during that time. The creation of an EC was supported by the grant of subsidy in 1994 for the development of the plan of action undertaken by five environmental cooperatives. In 1996, a subsidy of 19 million guilders (former Dutch currency - about USD 10.8 millions) was made available for projects related to the renewal of the countryside. In this context, other ECs projects could find ways of developing. (GLASBERGEN, 2000)

Today, there are between 150 and 200 ECs in the Netherlands (OOSTINDIE, 2009). They are spread all over the Dutch territory (DANIEL, 2012) and count in total around 10,000 members which represents approximately 10% of Dutch farmers and accounts for around 40% of Dutch agricultural land (FRANKS, 2008). The membership of an EC varies on average from 25 to 200 farmers, which gives it the status of a small organization (GLASBERGEN, 2000). Most of the member-farmers hold relatively large and full-time farms (VAN DER PLOEG et al., 2001) and most of the cooperatives include non-farmers within their membership. The largest percentage of the members are dairy farmers (like Vel&Vanla), followed by cereals (e.g. De Kop Van De NOP and Zwartemeerdijk), pork (e.g. Milieucoöperatie Pion-De Peel, 1996), and then horticulture (DANIEL, 2012).

Definition of an Environmental Cooperative

Wiskerke (2003, p.10) defines environmental co-operatives as “regional groups of agricultural entrepreneurs”. They usually also include citizens and other rural stakeholders working at a regional level such as representatives of environmental organizations, local authorities, agribusinesses companies, animal welfare groups, and educational institutes. Franks and Gloin (2007, p.473) give a more concise definition of EC; “local organizations of farmers and often non-farmers who work in close

collaboration with each other and with local, regional and national agencies to integrate nature management into farming practices by adopting a pro-active approach based on a regional perspective". This definition is explicit enough at this point of the study; its terms will be studied in a broader perspective later.

An EC is first of all a farmers' cooperative which works similarly as a sales, marketing or supply cooperative, and is ruled by a constitution which sets the legal framework. Additionally, the cooperative works at making the environment, nature and landscape a priority in the daily functioning and management of the agricultural operations through individual and collective initiatives. There is a conviction that land and nature management can be better accomplished when integrated in the farming system, and it is translated through a feeling of collective responsibility for environmental objectives set at a regional level. The other particular characteristics of the structure are the possibilities for new contracts and new interactions between local, regional and national authorities and farmers, and the transparency of the cooperative's activities. These points will be developed more fully later in this study. (WISKERKE et al., 2003)

Structure and Legal framework of Environmental Cooperatives

ECs hold one of three types of status: they are registered as Associations with the local government ("Verenigingen"), as foundations, or as legal cooperatives (ESHUIS, 2007). The members who are non-farmers have the same rights and opportunities in the management board as the member-farmers (FRANKS & GLOIN, 2007). The organization is organized around a traditional cooperative structure, with a Management board or Executive Committee consisting of a chairman, treasurer, and secretary. In the largest ECs, a Chair or Sub-committee manages contracts and members' initiatives.

Commonly, the management board meets monthly and the full membership meets twice a year (FRANKS, 2008).

Besides having a typical agricultural cooperative's structure, ECs are considered as self-governing organizations with self-governance legally recognized. Typically, members of self-governing organizations decide about future action plans by communicating their interests, results and progress with respect to the purpose of the organization. They have the duty to make transparent and to justify to society the decisions they make and activities they undertake, and they usually have to represent all stakeholders concerned with the issues discussed. The main principles the members have to comply with in order to seek legitimacy are "the principles of good and effective governance – responsibility, accountability, transparency, representativity, and accessibility" (WISKERKE et al., 2003).

As a voluntary organization, ECs' members decide for themselves whether to participate in any EC's activity. Still, individuals retain total ownership and control of their own production and business assets (e.g. land). (FRANKS, 2010)

Characteristics of Environmental Cooperative's Members

A survey carried out on six Dutch ECs revealed that the members are in general either relatively young or are older and retired, are managers of full-time farms, are interested in new approaches to the agricultural system, are formerly involved in voluntary organizations and farmers' organizations, interested in small-scale and local projects, and convinced of the interdependency between nature and farming. The EC VEL&VANLA reports that some of the members also come from disadvantaged areas, and use agricultural practices specific to distinct areas of the Netherlands. (FRANKS, 2008)

The main motivation of farmers to join an EC is reported to be the economic aspects: through the EC there is the possibility to be financially rewarded for conservation practices and nature and landscape management, thus allowing farmers to develop other sources of revenue (CROSS et al., 2007). Apart from the economic purpose, farmers' motivations are the need to find production alternatives which combine farming and environment, the perception of the farmer as a manager of the nature and landscape, the willingness to improve "farming's public image", and the willingness to develop a new form of institutional framework which promotes dialogue and co-operation between members, with other rural dwellers, and with governmental and environmental agencies. (FRANKS, 2008)

The case of the non-farmers is interesting and is variable among the ECs. Most of the ECs look at non-farmers in the membership as a source of advantages through the supply of specific skills (e.g. organizational skills, financial management, network extension etc.). Besides, non-farmers have usually more time, and, through their communications, can significantly increase the credibility of the projects with local and national governmental representatives. However, others view the non-farmers as obstacles to the development of the cooperative by weakening farmer control, especially in the period when the group is just forming (FRANKS, 2008). Many interviewees believed that ECs should offer non-farmers membership but only after an agreement by the farmers concerning the organization of the structure and the establishment of the management board, so that activities mainly reflect the views of farmers.

Purposes of the Environmental Cooperative

Combining natural environment and farm management

Farming systems are open systems to their environment from which they withdraw natural resources as inputs and release outputs after transformation or conversion (VAN HUYLENBROECK, 2011). Agricultural systems are then inextricably tied to their natural environment through perpetual transfers and exchanges of energy and materials. Appreciation of this view was being lost during the era of modernization and intensification of the agriculture -- when farming mostly focused on economic criteria. The creation of ECs had the purpose of re-integrating or more concretely acknowledging the integration of the agricultural system into its environment. ECs start from the perspective that agricultural activities can no longer be isolated from its natural environment and from the characteristics of its physical surroundings. This type of cooperative aimed therefore at re-considering the undeniable ecologic process ran by the agricultural system as part of the farm's daily decisions, and from a regional perspective. (GLASBERGEN, 2000)

Besides and further than the enhancement of the link between agriculture and nature, ECs had the purpose to increase the compatibility between these two elements, and to increase the value of the conservation action plans undertaken by local farmers. (GLASBERGEN, 2000).

Responding to a logic of sustainability

An important point about the EC is its mission of long-term development seeking the sustainability of the actions of the cooperative (GLASBERGEN, 2000). The financial rewards systems and the benefits offered by the cooperative to the farmers help to establish long-terms contracts between the members and the cooperative, and to

ensure long term environmentally-oriented projects. Moreover, the cooperative enhances the links between the farmers and other actors of the region or territory, strengthening therefore both its agriculture and rural development.

The Environmental Cooperatives, a Novelty in its Own Kind

Dutch ECs are qualified as “novelties”. The following part deals with the concept of novelty and the features identifying the novelty of ECs.

The Principle of Self-Governance

General definition and implications of self-governance

The new forms of governances which emerged in the Dutch countryside in the 1990s have characteristics of self-organization and self-regulation in the sense that their choices and activities are not dictated by authorities’ directives. Their initiative is referred to as “pro-active”. It refers to a bottom-up governance system generated by local citizens to go beyond the market but short of the state. Practically, an intervention by the government means participation in the organization as an actor among the other actors. Interactions among members are typically carried out through negotiations, informal understandings, and trust rather than by official social control. Furthermore, the co-ordination is considered to be non-hierarchical. (WISKERKE et al., 2003)

Self-governing environmental organizations have different forms in different countries. The Conservation, Amenity and Recreation Trusts (CARTs) in the United Kingdom (HODGE, 2001), the Rural Environmental Protection Schemes in Ireland (GOREMAN et al., 2001), or the Community Supporting Agriculture in the U.S. are a few examples that stand beside the case of the environmental cooperative in the Netherlands. (WISKERKE et al., 2003).

The main reported positive results of “self-governance” are an improvement in the efficiency and effectiveness of policies and public administration and an increase in the active involvement of citizens through the willingness for more open decision-making processes. Negative points concerning this form of organization are the risk of public control when the lack of authoritative supervision leads to less responsibility for performance. (WISKERKE et al., 2003)

Self-governance in the case of the environmental cooperative

Basically, the mechanism of self-governance creates an opportunity to shift more responsibility over the implementation of environmental policies to local communities. Higher possibility of choice is then given to the farmers for the strategies they decide to implement to comply with regional environmental measures. Farmers are allowed to adapt them to the characteristics and the specificities of their region or territory. (WISKERKE et al., 2003)

ECs start from the idea that farmers are able to suggest and to implement adequate answers to local and specific environmental issues. This is due to the concrete knowledge farmers have of the area. Any goals set at the regional level can be then reached more efficiently. (GLASBERGEN, 2000)

Through the collective organization of the EC, the role of the government changes substantially. Its interventions are no longer manifested via unilateral regulatory frameworks which frequently reflect a lack of knowledge of the specific characteristics of the territory and the various types of farming. Rather, interventions occur with a higher level of dialogue and consultation, as an actor among the other members of the cooperative. Consequently the role of the government and local authorities involved in agriculture is more oriented toward the coordination of the

innovations rather than in defining, implementing and controlling measures. (AGGERI, 1999)

The Integration of Environmentally-Oriented Practices as Part of the Farm Management and Business of the Cooperative

Functioning of the combination

Instead of tackling environmental problems at the level of the individual farm, the goals are set at the level of the region. This way, farmers can determine the most appropriate methods for them to contribute to the achievements of these larger goals. As the environmental plans adopted and implemented by the farmers are more adapted to their individual farming and management styles, the effectiveness of the conservation practices is increased and is likely to be more sustainable. It is worth noting that adaptation probably takes more time at the starting stage because farmers do not respond to a general rule but have to come up with their own plans. Nature management within the EC “consists mainly of agreements made with the government to maintain landscape elements in exchange for money” (GLASBERGEN, 2000, p.251). The farmers who make special contributions to the environment by doing more than others or by doing it sooner are financially rewarded at higher levels. (GLASBERGEN, 2000)

Example of project – VEL & VANLA

The nutrient management project is one of the main projects carried out by the EC Vel & Valna. It consists of field laboratories that were made possible by land offered by the government to farmers for the development of their own strategies. This project was centered on increasing nitrogen efficiency in dairy farming systems by cost effectively decreasing ammonia emissions and nitrate leaching. Deeper studies were

carried out on the farms with high nitrogen use efficiency. They concluded that to improve the nitrogen use efficiency at the farm level, the farmer needs to increase the nitrogen efficiency within the different subsystems (animal, manure, soil and fibers) as well as in the relations between these subsystems. The idea was a change in the look of the system as a whole, by making better use of the local resources available, to find a new equilibrium both ecologically and economically sustainable for the farming system. Scientists and farmers together analyzed nutrient flows and its management in the farm. The research could progress through the contribution of 60 experimental farms which implemented changes, adaptation and reflected on these latter. This research had led to a particular dynamic within the EC through the sharing of experiences among farmers and thus the creation of a learning system. (VAN DER PLOEG et al., 2006)

Within the Nutrient Management Project of Vel & Vanla, scientific research became more involved in developing novelties in the field of agriculture, and it highlighted the concept of co-production in which resources and knowledge are continuously remolded by human practices (and *vice versa*) to permanently adjust the equilibrium. The literature on this project underlines the potential of the farmers as sources of knowledge to better understand the ecosystems in their possibilities of being transformed and managed. Besides the technical knowledge, farmers know to what extent particular techniques match “in the social-material environment in which they are placed” (STUIVER et al., 2003, p.36). This project is an example of ECs as unique field laboratories for innovation towards new form of environmentally-oriented agricultural practices and sustainable rural development. (STUIVER et al., 2003)

The Link between the Environmental Cooperative and Various Stakeholders and Entities of the Territory

ECs are characterized by “new institutional relations between the state agencies and the agricultural community” and “new social networks of trust at local level” among the stakeholders of the territory (WISKERKE et al., 2003, p.19). This part deals with these two social dimensions which contribute to the environmental cooperative as a novelty.

Benefits of the collaboration between various stakeholders through the EC – theory

The strength of the ECs resides in the interaction of the organization with multiple and various actors of the territory. Indeed, the manager acting alone cannot “provide the socially optimal mix of ecologically provided goods and services” (FRANKS, 2008, p.3). In other words, at an individual level, it is difficult to cost effectively build the plan enabling the integration of environmental practices into the farming management while matching to the social context and characteristics of the given area. The ECs help overcome this issue by bringing together diverse groups of actors with various and crossed interests and skills. (FRANKS, 2008)

Integration of non-farmers in the membership of the EC

An important and unique feature of the ECs is the participation of non-farmers in the management board and functioning of the cooperative (for most of the cases). The non-farmers are for instance representatives of specialized environmental organizations, animal welfare organizations, regional and governmental authorities, and other local citizens. They have the same rights within the cooperative than the farmers. This mix contributes to the creation of strong interactions among the various people of the region or territory.

The EC and the government

One of the main roles government has played is as supporter of the ECs through, for instance, agri-environmental programs (e.g. Programma Beheer in 2000) which encouraged collective management (FRANKS, 2008).

State agencies define quantifiable policy goals for the area covered by ECs with respect to landscape, nature and environment (e.g. the maximum amount of nutrient losses allowed). The government leaves the flexibility to the ECs for the implementation of the means to reach these goals, and farmers are allowed to choose the measures and instruments they consider being the most effective in their specific circumstances. The cooperative draws action plans and negotiates them with the government; both parties agree on the contract - only valid for the farmers-members of the EC (the other farmers of the area being under the regime of state regulations). (WISKERKE et al., 2003)

The EC and the community organizations

Through common projects, various links are created with agricultural organizations, authorities, agribusiness, environmental organizations, and agricultural schools for instance. New social networks are created at the local level. (WISKERKE et al., 2003)

Agribusiness companies are a source of financial support and a source of knowledge for the ECs in terms of market opportunities (e.g. for environmentally friendly products). Research and academic institutions are also important for the development of the EC, as a source of advice and reliable science-based answers to specific problems. One example is the partnership with Wageningen Agricultural University to help with the formation of the action plans. (GLASBERGEN, 2000)

Internal Functioning and Activities of the Environmental Cooperative

The EC works as a reward system for the farmers, considering their involvement and initiatives.

Economic Management

Start-up funding

Initial funding fundamental during the start-up of the ECs comes from either the Ministry of Agriculture or the Province (e.g. in Zuid Holland), or from specialized bodies like the Water Board. Concretely, the Dutch ministry of Agriculture (MinLNV) has invested, in the early 1990s, €10,000 (about USD 12,500) in each “administrative status” environmental cooperative, and made additional financial supports of about €55,000 (about USD 69,000) available to develop ideas for technical innovation such as new spraying techniques. A further grant of the same amount helped pay environmental maintenance and landscape management. Later in 1996, a second round of grants of approximately €2 million (about USD 2.5 million) was allocated as an incentive for further research and deeper projects on better integration of farming and environmental management. Funding were also granted to Universities in exchange of their expertise and suggestions related to forms of cooperation and environmental practices. (FRANKS, 2010)

Life cooperative funding

Farmers involved in ECs are rewarded for their actions and gain extra revenue through their participation in projects aiming at implementing conservation practices within their farming system. The higher the number of a cooperative’s projects and activities the higher will be their financial gains (DE ROOIJ, 2006). A survey about Vel & Vanla calculated an average extra annual income of about €5500 (about USD 6700) per

farm resulting from the conservation activities engaged in the framework of the EC, through it is very variable from farm to farm (VAN DER PLOEG ET AL., 2001).

The funding of the ECs and the members' financial rewards are derived from agri-environmental schemes (European Union's, national, provincial), local and regional green funds (e.g. Midden Delfland), public agencies and direct supports (AMBLARD, 2011), investments by citizens (e.g. Lunters Landfonds), marketing contracts such as regional typical products and region branding, and educative projects. (OOSTINDIE, 2009)

Along the life and development of the EC, funds are mainly ensured by the activities and projects managed by the members. Besides, members pay an annual subscription. (FRANKS and al., 2007)

Activities of the Environmental Cooperative

The activities carried out by farmer-members are much diversified and are undertaken at both the individual and collective level. They can be categorized into four plans: environment and landscape maintenance, nature conservation, environmental care, and business bookkeeping (GLASBERGEN, 2000). Some examples of these activities are field margins' management (e.g. along ditches and parcels), species management (e.g. meadow birds and geese), parcel management (e.g. later mowing grassland, botanical management, set-aside for nature), landscape management (e.g. hedges, pools and ponds, planting), but also plans' drawing, contracts' organization, collaboration and meeting between members to share on management methods (OOSTINDIE, 2009).

The EC is founded on the idea of acknowledging and valuing actions towards the environment in the agricultural system. It promotes the idea that a market should be created for environmental pursuits and that farmer must be able to financially benefit

from doing something towards environmental conservation and nature and landscape management. As part of the framework of the EC, the reduction of regional environmental load carried by environmental agencies enables the development of a valuation and rewards system. (GLASBERGEN, 2000)

The activities of the EC can be roughly summarized as information sharing and advice provision, coordination of changes in agricultural practices, fund raising, and representation and lobbying (AMBLARD, 2011).

Products of the Environmental Cooperatives

ECs organize the supplies and sales of high-quality and environmentally friendly products, help at maintaining the nature and landscape, deliver environmental quality at a specified price (as existing environmental markets), and organize and manage technical aspects (e.g. storage, removal, processing, and sale of manure). In brief, ECs are the place for three types of environmental markets: “the market of organic farming, the market of the production of nature, and the environmental market” (GLASBERGEN, 2000, p. 254).

Besides, the EC is a source of advice on environmentally friendly agricultural management and on relevant and new administrative systems (GLASBERGEN, 2000). Some of the non-material products offered by the ECs are the organization of trainings about certain conservation practices, the assistance in the access and application of farmers to environmental schemes, and providing public information on innovative cooperatives (FRANKS, 2007). Each EC has its own specificities depending on the group of farmers involved, the local natural environment, and the institutional environment. Each EC contributes then in its own way to the development of the area.

Impacts and Externalities of this Form of Cooperation

Environmental Impacts

The principal long term externalities targeted by ECs concern the environment and the landscape. Dutch environmental issues caused by agricultural practices are mainly the contamination of water (infiltration in arable lands at term), the leaching of minerals (e.g. nitrates) in the soils, the emission of ammonia, the discharge of waste water, the treatment of solid waste from livestock breeding (e.g. manure) and the high consumption of energy (GLASBERGEN, 2000).

Vel & Vanla is the oldest Dutch EC and thus among the most developed ones. This study used it then as a case to obtain indications and predictions of the potential of ECs in terms of economic and environmental benefits over the time. As part of a project, Vel & Vanla's members focused on reducing the use of external inputs and on increasing the efficiency of the use of internal farm resources in order to reduce the level of environmental pollution in their farming operations. To give an idea of the environmental benefits, through their operations, this EC managed to reduce nitrogen surplus from 346 kg N/ha (about 140 kg N/acre) in 1995-96 to 269 kg N/ha (108 kg N/acre) in 1998-1999 (in line with the national policy goals set for 2003), while the reference (regional average) had gone from 371 kg N/ha (150 kg N/acre) in 1995-96 to 306 kg N/ha (124 kg N/acre) in 1998-99 (VAN DER PLOEG et al., 2001). As this example shows, the EC enabled greater efficiency in the conservation practices and positive impacts on the environment, through collective action.

It is not easy to assess the ECs' contribution to the improvement of the environment because there is no comparison studies demonstrating what would be the effects in the absence of the EC. However, ECs result in higher rate of submissions to

environmental schemes and therefore lead to a faster process of implementation (FRANKS, 2007).

Mostly, pollution resulting from agriculture practices are non-point source pollutions types (e.g. pollution from nitrates). They are very diffuse and have a high spatial variation depending on external factors such as meteorological conditions. Adaptation of environmental measures to local conditions is thus of importance for an effective reduction of water pollution. However, designing precise measures may be very costly for the public agencies, considering the need for the collection of information, processing and analysis. Relying on collective action is thus an undeniable advantage to optimize the use of farmers' knowledge about their own farming system and local environment. (AMBLARD, 2011)

Reduction of the Transaction and Operational Costs

Two of the main benefits ECs deliver to the Dutch ministry and to the farmers themselves, are significant reductions of transaction and operational costs involved in the process of conservation practices implementation. (POLMAN & PEERLINGS, 2002)

In the context of environmental policies, transaction costs include search and information costs, bargaining and contracting costs, enforcement costs, and monitoring costs (AMBLARD, 2011). The reduction of these transaction costs is achieved through the sharing of the fixed transaction costs among members (e.g. costs linked to applications to agro-environmental schemes, costs of implementation). Although the structure generates extra fixed transaction costs such as membership fees and administration costs (e.g. enforcement and monitoring costs), the overall reduction of transaction costs, compared to the situation in which farmers sign individual environmental contracts, is significant.

A survey carried out on sixty seven Dutch ECs (POLMAN, 2002) revealed that the amount of wildlife and landscape management done by farmers does not change significantly with the type of contract, whether it is via direct contract with the government or via the EC. However, the number of farmers willing to implement conservation practices and to take part in nature and landscape management is likely to be much higher in the case of EC because of the overall reduction of transaction costs. The reduction of the operational costs is also an important element resulting from the cooperative. This mainly deals with operational costs incurred by the work of specialized environmental agencies. Part of the activities and conservation plans carried out by those organizations are indeed implemented directly by the farmers-members. Meanwhile, farmers benefit from the advices and expertise of the environmental organizations, some of whose representatives are members of an EC.

VAN DER PLOEG (2001, p.227) estimates an overall cost reduction of about €315 per ha (USD127 per acre) in the farm (considering the transaction costs, state agencies' costs, and control costs), which implies an annual benefit of €4,000 for an average farm of 30 ha (USD5,000 for a farm of 74 acres)

The structure of ECs can be considered economically efficient due to the collective contract which brings together formalization, screening, and monitoring (FRANKS, 2010). It enables a better overview and more efficient implementation of the actions. Furthermore, the transaction costs' reduction enhances farmers' participation.

Stronger Bargaining Power

The EC brings together farmers with common interest around specific issues. As part of this structure, farmers find a means to concretely demonstrate their interests and to practically implement what corresponds to their beliefs. Together, the members

constitute a unity with a higher power of negotiation than there would be if the farmers acted alone. Furthermore, the government and nature organizations are more willing to deal with such an organization rather than with a single farmer because public transaction costs are also substantially reduced (POLMAN, 2002).

The authorities are more disposed to discuss and negotiate regulations with a cooperative whose farmers have previously agreed on specific issues. The cooperative is therefore a means to create new and stronger interactions between the farmers and the authorities. Moreover, members of the EC are strengthened at the regional level, which is a factor of diffusion of concrete knowledge, and a factor to highlight the environmental, historical, cultural, and social characteristics of the given region. They take on a role of representative in sharing environmental issues they solved by bringing concrete solutions. (GLASBERGEN, 2000).

Besides, ECs are supported by environmental interest groups who find through the structure a potential for more credibility with national and international authorities than would have activist groups alone. (GLASBERGEN, 2000)

“Better” Interactions with the Authorities

The involvement of various stakeholders of the territory within the EC leads to a higher level of credibility between the agricultural actors and the legislative body. Greater transparency apparent in the EC about its activities and projects creates a heightened climate of confidence between the different levels of professional actors, and especially with the authorities. (FRANKS, 2010)

Enhancement of the Rural Development of the Area

Higher involvement of farmers and other actors of the territory in projects related to environmental issues

It is reported that the structure has a real effect on the level of farmers' motivation in complying with environmental regulations and working on objectives set at a higher level. It is related to the fact that those members need to deal with environmental measures they have contributed to design, rather than externally imposed. It is directly linked to self-governance. (AMBLARD, 2011)

Through the EC as a source of knowledge and dissemination of information, there is an increase of people's engagement as citizens through networks and collective projects, an improvement of the quality of application to environmental schemes, an increase in the initiation of projects and for the creation of local monitoring. (FRANKS, 2008)

The higher involvement of people is also linked to the EC as a structure able to bring together people of similar backgrounds from a same area. They may share similar occupations, depend on the same resources, speak the same language, and belong to the same ethnic or religious group. These similarities facilitate regular interactions among group members and increase their level of understanding between each other. It assumes homogeneity among the interests and concerns of the members. This homogeneity reduces hierarchical and conflicted interactions, and promotes better resource management. It is represented within the membership of the cooperative and very much reflected outside, on the community as a whole. (AGRAWAL & GIBSON, 1999)

Contribution to rural development

The positive consequences of the EC go beyond the effects on the environment and landscape. It creates social capital through the creation of links between the local stakeholders. It also encourages to the emergence of local coordinators who bring different actors and farmers together. They are also empowered to imagine alternatives and to develop mechanisms in response to specific issues of their territory. It therefore contributes directly to the vitality of the area and the cohesion of its people. (WISKERKE et al., 2003)

From a vertical approach, the potential of the EC resides in dealing with issues/subjects in an integrated way, at the local as well as at the regional level, rather than from a fragmented approach, which appears to be less efficient in the long run. Despite the fact that the starting-up of the ECs' action plans usually takes some time, members are generally strongly oriented toward performance and willing to get concrete results in a short period of time in order to prove the success of their cooperation. The effect on the rural development of the area is then quickly visible. (GLASBERGEN, 2000)

ECs are also incentives to the diversification of farmers' incomes through the development of non-farm activities such as on-farm selling and agro-touristic activities. New patterns taken up by the farmers of the area participate in the development or improvement of the reputation of the area as a tourism destination. It encourages farmers in pursuing their efforts towards the development of the area, directly and indirectly, and meanwhile expands interactions with the tourism sector (e.g. environmental cooperatives with local tourism agencies) (VAN DER PLOEG et al., 2001). Making an area more attractive and enhancing rural development opportunities are

common driving forces in forming such cooperation. Specific drivers vary then among regions and countries. (FRANKS, 2008)

Constraints and Difficulties of the Development of the Environmental Cooperatives

Resistance from the Farmers and the Governmental Authorities

Studies carried out on Dutch ECs report the existence of a certain resistance from farmers in incorporating environmental concerns in the system of production. It is mainly due to the fact that environmental requirements in agriculture are perceived as additional costs. From the farmer perspective, there is no economic interest to adopt more environmentally sound production methods (except for the niche of ecological markets). Even for the farmers who could meet environmental costs, settling up environmental practices within their farming systems does not generate extra revenue; those are therefore often considered as not interesting enough. The structure of EC offers something more attractive in respect with these resistances.

Part of the explanation for the obstacles of environmental practices' implementation on the farm resides in the general lack of effective markets that value environmental benefits produced by farmers. Many in the agricultural sector would like to change their production methods provided that it would be economically rewarding to do so. In addition, many farmers regard stricter environmental policies as a necessity to the continuation and the sustainability of their production, and as long-term opportunities. (VAN DIJK, 1998)

According to other studies, the motivation of farmers to join an EC is differently reported. GLASBERGEN (2000) asserts that subsidies to farmers made only a limited contribution to the conservation of natural value in agrarian areas. In other words,

farmers need to be convinced by something else than financial payments to implement conservation practices. FRANKS & CROSS (2007) state that “many factors determine agri-environment participation rates, but the trade-offs between payment and management restrictions are a major one”. The study can probably conclude that the overall motivation of farmers in integrating farming conservation practices in their farming systems, and at further in taking part in an EC, depends on the area’s features, the resource specificities and the group of actors’ characteristics.

Moreover, the lack of support from governmental authorities is often reported in the Dutch case studies, especially concerning the acknowledgement of the characteristics of self-governance. The challenge resides in the mobilization of more stakeholders such as local and regional agencies in the management board and functioning of the ECs.

Difficulties to Implement the Terms of Self-Organizations

The action-plans which are put forwards by the ECs and their exemptions from the governmental rules are re-negotiated frequently with the governmental authorities. ECs had been first authorized and supported by the government under the title of “governance experiment” in the 1990s. This status has then changed and the innovative cooperatives were considered as scientific research projects, implying fewer rights for the organization and its members, and more administrative constraints. (WISKERKE et al., 2003).

A determinant aspect to the successful development of the EC is the identification of leaders able to take initiatives, inspire the other members and influence the management of the EC. Usually farmers lack the time to take this responsibility,

even if they have great potential in this position. Indeed, communication from farmers-members to potential new members is a crucial factor, in particular for the explanation of the benefits which could be achieved by ECs' members. Leadership positions within such a structure are then very important in guiding its development. (FRANKS, 2008)

Development difficulties faced by the environmental cooperative

Just like any other farmers' cooperative, the establishment of such structure requires the acquisition of infrastructure, machinery, and specific equipment and services related to conservation practices operations. This implies investment to which members partially contribute. Studies about the difficulties and concrete challenges met by the EC along its creation and development are sparse, and possibly non-existent. The study assumes that these problems and difficulties can be more easily overcome by an EC. Thanks to collective action, collaboration between members and partnerships with the government and other collaborative institutions, financial management, strategies of development, and choices of the projects and activities can be easier managed.

Long-Term Risks of the Structure for the Farms of the Area

GLASBERGEN (2000) underlines that small farms are not always able to comply with the functioning and the rules of the EC, in particular with the elaboration of the strategies and the implementation of the operations. It obviously depends on the region where the cooperative is located, but small farms can be at a risk of survival, because of lack of time, investment capacities, etc.

Besides, projects initiated as part of the ECs are often planned for the long term, therefore the presence of a plan of succession for the farm and the management plans related to the conservation practices are of importance. (GLASBERGEN, 2000)

Risks for the Internal Functioning of the Environmental Cooperative

From the perspective of the cooperative

The limit of the farmers' cooperatives are evaluated in a study of Cook (1995). The author explains that cooperatives "are not the dominant form of agribusiness in the U.S". He describes the first stage of creation of the farmers' cooperatives as, generally, a defensive reaction, usually linked to the nature of the market. The characteristic of the cooperative giving to the user/member the role of investor can be a source of problems during the life-cycle of the cooperative. These problems are described as the free rider problem, the horizon problem which affects then the investment' incentives of the members and therefore the development of the cooperative on the long term, the portfolio problem, the control problem, and the influence costs problems (c.f. the study for further details on these issues). According to Cook, the farmers' cooperative evolves in 5 stages which the last one can be fatal (because results in either "exit", "continue" or "shifting" of the organization). However, the author mentions how these problems, mainly resulting from the property rights features, can be overcome. To name a few of them, the collective action via cooperative can persevere if there is a new market "in which existing preferences are unknown", if there is the accomplishment of shared risk through relational contracts, and if "the difficult-to-exchange multidimensional goods that possess the properties of both private and public goods is efficient". This study has chosen to name those latter overcoming ways because of the likely potential of an EC to include them.

From the particular perspective of the EC

One of the risks of becoming a member of EC is the inadequate benefits in the short run. The projects are in most of the cases planned on the long run; sometimes the

measures associated can lead to short term effects which are contradictory to the ultimate purposes. Consequently, the government and the other institutions which give support to projects can lose confidence and resist granting financial supports to the environmental cooperatives. Hence the clarity and transparency of projects about the methods and the expected results over time are all critical. A second risk for the internal development of the EC lies in the degree of professionalism, perceived as insufficient in certain cases, because they are the farmers implementing the projects. Active members need an effective access to knowledge and expertise to reorient themselves, with the purpose of new operational plan linking the daily management of the farm with environmental conservation. A third risk concerns the internal accountability of the cooperative and the problem of free riders. Free-riding is at risk of emerging in cases of collective action or regarding the management of a common pool resource. This risk is explained by the fact that some of the users of the given structure or of the natural resource enjoy its benefits and services without paying anything or contributing to it. This underlines the necessity for external monitoring and auditing capable of carrying an internal control and applying sanctions when need arises. (GLASBERGEN, 2000)

The size of the cooperative is also a matter which needs to be considered to avoid long-term risks. Transaction costs are likely to increase with the size of the EC, but on the other hand, small size can be a limiting factor to attract the resources needed to “sustain collective action” (AMBLARD, 2011). It is worth noting that the bigger the EC, the higher it is likely to be fragmented into smaller groups. There is a compromise that corresponds to the heterogeneity or homogeneity of the members. High heterogeneity is a source of enrichment, but has implications such as a higher cost of bargaining.

Considering its local, overall context, and these variables, it is up to the cooperatives to find an equilibrium ensuring its viable and sustainable functioning. (AMBLARD, 2011)

Factors Influencing Success of Environmental Cooperatives

This section focuses on the main environmental, economic and social variables which enabled EC's viability in terms of cooperation, environmental conservation practices system, and community effects. A parallel with the U.S. setting was also designed to form assumptions and prepare the chapter 3 of this study. The following factors were considered to influence success of the EC:

The support and assistance from the government during the start-up of the project. This is a key factor for EC development, especially during the first years. In the Netherlands, the government offered support by granting official "governance experiments" status to the first ECs, thus provided start-up grants, and the Dutch government revised its agri-environmental program (Programma Beheer) to include options for joint submissions from EC members. (FRANKS, 2008).

For the U.S. perspective, the question is whether the Federal or State authorities would be able to support such an initiative coming from the local level. Does such support exist?

The structure of cooperative. The structure enables farmers to coordinate supply and demand in the same unit, which is a big economic advantage for the individual farmers as it reduces the transaction costs. Structure reinforces the position of individual farmers in the markets and creates a stronger cooperation between farmers. (GLASBERGEN, 2000)

For the U.S. perspective, the position of farmers in the Illinois' countryside needs to be observed. Do farmers in the U.S. in general or in Illinois who are members of a

cooperative get more involved at the global market than those who are non-members. If yes, how are the transaction costs affected?

The high level of cooperation between members. Cooperation enables farmers-members to benefit from market opportunities (e.g. promotion of regional products and creation of labels), reinforces or creates sales channels at the local and regional level, enables a high capacity of negotiating with external partners, which favors the creation of opportunities for collaboration and the credibility with governmental authorities (GLASBERGEN, 2000).

For the U.S. perspective (Illinois), the question is whether there are local products which could be developed further at the market level if better opportunities were provided. Do local farmers or organizations feel that authorities do not give them the attention they need to achieve this goal?

Self-governance. Self-governance enables a “responsive and favorable institutional environment” (WISKERKE et al., 2003). Indeed, the institutional environment and political structures significantly determine the mode of existence of rural governance. Self-governance varies from country-to-country, regions and cultures, and depends on the local norms and the mode or habit of people to participate in cooperation organizations.

For the U.S. perspective, the objective is then to analyze the significant differences with the Netherlands in terms of culture, legislation, policies, and institutions which could allow or prevent the development of a structure such as an EC. In addition, what are the levels of interaction between the cooperation organizations and the Federal authority or the State authorities?

The self-regulation. Self-regulation enables reciprocity between public and private sector, “mutual trust, legitimate representation, a trustworthy government and credible accountability” (WISKERKE et al., 2003, p.21).

For the U.S. perspective, the question is whether a change in or deviation from the general rules, policies and legislation is possible in the U.S. and especially in Illinois. What is the level of flexibility? Which criteria would be necessary in a U.S. setting to make a self-regulation framework effective? What would be the role of the other local stakeholders to contribute to the rural development?

The efficiency of the action plans through collective action. This develops the ability to respond to specific issues related to the characteristics of the environment, higher possibility of adaptation and higher efficiency to solve the problems. It also enables higher levels of trust between the actors through respect, rights of others, and appreciation of their motives.

For the U.S. perspective, analyzing the different areas of Illinois considering their differences in characteristics, environmental issues, etc., is important.

The high diffusion and sharing of information. This enables a consideration and higher awareness of the non-farmers vis-à-vis the structure of EC.

The economic viability of the environmental conservation projects and landscape management. This enables closer interactions based on trust with the authorities, a significant reduction of the public costs and the development of a system of financial rewards to the farmers.

For the U.S. perspective, it would be interesting for instance to predict the cost effects of an EC in the U.S. The limitation to this is that there are no reference case study calculations which have been done in the Netherlands

An innovative and experimental model. This enables the promotion of alternatives for the agrarian business operations by the suggestions of new perspectives and new institutional approaches for the future of the agricultural system (GLASBERGEN, 2000).

For the U.S. perspective, the objective is to analyze how farmers are sensitive to agricultural innovations, and to innovative approaches engaging interactions and collaboration with stakeholders they are not used to work with.

High transparency in the environmental cooperative's activities. This enables a regional approach and a higher feeling of confidence between the different partners.

For the U.S. perspective, the objective is to analyze whether there are factors enabling a regional (more local) approach in Illinois as far as environmental regulations are concerned (e.g. analysis of the duties and position of the county at the level of the State).

From this base, this study therefore focused on the U.S. setting in which EC could eventually evolve. The relevant variables extracted from the Dutch literature for which the representation was analyzed for the U.S. setting through the primary data collected, will be addressed in Chapter 4 about the research design of this study.

CHAPTER 3 U.S. AND ILLINOIS CONTEXT SETTING

Perspective setting

Both European and American farming systems have been highly intensified during the last decades. However, agricultural models and farming practices between both vary due to differences in space availability, resource characteristics, farmers' customs, and agricultural history. This study aimed at putting in perspective for both continents, an innovative form of farmers' cooperation and a new approach of environmental conservation practices. Chapter 3 gives an overview of the U.S. setting concerning agriculture, the existing forms of agricultural co-operations, and conservation practices and the organizations in charge of their implementation. It also introduces the study area of the research and highlights the U.S. characteristics which could be favorable to a structure similar to an EC.

Choice of the U.S. study area

Criteria of Choice

This research used both primary and secondary data. The primary data was collected in the state of Illinois in the U.S. and aimed at evaluating the applicability of the model of EC in the U.S. This state was chosen based on the predominant variables extracted from published studies of the Dutch EC (cf. Chapter 2; FRANTZ, 2007, 2008, 2011; GLASBERGEN, 2000; POLMAN, 2002; WISKERKE et al., 2003). In order to facilitate the construction of a cooperative model for the U.S. setting, the social, economic and legal environment of the region needed to have elements which seem favorable to such construction, including similar elements to the Netherlands. The research area was

therefore chosen based to its relevance in terms of its characteristics which could more likely predict the acceptance of the EC model in the U.S.

To select the research area, the study identified the following factors:

- The number of cooperatives (any kind) relative to other U.S. States
- The density of farmers' organizations and/or cooperatives; a high number would certainly reflect the willingness of farmers to collaborate and to share activities
- The topography/hydrography/landscape; a diversified landscape (streams, pools, forestlands, and fragile areas) and a variable topography (e.g. mountains) would certainly imply a stronger interest by the locals in protective measures that combine agriculture and conservation of the particular landscape and environment
- The acknowledgement of environmental issues such as soil erosion, water pollution, endangered species of fauna or flora, and deforestation - to justify conservation practices as part of the farming systems
- The importance of the agricultural sector; farming acreage, money invested by the State, and revenue share generated by a State compared with the total U.S. agriculture revenue. A high economic importance of the agriculture could lead to forms of resistance in changing the pattern of production
- The nature of the agricultural products grown; diversity - to identify the relevance of a certain type of cooperation compared to another. Farmers producing same crops would see perhaps more sense in a form of cooperation among them, through a cooperative for example. However, they could also perceive the cooperative as risky due to the existing competition existing among them
- The nature and type of the farm; owners' age, management type, location - distance between farms (if far from each other, the cooperation between farmers is challenged), farming type, e.g. conventional, organic. Different productions, forms of management, and farmers' characteristics imply different objectives and ambitions for the farmer
- The legal framework; particular incentives for environmental conservation as part of the agriculture practices
- The number of environmental organizations regulating pesticide uses, water pollution and other natural resources related issues - to give an impression of the area's general concern for environmental conservation
- The number of farmers involved in conservation measures, and the types of conservation programs they join and environmental conservation they practice.

The current study aimed at analyzing how farmers can, on the one hand, collaborate in the implementation of environmental conservation measures, and on the other hand integrate environmental conservation practices as part of their farming system. The target region had to consist of relatively large agricultural land acreage, because the study is primarily interested in agriculture and the producers. However, a small number of large farms would not facilitate cooperation. A moderate level of agricultural acreage per farm combined with a high number of farms seemed therefore a good intermediary. Figure 3-1 shows the percentage of farming lands as part of the total land area per county in the U.S. Agricultural activities are intensively performed in what is called the Corn Belt in the middle region of the U.S. The northeast section of the Corn Belt fit with the criterion large number of medium sized farms. This section includes the states of Illinois, Indiana, Wisconsin, and Iowa.

Figure 3-2 highlights the high concentration of agricultural cooperatives in Illinois, Iowa, Wisconsin, Minnesota, and North Dakota. The average revenue per cooperative is also high in these States relative to most of the other States.

Figure 3-3 highlights a high average membership per cooperative in Indiana, Illinois, Wisconsin and Iowa.

The study-area could therefore have been located in one of the four states: Illinois, Indiana, Wisconsin or Iowa. The State of Illinois was selected as the study area. The reasons of this choice are discussed below.

Justification of the Choice of Study Area – the State of Illinois

Illinois – an intensive farming type of production

Illinois is composed of 102 counties, 57.900 squared miles (or 14.5 million ha) (25th in the U.S.) of which about 80 percent is farmland, and has a population of around 12,869,000 people (ranked 5th in the U.S.) including Chicago which is the third most densely populated city in the U.S. Illinois's topography presents few variations: on average it has an altitude of 180m and though slightly higher in the South. Its hydrographic network is tracked by the confluence of the Mississippi and the Ohio Rivers, and the climate is continental with cold winters and warm summers, and characterized by well distributed annual precipitation (USDA & NASS, 2011). These factors enabled the development of an intensive agricultural system composed of soybean (second highest U.S. soybean producer, comprising 33% of total Illinois commodities sales), corn (second highest U.S. corn producer, with 40% of Illinois commodities sales), hogs, cattle and beef cows (23% of farms (Illinois' Department of Agriculture, 2013)), wheat production, and dairy products (dairy cows account for 3% of Illinois farms, (Illinois' Department of Agriculture, 2013)). Illinois has about 28 million acres of farmland and 76,000 farmers (Illinois Local and Organic Food and Farm Task Force, 2009). The average age of Illinois' farmers is 56.2 years, and 48% of farm operators consider farming as their principal occupation (USDA & NASS, 2011). Beside crop and livestock productions, Illinois is a leader in food manufacturing and meat processing, with Chicago long known as "Hog Butcher for the World". Food processing is the largest manufacturing activity in the state with more than 950 companies. As part of the agri-related industries, farm machinery and agricultural real estate also contribute to the Illinois agricultural economy. In 2009, Illinois was third in the U.S.'s agricultural

exports behind California and Iowa (USD13.6 billion (€10,1 billion), USD7,8 billion (€5,8 billion) and USD7,5 billion (€5,6 billion) respectively). (JENNINGS, 2009)

Illinois – Leader in agricultural stakeholders’ networking

Cooperative support and farming management training. The Illinois Bureau of Marketing and Promotion is in charge of increasing market access opportunities for Illinois food and agribusiness products. It participates in cooperative sponsored activities which mainly target small and medium-sized Illinois agribusiness and food processing companies. Also, the Department of Agriculture organizes workshops and deals, for instance, with manure management training for livestock producers to meet the requirements of the state’s Livestock Management Facilities Act. As is the case in the Netherlands, manure management and nutrient balance within the farm is a fundamental concern for farm management and requires a lot of attention. In the framework of an environmental cooperative, this kind of training would typically be organized by the cooperative itself, which would likely reduce the transaction costs generated by the authorities in charge. The possibility or potential of the transfer of activities from external and specialized organizations to the cooperative itself and its farmers is part of the object of the study. (JENNINGS, 2009)

Illinois – national leader in local food systems. From the total Illinois’ farmers, only several thousand produce for local markets, but the number is increasing (Illinois Local and Organic Food and Farm Task Force, 2009). With a generally industrialized agriculture, it is a national leader in the delivery of vast quantities of low-cost commodities into the global food system thanks to a focus on the benefits from growing their own Illinois farm-and-food economy (Illinois Local and Organic Food and Farm Task Force, 2009). Nevertheless, the State of Illinois is the U.S. Midwest leader in local

and organic food and fiber production (ERS-USDA), and there are strong incentives towards local food and short food supply chain strategies, and connections between producers and consumers. This suggests a willingness from the actors involved in the food production to collaborate. To name a few of these incentives, Illinois House Bill 3990 established a local food, farms, and jobs committee in charge of developing alternatives to get more fresh food “into homes and schools for Cairo (extreme south) to Chicago (in the north)”, and the Department of Agriculture established the first of its kind “Community Garden Program” which helps promote farmers’ markets statewide. Furthermore, the Illinois Local and Organic Food and Farm Task Force was established in 2007 by the Food, Farm, and Jobs Act of 2007. It has the responsibility to develop policies and funding recommendations concerning the development of an Illinois’ local and organic food system, including an increase in locally grown food and local organic food production. It promotes farmers’ markets, has an organic cost share program, and developed marketing strategies (JENNINGS, 2009). The latter initiative -- at the State level -- reflects a feeling of territorial identity and identification with to a certain image of the area, an image of local food production which can be marketed. This element is fundamental for the present study.

The presence of a typical U.S. intensive farming system combined with the development of local incentives towards local food productions and consumption, and closer connections between farmers and producers made this State a very interesting area for the present study. Illinois is a place with many innovative projects, indicating the potential for a shift in the pattern of the food production system towards more sustainable forms of food productions.

Presence of environmental issues and natural resource damage

Illinois' agricultural resource characteristics. Illinois is characterized by very fertile soils; some talk about "some of the most productive soils in the world" (ASWCD, 2013). Soil scientists estimate that nearly 90 percent of Illinois' farm ground merits the highest level classification "prime farmland" because of the uncommon combination of soil types and fertility, climate and rainfall (Illinois Local and Organic Food and Farm Task Force, 2009). Apart from the soil resources, the hydrographic includes the Mississippi, Illinois, and Rock Rivers, and Lake Michigan. There are also a large number of small lakes throughout the state. Timberlands (about 10% of the Illinois land cover), minerals - petroleum, lead, fluorite and coal are the other important natural resources of Illinois.

Illinois' natural resources risks. Because of the particular climate including periods of extremely hot and dry weather, Illinois' land cover is the object of deterioration which affect crops' conditions. Illinois' high soil fertility is endangered by the very intensive agricultural system. The main environmental issues caused by agricultural practices are nutrient leaching, soil erosion, and biodiversity reduction. Figures 3-4 and 3-5 illustrate the impact of agriculture on the Illinois territory, affecting the natural resources in the long term. These figures give an idea of the likely areas of high levels of nitrate and pesticide leaching. Figure 6 gives a representation of the distribution of the farms over Illinois according to their size (in annual sales). One of the assumptions of the study was that the smaller farmers would be more willing to accept an environmental cooperative, as compared to the biggest ones (cf. Chapter 1). This assumption was tested via the application of statistical models. From the three previous figures, Figure 3-7 (based on figures 3-4, 3-5, and 3-6) highlights the likely correlations

between the location of Illinois's biggest farms and the highest levels of pesticide and nitrate leaching found in Illinois. The large east – middle area corresponds to the most intensive area of Illinois in terms of agricultural production.

In Illinois, the relative high levels of environmental damages and future threats to the quality of the natural resources and landscape, which are partially the result of the agriculture system, imply a strong focus on the elaboration of environmental restoration and conservation strategies. They also imply perhaps the reconsideration of existing conservation programs in order to make them more appropriate regarding the current environmental damages. Innovative forms of conservation through a new approach in the institutional framework could be very much welcomed.

Farmers' Cooperation in the U.S. and Incentives

There are different kinds of cooperation among farmers. The legal status of the cooperative is the most common one. This section deals therefore mainly with an overview of the agricultural cooperatives in the U.S. Farmers' cooperatives are of importance in this study. Since the Dutch EC is above all a farmers' cooperative, U.S. cooperatives were the object of analysis because of the possibility of an eventual reorientation of their strategies towards the integration of environmentally-oriented and collective projects. This section aims at characterizing the legal, economic and social setting of U.S. cooperatives into which they operate in order to attempt an evaluation of the suitability of the EC framework and strategies to Illinois's farmers' interests and desires.

Agricultural Cooperatives – Definition and Status

The first American cooperative was established in 1752 in Philadelphia. A cooperative is defined as an independent business entity serving “the needs of the

collective membership, customer base, employees or other user group” (THE NATIONAL COOPERATIVE MONTH PLANNING COMMITTEE, 2005).

“Cooperatives are businesses owned and controlled by the people who use them” (NCFC, 2010). The cooperative’s structure differs from other businesses because they are member-owned and operate for the mutual benefit of members, with earnings returned on an investment basis. Farmer cooperatives are governed by a board of directors elected by their farmer members - generally based on one member one vote, rather than on the basis of shares or percent ownership as in other types of businesses (NCFC, 2010). The status of the farmers’ cooperatives in the United States is therefore similar to Dutch ones.

A survey carried out by the U.S. Department of Agriculture (USDA) identifies cooperatives by four major criteria: 1) the limitation of the membership to “persons producing agricultural and aquacultural products and to associations of such producers”; 2) the limitation of the cooperative members “to one vote regardless of the amount of stock or membership capital owned”; 3) the limitation of the business conducted with non-members which has to be lower than the value of business conducted with members; and 4) the functioning of the cooperative operating “for the mutual interest of members by providing member benefits on the basis of patronage” (PENN & EVERSULL, 2011).

One of the specific characteristics of cooperatives’ businesses is their need to operate by continually adapting to the economic and social environment, and evolving to meet members’ needs (THE NATIONAL COOPERATIVE MONTH PLANNING COMMITTEE, 2005). Cooperatives are usually formed in an unfavorable economic context in which

the market cannot provide goods or services at affordable prices and acceptable quality. Cooperatives are then a means to strengthen the bargaining power of the members, maintaining the access to competitive markets, offering cheaper inputs and services and new market opportunities, reducing costs, improving income opportunities, and managing risks (NCFC, 2013). The development of cooperative arrangements over the last century mainly reflected a desire to raise farm incomes. The structure follows seven internationally recognized principles: “voluntary and open membership; democratic member control; member economic participation; autonomy and independence; education, training and information-sharing; cooperation among cooperatives, concern for community” (THE NATIONAL COOPERATIVE MONTH PLANNING COMMITTEE, 2005). Farmers’ Cooperatives are granted certain legal protection and tax benefits that their competitors or investor-owned agribusinesses may not always have access to (HOUSE COMMITTEE ON AGRICULTURE, 2004).

U.S. rural areas are much more differentiated and at a greater distance from urban agglomerations. European rural areas tend to be closer and more integrated with cities. Space availability is greater and the population density is lower in the U.S. The differences between the continents perhaps explains why rural America is characterized by individual initiative and self-reliance as part of the U.S. culture and character (NCFC, 2013). The natural characteristics of the territory and the historical population dynamics impacts the way people work and collaborate together, especially in agriculture. On the one hand, U.S. farmers would tend to have a higher spirit of working together as they are far from the decision centers and the urban poles. On the other hand, owning large

parcels of land can lead to a stronger feeling of competition with neighboring farm, which can negatively affect cooperation.

Importance of Farmers' Cooperatives - Statistical Data

In the United States

There are over 40,000 cooperatives in the U.S., whose members represent around 100 million American people (HERMANN, 2003). These include cooperatives pertaining to agriculture, to child care, to credit, health care, housing, insurance, telephone, and electricity (NCFC, 2010). There are about 2,500 U.S. agricultural cooperatives (farmer, rancher, and fishery) that market 30% of U.S. farm commodities (HOUSE COMMITTEE ON AGRICULTURE, 2004). Marketing cooperatives comprise half of the agricultural cooperatives, (PENN & EVERSULL, 2011) although there are supply cooperatives (manufacture, sale and distribute farm outputs, inputs, and energy-related products), bargaining cooperatives (help farmers obtain reasonable prices for their products), and credit cooperatives. The latter are banks and associations of the cooperative Farm Credit System which provide farmers with a competitive source of credit and other financial services (NCFC, website). Grain supply cooperatives constitute of 66% of U.S. farmers' cooperatives, while 19% are oilseed supply cooperatives. Dairy cooperative memberships accounted for 2% of the total U.S. farmers' cooperatives and 19% of the all cooperatives' net business volume in 2010 (PENN & EVERSULL, 2011). The number of farmers' cooperatives has declined by 25% in the past decade while the net business volume of cooperatives has increased (HOUSE COMMITTEE ON AGRICULTURE, 2004). This correlates to the decreasing number of farms in the U.S. (PENN & EVERSULL, 2011). This is especially visible in the dairy sector: from 1973-2002 the number of dairy cooperatives decreased by almost 70%, while their

share of total milk sales increased from 80% (HANSEN, 2009). This increasing market share for dairy cooperatives exists in both the U.S. and the EU-15 in recent decades. The cooperatives' total membership was about 2.2 million in the U.S. in 2010 (4000 more than in 2009) of which 715,000 were members of marketing cooperative (KENKEL et al., 2011). U.S. cooperatives employ full-time, part-time and seasonal employees, therefore not only farmers but also other employees are important to the functioning of the cooperative.

According to FLORY (2004), Board member of the Farm Credit Association, U.S. farmers' cooperatives have played a "crucial role in making agriculture prosperous, productive and efficient". They enabled farmers to increase their revenues, and to reduce their costs for supplies and business services. Cooperatives have been an effective economic development tool to meet challenges of market failure linked to deficiencies in the system of providing goods and services (FOLSOM, 2003).

In Illinois

The State of Illinois hosts 74 marketing cooperatives and 45 supply and service cooperatives (PENN & EVERSULL, 2011). Illinois farmers' cooperatives count in total 127,500 members and run a net business volume of USD10,6 Billion (€7,85 Billion). One of the uniqueness of Illinois is the high presence of Community Supported Agriculture (CSA) which contributes to Illinois being referred as a leader in local food production and consumption (see Figure 3-8). CSAs are in the core of short food supply chain and contribute to the formation of local network within the community and the region. Besides, these initiatives raise people's awareness about environmental issues and systems of food production. Generally, through CSAs, consumers get to know where and how the food products are produced. Consumers are consequently more

interested in production issues and externalities (positive and negative) resulting from farming. (DE MUTH, 1993)

U.S. Federal Organizations and Programs Supporting Farmers' Cooperatives

For the purposes of this study, providing an overview of the different organizations which support U.S. farmers' cooperatives is important, as these organizations shape the context into which agricultural cooperatives operate and evolve. Cooperative businesses became part of the mission of the USDA's Cooperative Extension Service in 1926. In 1993 National Institute of Food and Agriculture (NIFA; formerly CSREES) was created, which includes a branch organization of Regional Research and Extension Committee for cooperatives (KENKEL et al., 2011). Before the USDA Reorganization Act of 1994, the Agricultural Cooperative Service was a separate agency aiming at encouraging and promoting cooperative initiatives from farmers. It has been recombined today into the Rural Business Cooperative Service (HOUSE COMMITTEE ON AGRICULTURE, 2004). This service is in charge of providing assistance in terms of management and education, and works with cooperative leaders and Federal and State agencies to improve the organization, leadership, operations and development of cooperatives. It gives incentives and assistance to rural farmers for the development of cooperative organizations, and advises rural residents "on developing existing resources through cooperative action to enhance rural living" (USDA, 2004, p.48). These federal organizations are the main dealers in the setting of institutional framework of the U.S. agricultural cooperatives. In addition, the Farm Credit System (cooperatively-owned) helps farmers, ranchers and their cooperatives have a competitive way to finance their operations by providing loans, leases to farmers, ranchers, agricultural cooperatives mainly. The system has been created in 1916 to

provide a source of credit to the U.S. farmers and ranchers. It provides today more than one-third of the credit needed by those who live and work in rural areas of the U.S. (Farm Credit System, 2013).

The USDA Rural Development's Cooperative Programs (CP), the Farm Credit Bank, the Rural Business Opportunity grants and the Rural Business Enterprise grant are Federal programs supporting U.S. farmers' cooperatives.

Adaptation of the Traditional Cooperative to a New Environment

During the last decade, U.S. agricultural cooperatives have been changing significantly in terms of focus, purpose, and composition. One of the causes is the increased foreign competition in agricultural commodities, which has led thinner profit margins for the producers. In response, cooperatives have moved towards value added products and "away from bulk commodity marketing" (HOUSE COMMITTEE ON AGRICULTURE, 2004). This shift is associated with a call for more non-producer investors.

Producers mainly look at the cooperative as a better way to compete with large and monopolistic global food producing corporations. The current challenges and the restructuring of U.S. agriculture (the trend toward larger farms combined with a diminution of their number, similar to the European situation) demand adaptations and changes in farmers' co-operations. U.S. cooperatives are also buying inputs from larger, fewer and more sophisticated companies. To cope with this, U.S. rural development programs have put the cooperative model as a top priority to assisting farmers and ranchers in this increasingly competitive environment. (HOUSE COMMITTEE ON AGRICULTURE, 2004)

In the Northeastern U.S., a significant increase in the number of small-scale fruit and vegetable cooperatives (sales above \$10 million (€7,40 million)) has been observed

in the last decades. It was induced by a growing demand for high-quality fresh and processed products and farmers' needs to find alternative markets. This was coupled with the growing interest of local agencies and non-governmental organizations in the development of innovative agricultural opportunities. A rise in small-scale grower cooperatives is related to the growth of consumption; total vegetable consumption increased 28.0 percent from 1976 to 2000 (from 359.2 pounds (162.9 kg) per capita to 459.8 (208.6 kg)). However, relative to this trend, little public policy has focused on cooperatives in meeting the growing demand for fresh, high-quality fruits and vegetables. (HILCHEY et al., 2006)

Farmers' cooperatives are a potential and an effective alternative to meet the new U.S. -- and more specifically Illinois -- emerging pattern of food consumption and food production. Furthermore, the model of ECs offers the potential to combine it with greater care about the environment and thus to deal with the current global challenges associated with the environment. The current study considers the fact that a context/environment conducive to local food productions is also a conducive environment for environmental practices incorporated into the farming system. First of all, local food production reduces the energy consumption used as part of the goods transports, and reduces as well a part of the waste of products (due to spoilage, etc.) which is inevitable during the process of importation from one place to another. Furthermore, people who are interested in buying and consuming "local products" tend to be interested in how the food products are produced. According to a survey conducted in Rhode Island (U.S.), the reasons mentioned by the consumers of this State to buy locally are after the "quality and freshness" (from a consumers' survey):

“lower environmental impacts”, “support small business”, “help local economy” (ROHEIM, 2007). Furthermore, buying local products may be associated with an awareness of the economic impact of these purchases on the community and rural development of the area.

Farmers’ Cooperatives - A Potential to Simulate the Economic Development of U.S. Rural Areas and Communities

Impact of farmers’ cooperative on the community

In July 2011 the U.S. Senate declared the year 2012 as the “International Year of Cooperatives (IYC).” The purpose was to recognize the benefits cooperatives deliver to their communities, and to highlight the role of agricultural cooperatives in giving farmers an ownership in the food and agriculture system from the farm to the grocery store (NCFC, 2012). The U.S. Congress also recognized, in a report entitled “Cooperatives and Rural Development, 1989”, the role cooperatives played in economic and rural development. Beyond helping producers compete in the marketplace, farmers’ cooperatives also help contribute to the economic well-being of certain rural areas and help meet community needs (NCFC, 2012). U.S. farmer co-operatives are considered as “the economic lifeblood of many rural communities” by providing jobs to 250,000 Americans, strengthening the agricultural economy, promoting interactions and cooperation among local farmers, and improving rural areas’ conditions. Cooperatives enable the reinvestment of the money earned through it not only in the agricultural production system, but also in the community itself (HOUSE COMMITTEE ON AGRICULTURE, 2004). The impact of cooperatives in the community and region has been assessed through a case study approach related to fiscal and employment impacts and annual sales which resulted from the cooperative’s business, access to goods, changes in

communication, education, leadership capacity, and also environmental concerns (FOLSOM, 2003). The results of that survey highlighted the value of locally owned businesses, including cooperatives which have an economic effect on the area (revenue) and on direct and indirect employment. The structure of cooperative is indeed able to foster the social capital of an area by providing “a context for people to interact around a common interest” (WALZER & MERRETT, 2002). Besides the economic and social impacts of the cooperatives, these structures are among the biggest financial supporters of departments of agricultural economics in the U.S. with more than USD20 million (€15 million) invested in scholarships, faculty, research and other endowments (KENKEL et al., 2011).

New generation cooperatives (NGCs)

Losses of jobs in certain rural towns combined with the prevalence of small farms which have difficulties facing for example competition increasing inputs' prices, explain why rural farmers look for off-farms jobs for extra revenue. There is a need to revitalize many U.S. rural communities and economies. To do so, the development of food processing or manufacturing plants is seen as an alternative to focusing on local development strategies solely based on the agriculture sector. So-called “New generation Cooperatives” are structures emerging from local initiatives and which were created in the U.S. in the 1990s. These are opportunities for incorporating agriculture into broader local economic development initiatives. The NGCs are defined as “cooperative business ventures in which producers invest in a local commodity processing business with the hopes of receiving a higher price for their products and a dividend from the additional value generated in the processing stages” (WALZER & MERRETT, 2002, p.2). They are owned by the producers but generate employment also

for non-farmers. The main challenges NGCs deal with are the identification of markets, the development of an efficient production process and marketing of outputs. A study conducted on U.S. NGCs revealed facts which are interesting in the context of the present study. Most of the NGCs studied were located in the Middle-North of the U.S. The NGCs' representatives were asked in particular about who initiated the first discussions to the development of the NGC. Among the respondents, 63% reported that those were farmers mostly because of an unfavorable economic context. According to the study (WALZER & MERRETT, 2002), the initiation of the NGCs came mainly from the agriculture sector rather than from local development groups who seemed more interested in traditional business and manufacturing than in food processing. One of the main observations was that farmers prioritize their financial security as do other business owners (and they are able to enhance it through the NGC's membership), but most of the farmers were also interested in promoting local economic expansion through non-traditional means.

ECs hold many of the same characteristics of New Generation Cooperatives to the extent that ECs also aim at developing farmers – members' initiatives related to the marketing of regional products, and the promotion of a nontraditional processing and other practices. Also, ECs and NGCs share many common purposes and challenges. The NGCs are innovative U.S. forms of co-operations between farmers; they therefore can be characterized as novelties.

Farmers' cooperatives contribute highly to the economic strength of the rural areas in the U.S. (similar to Europe). In the context of this study, these assessments and evaluations about the potential of farmers' cooperatives (especially NGCs)

becoming more like ECs are important. The level of social network in any cooperative is likely to be based in part on mutual trust and confidence, which diminishes the need for control and monitoring within the projects and between the different partners concerned. Furthermore, members of traditional cooperatives and NGCs could develop an interest in further cooperation around environmentally-oriented projects in order, for instance, to make their region more attractive and to develop the local economy.

Weaknesses and Challenges of the U.S. Cooperatives

Despite the crucial position of farmers' cooperatives in the U.S. agricultural economic environment, they face a variety of challenges and issues. According to a study which used interviews of U.S. cooperative managers, farmers' cooperatives are affected by external factors such as the volatility of the commodity and input markets (hence the need for strong risk management strategies), changes in consumer preferences, global competition, and regulations at all levels. Internal factors challenging agricultural cooperatives included the need for effective strategic planning (issue mentioned by 90% of the cooperative leaders), the alignment of managers' and employee' incentives with members' interests, and cooperation with other cooperatives. In particular, governance is mentioned as an important challenge for U.S. cooperatives. The main aspects of governance perceived as a challenge by U.S. agricultural cooperatives are the identification of leaders holding an "essential mix of skills" and the type and degree of involvement of the members within the cooperative and the board. Other governance issues are related to the performance of the board of directors and the involvement of non-farmers (a recent development in U.S. agricultural cooperatives). Finally, communication is mentioned as challenging for the success of a cooperative. Part of communication implicates members' level of education which

influences their participation in decision-making (management), reaching young producers and new employees, and improving public understanding of the cooperative business model. Successful supply chain partnerships and supporting networks was also highlighted as challenges. (KENKEL & PARK, 2011)

The points highlighted above were partially mentioned in the case of the Dutch EC. However, economics was not the main reason for the creation of ECs in the Netherlands. The EC was viewed as a means - through another type of institutional approach - to face the different issues more easily (e.g. application process to environmental schemes), that is, with more transparency and with a stronger and larger territorial network (especially inclusion of non-farmers). One question at this point is whether some of the challenges facing U.S. cooperatives (e.g. external communication, partnership creation, and influence by variations of the market) could be better faced if the framework of an EC were adopted.

Incentives towards Farmers' Environmental Practices in the U.S.

U.S. Conservation Programs and Institutions in Charge of their Implementation

Environmental issues in agriculture such as related to nonpoint sources of pollution make regulation and monitoring difficult. This is why the U.S. Environmental Protection Agency (EPA) and USDA rely mainly on voluntary incentive programs to address environmental issues. A range of more than twenty environmental protection and conservation programs is offered to U.S. farmers and other landowners. An overview of the main current programs (based on the 2008 U.S. Farm Bill) is presented in this section. Land retirement programs capture the largest share of U.S. conservation spending (46%), knowing that U.S. farm Bill conservation programs had a budget of about USD2.749 million (€22.03 million) in Fiscal Year 2010 (USDA, past 2010).

Funding for working-land programs stood at about 35% of the total budget allocated to conservation programs. (USDA, 2011)

Land retirement programs

The conservation reserve program (CRP). The CRP is the largest voluntary public–private partnership for conservation and habitat protection (annual budget of nearly \$2 billion (€1.48 billion)). Participants enroll in a contract up to 10 years (renewable) to take a certain part of their acreage out of production in exchange of annual rental payments and cost-share assistance from the government. This program targets highly erodible or environmentally sensitive lands. Most of the landowners carrying out CRP conservation practices receive a 50% cost-share, on top of which can be added payments from local authorities. Rental payments vary among States according to the type of soil. Common CRP practices are the establishment of permanent grasses and legumes, permanent wildlife habitat, field windbreak, tree planting, and restoration of wetland conditions. In 2009 the enrollment was about 33.6 million acres (13.6 million ha) (over 8% of all U.S. cropland). The CRP program is one of the most effective and efficient program in terms of restoration of the wildlife habitats and preservation of the fauna and flora. (FERRIS & SIIKAMAKI, 2009)

The Wetland Reserve Program (WRP). The WRP is functioning similarly to the CRP but targets conservation on wetlands by providing technical and financial assistance to farmers. About 80% of WRP easements are permanent and 3 million acres (1.2 million ha) are enrolled; they are mainly farmed wetlands and lands that were previously converted from wetlands. (NACD, 2007)

The Voluntary Public Access and Habitat Incentives Program (VPA-HIP). This program, launched in 2010, provides grants to States to encourage owners of farm,

ranch, and forest - lands to make land available for public access (contracts leases up to 5 years). It includes natural recreation area, hunting or fishing areas.

Working-land programs

The Environmental Quality Incentives Program (EQIP). EQIP provides technical assistance (e.g. engineering design, management plan) and financial assistance (to offset the costs associated with the installation, the materials and the income losses) to farmers who install or manage conservation practices on land in production. It can deal with nutrient management, conservation tillage, and fences to exclude livestock from streams (USDA, 2011). Other more specific programs deal with energy management plans or organic production transition.

The Conservation Stewardship Program (CSP). Created by Congress in 2008, the CSP encourages landowners to improve their conservation performance by adopting additional activities, and managing existing activities on agricultural land (cropland, pastureland, rangeland are eligible) and nonindustrial private forest land. Lands enrolled in CRP, WRP or Grassland Reserve Program are not eligible for CSP payments.

The Wildlife Habitat Incentives Program (WHIP) (2009). WHIP aims at developing or improving high quality habitat to maintain the fish and wildlife populations. The Natural Resource Conservation Service provides assistance to landowners to help develop likely areas on their property for endangered species of animals and flora (such as upland and wetland). Landowners apply for entering given lands into WHIP by suggesting a plan of operation – this is the basis of a cost-share agreement. The WHIP program has proven its efficiency by targeting wildlife habitat projects on all lands and aquatic areas. It is often the program chosen by the landowners who are unable to meet

the specific eligibility requirements of other USDA conservation programs. (NRCS, USDA, 2011)

The Cooperative Conservation Partnership Initiative Program (CCPI). This program is a complement to major conservation programs such as EQIP, CSP and WHIP. Under CCPI, the NRCS enters into partnership agreements with eligible entities (states, tribes, producers' associations, and farmers' cooperatives) that want to enhance conservation outcomes on agricultural and nonindustrial private forest lands. The main mission is to encourage producers to cooperate in meeting environmental regulations, by implementing conservation practices and promoting the development of innovative conservation methods. (USDA, 2011)

Agricultural land preservation programs – easements programs

The farm and ranch lands protection program. This program purchases rights to certain land uses (through conservation easements) such as housing and other developments in order to maintain land in agricultural use.

The Grassland Reserve Program (GRP). The GRP aims at restoring and enhancing grassland, including rangeland and pastureland.

The healthy forest reserve program. This program assists landowners in restoring and enhancing forestland resources on private land.

Common points of the U.S. conservation programs

Candidates for government-backed conservation programs need to comply with eligibility criteria to be able to apply. These programs often involve long-term contracts due to the type of issue targeted; environmental benefits of the measures require time before being visible. Orders of priority are also established in funding the projects. They are based on an Environmental Benefits Index (EBI) (Soil & Water Conservation Society

and Environmental Defense Fund, 2008), on locally identified natural resource needs, and on its consistency with state and national objectives. Different evaluation methods are used within the easement programs, like the appraisal method to determine the Fair Market Value in the case of the rental payments of the CRP.

Means of analysis of conservation programs' effectiveness

Three main agencies deal with the regulations, the implementation, and the examination of the outcomes of the policies. The Farm Service Agency (USDA) develops indicators to determine the payment amounts, such as soil rental rates in the case of the CRP. Some are critical about payment calculation methods and updates (HARDEN, 2012). The Commodity Credit Cooperation is in charge of calculating counties' averages on other parameters. The Economic Research Service (ERS) examines the economic effects of farm programs on producers, consumers, taxpayers, and rural communities, analyses alternatives, and compares new and previous Farm Bills vis-à-vis certain measures. Trade-offs between different programs are also analyzed.

Illinois Environmental Conservation Incentives (Programs and Organizations)

Illinois environmental preservation incentives

The main environmental conservation programs which are relatively specific to the State of Illinois are the Illinois Recreational Access Program (IRAP), the Mud to Parks (M2P), and the Partners for Conservation (PFC) (Illinois' Department of Natural Resources).

One of the problems facing the Illinois' Department of Natural Resources is the provision of public recreational access and outdoor opportunities. IRAP uses USDA funding to compensate landowners for allowing public access for certain types of recreation including fishing, hunting, bird watching, and outdoor photography. It helps

connect families to the land and outdoor opportunities. It is extended to private lands through payments to eligible landowners who agree up to a three-year lease for the IRAP activities.

The Illinois Mud to Parks Program (M2P) aims at taking river mud and returning the dried mud (as soil) to the land. It was created in the late 1990's to address the problem of sedimentation affecting Illinois' rivers, by removing the sediment and reusing it for parks and wildlife habitats. Soil eroded from rural and urban areas settles out in rivers, wetlands, detention basins, and lakes, which leads to a reduction of water storage capacity and navigability, and a destruction of the habitats. This program attempts to find beneficial and innovative uses for sediments, and provides financial assistance for related projects (e.g. reuse of sediment as landscaping materials, soil amendments, construction fill).

The Illinois' Department of Natural resources (2013) acknowledges Illinois's challenges in managing its natural resources and preserving and enhancing biological resources "in a landscape that is 90 percent privately owned with more than 75 percent of the state in farmland". The PFC Program aims are bringing together entities to find solutions. It deals with an ecosystem-based management, and the enhancement of conservation strategies that match to ecosystems' scales, and involves private landowners unlike the traditional focus on areas owned by public agencies and dedicated to public recreation. This program is based on incentives rather than government regulations. It aims at enhancing locally-organized efforts, the incorporation of the interests and participation of local communities, and of private, public and corporate landowners. (Illinois' Department of Natural Resources, 2013).

Illinois conservation organizations

Various organizations deal with the management and the conservation of natural resources in Illinois. The ones presented in this section are the most relevant ones in the context of this study, considering their functions, impacts, and the interactions among the various act.

The Illinois Bureau of Land and Water resources (BLWR). The BLWR is in charge of implementing the Department's natural resource conservation programs, including the Erosion and Sediment Control Program, the Soil and Water Conservation Districts Grants-In-Aid Program, the Partners for Conservation Fund Program (PFC - formerly the Conservation-2000 Program), the Farmland Protection Program and the Mined Land Reclamation Program. (Illinois' Department of Agriculture and BLWR, 2010)

The Illinois environmental protection agency (IEPA). Just as at the U.S. level, the IEPA deals with the environmental quality of the State, with the objective of protecting health and well-being. The agency mostly addresses environmental damages which result from point source pollution from businesses or industries. Three bureaus comprise the IEPA: the bureau of air, the bureau of water and the bureau of land. The organization develops for instance programs for complying with the U.S. Clean Air Act Amendments, addresses hazardous waste management, deals with water quality, with pollution prevention, and develops environmental planning. (IEPA, 2013)

One of the branches of the Illinois EPA is the Office of Community Relations (OCR) oriented toward the interaction and the diffusion of information to the public. This office is in charge of the explanation of the environmental laws and regulations to the public, the evaluation of citizens' environmental complaints, dealing with environmental groups and local officials, organization of public meetings, organization of activities to

raise people awareness about environmental issues, and with sending technical staff into the field to meet with the community and local officials. One of the main roles of the EPA's OCR is to fulfill the public participation requirements for the Illinois EPA programs, such as air, water and land pollution control permit section, and Watershed Management Program. The main objective is to encourage and facilitate communication between Illinois' citizens and the IEPA authority. More particularly, OCR ensures the reception of accurate information and gives people the chance to provide inputs on environmental decisions; OCR fosters communication between technical staff and the community, and they help overcome obstacles to the implementation of Agency programs. (IEPA, 2011)

IEPA serves then as a link and intermediary between farmers and governmental or state organizations by interacting with both sides. Unlike an environmental cooperative, where there is integration of these different entities into the same unit IEPA incurs considerable transaction costs. An environmental cooperative offers a place of common discussions and potential for negotiations with the authorities. Individual cases can be taken into account. With the IEPA, individual farmers' voices do not have the same weight in the decisions, and there is a higher probability that an individual's particular situation is not considered.

The conservation technology information center (CTIC). The CTIC promotes experiences of conservation practices in certain areas of the U.S. No-till and conservation buffers have for example proved to be an efficient tool for the reduction of soil erosion, the protection of the ground surface, groundwater, and the provision of wildlife habitats. These practices have especially been effective in the North Central

region of the U.S. including the states of Illinois, Iowa, and Wisconsin because of the high fertility of their soils and consequently the potential of erosion. The National Conservation Buffer Initiative reported nationwide 1.2 million miles of conservation buffers installed through April 2002. Half of those miles were enrolled in the CRP or CREP. (CTIC, 2002)

The main difficulty for the implementation of any of the environmental practices described above - associated with novelties - is raising farmers' interest in doing it. Convincing growers of their economic and environmental benefits often requires one-on-one communication. It is maintained here that ECs offer a framework for this communication, enabling faster diffusion of necessary information and offering the means to implement those new practices more efficiently. This is due to the "learning system" (e.g. knowledge sharing) that constitutes the EC.

Environmental organizations and collaboration between territorial stakeholders

The association of Illinois Soil and Water Conservation Districts (AISWCD).

Conservation districts were born in the 1930s after the ecological disaster referred to as the "Dust Bowl" -- the period after a time severe dust storms that caused significant environmental and agricultural damages to American prairie lands. The "Dust Bowl" was the result of drought combined with poor farming methods (lack of crop rotations, cover crops, soil terracing, and wind-breaking trees). The drought and farming methods led to severe soil erosion. Therefore soil and water conservation became a national policy and priority declared by the Congress. Incentives for active and voluntary support of landowners were created, because it was perceived that voluntary participation would be the best guarantee for effective and efficient conservation practices on private land.

In 1937, legislation in the different states authorized local landowners to form soil conservation districts. (AISWCD, 2013)

There are around 3000 conservation districts across the U.S. They aim at advising and encouraging local people about land, water, forests and wildlife conservation. Their mission is the coordination of the different sources of assistance existing at the public and private, local, state and federal levels, in order to develop “locally driven solutions to natural resource concerns” (AISWCD, 2013). In particular, conservation districts help at the restoration and conservation of wetlands useful for water purification and wildlife habitats, the protection of groundwater resources, the soil maintenance through plant trees and other land cover, the development of alternatives towards environmentally sustainable management of the land, and the organization of education programs to raise people’s awareness. The activities involved include: tillage practices, nutrient, manure and woodland management, buffer and filter strips, grassed waterway, and Integrated Pest Management.

Various programs such as the Conservation Reserve Enhancement Program (CREP), the water quality protection programs funded by the Illinois EPA 319 Clean Water Act Grant, and the Storm water Management program are funded by the Illinois EPA Green Infrastructure Grant, and are organized through the SWCDs. Soil and Water Conservation Districts aim at communicating and demonstrating at a local level to farmers - and also to the rural community generally, to businesses, and in school programs - technologies related to environmental practices. (AISWCD, 2011)

AISWCD is a non-profit organization governed by a board of directors who represent the Illinois’ 98 Soil and Water Conservation Districts; each local District is

governed by an elected five member board mandated by state statute to protect the land, water and other natural resources located within its borders (AISWCD, 2013)

U.S. Conservation Programs – Reconsiderations and Challenges

Current U.S. conservation programs are the object of criticism about their effectiveness and efficiency.

Impacts of U.S. conservation programs

After more than 25 years of CRP and 20 years of WRP, those programs continue to be viewed positively by both conservation and agricultural communities. CRP is beneficial for farmers because of its voluntary basis, its income guarantee during the length of the contract and its absence of property rights transfers. In addition, it temporarily supports commodity prices by removing part of the land from production. However, the effectiveness of these programs is closely linked to the volatility of market prices. As a response to rising commodity prices and without any modifications to the program, farmers reduce their reenrollment. The alternative to land-retirement programs focuses on working lands conservation. The EQIP is one of them and enables farming in a more environmentally friendly manner without retiring land from agriculture. The green payments made to producers as compensation for environmental benefits generated from the farming activities are received under the Conservation Stewardship Program and serve both farm income and conservation objectives. Combining agriculture and conservation can involve a tradeoff, often to the detriment of the conservation objectives. But this is not always the case. (SULLIVAN et al., 2004)

Critical points and current issues regarding conservation programs

The demand for major commodities is strong and the market prices are high. This results in a decrease in the enrollment of land in the CRP Program. This has

recently been occurring: there has been a reduction in CRP acreage to 32 million acres (about 13 million ha) (cap for 2010-2012), and an increase in cropland rental rates. In addition, the percentage of lower-quality land placed in the program increases, which carries with it a drop in ecosystem services. The phenomenon is difficult to overcome unless annual payments are increased in order to match with the profits from crop production. In addition, USDA will likely have to cut the amount of the next budget devoted to conservation issues, given U.S. House of Representatives' and Senate's versions of the 2013 Farm Bill. An (expected) expansion in ethanol production similarly impacts conservation programs by reducing lands' enrollment. In the case of the CRP, it is estimated that the amount of acreage that would maintain the environmental benefits currently provided by the program would require doubling CRP rental rates over the long term. (HELLERSTEIN et al., 2011)

Specific focus on the CRP

The CRP is a major object of criticism, since it is perceived as a source of the U.S. government's welfare system for farmers than as a program for environmental preservation.

The lack of "efficiency" is the main negative aspect reported about the CRP. Critics suggest that it pays farmers for something they should be doing anyway; farming highly erodible lands should be avoided to maintain production capacities of the soil. CRP's efficiency is also doubtful because of its high costs, the absence of strategies to consider wildlife in lands chosen for enrollment, the ability of farmers to place marginal agricultural lands in the program while they continue to farm the better lands, and the lack of a requirement for planting native vegetation in the lands enrolled, which would favor wildlife population development if it were required. The most important factor

concerns commodity prices: landowners cancel their enrollment or fail to renew it when commodity prices increase. (CRP was thought to be a way of keeping farm incomes stable). Regarding the other existing U.S. conservation programs, WUERTHNER (2008) suggests that a better alternative to the CRP would be the outright government purchase of lands for conservation. Finally, CRP does not guarantee public access to these “protected” lands. Farmers may choose to rent out hunting permits on these lands, but this does not raise public interest and concerns for the preservation of these lands. (WUERTHNER, 2008)

U.S. Incentives towards the Valuation of Environmental Practices in the Farming System – the water quality trading system

Functioning of the water quality credit trading system

Broad guidelines for water quality trading have been established by the EPA, but it is up to the individual states to establish specific policies regarding their needs, possibilities, eligible conservation practices, etc. One of the organizations dealing with environmental goods as marketable objects is the CTIC. CTIC addresses agriculture's needs and attempts to develop water quality trading systems. Workshops are organized to bring producers, advisors, potential quality trading aggregators and municipal wastewater facilities together in order to expose the concepts, benefits, challenges and development steps of water quality trading (e.g. work on nutrient management alternatives to improve water quality).

Through water quality trading programs, farmers get paid for their stewardship activities. They “sell” the amount of nutrients or sediment reduced by conservation practices to facilities like wastewater treatment plants that can thus meet the regulatory requirements about the amount of polluted substances that may be discharged in their

wastewater to local water bodies. These water quality standards correspond to total maximum daily loads (TMDLs) declared by the Clean Water Act. It is generally less expensive to pay producers to implement conservation practices rather than installing new treatment technologies. Through such an agreement, the actors involved benefit financially from it and water quality is improved with lower investment. Water quality trading is a market-based tool that enables a higher cost-effectiveness of the industrial and municipal facilities to meet regulatory requirements related to the quality and the management of the natural resources. It also serves as an effective incentive for farmers to implement conservation practices. Trading programs have the advantage of addressing the specific characteristics of an area and to focus on the needs of local stakeholders. The form of trading system varies, then, depending on the area. According to the CTIC, a water quality trading system can be summarized in the following elements: 1) the assessment of the potential for water quality trading; 2) the determination of the environmental benefits and the amount the producer is able to trade; 3) the determination of the trading partners; 4) the elaboration of the agreement between the partners; 5) the monitoring of the implementation of conservation practices; 6) the report of pollutant reductions; 7) and trade results. (CTIC, 2006)

Difficulties faced by water quality trading systems

This kind of trading system reveals high transaction costs generated by the complexities of the contracts between partners and by the hesitation of farmers to participate (e.g., for fear of periodic checks by government officials on their lands). A weak point also consists in potential variations in the rules governing trades, because producers often depend on funds from conservation programs which determine their potential costs and expected benefits over time. In the case of an EC, this latter risk is

lower or nonexistent. The EC does not deal with an individual farmer but with a group of farmers, who can support each other to some extent. With an EC, the external environment is therefore less variable; in case of unexpected event, farmers can cope with it together. In the case of the U.S. trading system, seasonal variability also affects the producer's ability to trade because the conservation practices intended to operate during wet seasons (e.g. preventing runoffs) do not generate any pollutant reduction during dry seasons. Hence, in the dry season the farmer may not have products to trade. (CTIC, 2006)

Duties and Allowances of U.S. Farmers vis-à-vis Authorities' Environmental Regulations

This section deals with an evaluation of the flexibility of U.S. environmental regulations imposed on farmers at the different levels of government. In the Netherlands, ECs emerged as a response to the “highly generic and means-centered agro-environmental policy” that exists there. Farmers were for instance “obliged legally to adopt a range of prescribed technologies” (e.g. injection of manure into the soil) and to “align their process of production to strict rules, procedures and parameters”. This external prescription and sanctioning had a tendency to “petrify farming” by excluding any deviation from the imposed rules (VAN DER PLOEG et al., 2006, p.3). The link between the governmental regulation and farmers is therefore very important in this study.

U.S. conservation programs are mostly voluntary. Some of them are conditions for farmers to be eligible for subsidies or other payments. Once enrolled in a conservation program, the requirements are relatively generic and farmers must comply at the risk of getting penalties. Farmers are relatively tied to the environmental

regulations which they apply for; the level of flexibility and adaptation to the local characteristics is low.

At the State level, there is an extent of flexibility in the implementation of the conservation programs. The State offers also additional environmental regulations and programs. Then, at the county level, there is also a degree of variations, visible for instance through the various Soils and Water conservation Districts which can decide different strategies according to the existing issues.

Environmental Conservation Practices as Part of Farmers' Cooperation in the U.S.

This section deals with the existing U.S. forms of cooperation between farmers based on other engagement apart from farming. The study focuses on legal frameworks for U.S. forms of co-operation and what this implies for the management of the environment. These frameworks can provide an interesting point of comparison concerning the model of EC as discussed in this study.

Group Actions and the Preservation of Natural Resources

Some environmental action groups coordinate local stakeholders' individual interests to achieve the enhancement of the quality and economic value of a community resource. Groups dealing with resource preservation often take the form of a cooperative or a nonprofit association which has a cooperative form of governance. One kind of cooperative, for example, manages the shared use of common-pool resources for the benefit of the members' own agricultural and fishing enterprises. The use of a resource by the group is then combined with sharing operating costs. From an U.S. perspective, the determinant attribute for a successful management of common-pool resources is democratic governance. Two typical examples of local democratic

governance are grazing associations and fishery cooperatives. There are in the U.S. 60 grazing associations with FS (Forest Service) permits, many of them incorporated as cooperatives. They receive an allotment of permits which are allocated among their members. The association coordinates both public land use and access to other lands through leases, grazing agreements, or purchases of pastureland. Besides the implementation of controlled grazing, they oversee grassland maintenance projects. The cooperatives are also a means to implement technical information and recommendation from USDA's NRCS. (USDA, 2012)

Watershed Collaborative Groups

Watershed groups (sometimes called watershed working groups) were created in the U.S. in the 1990s as a result of the increase in non-point source pollutions as the primary contributor to water quality degradation, and the increase in perception that regulations and actions of the federal authority were insufficient. By 1999 there were around 1500 locally-based watershed management initiatives. Watershed groups are locally-oriented, and use Federal funding from the U.S. EPA's Section 319 grant program, part of the Clean Water Act Amendments (1987), which helps develop watershed management plans. They use a watershed scale approach based on collaborative and community-based management (KOONTZ, 2004). Watershed groups consist of people living and working within a same watershed and collaborating with local, state, and federal governments. The watershed works as an umbrella by linking citizens' groups with universities, businesses, governmental agencies and by connecting the groups working in the watershed community. The creation of such alliance enables an increase in the accuracy of the watershed knowledge. The group serves as an advocate for resource management and protection in the watershed. This

collaborative approach has led to marked improvements in water quality, fisheries enhancement, and wildlife habitat.

Watershed collaborative groups share common characteristics with the Dutch ECs such as the notion of working together with various stakeholders of the territory and the design of strategies dealing with pollution resulting from agricultural practices. However, the actions of the U.S. watershed organizations are largely focused on restoring water quality and negative externalities resulting from agriculture, while Dutch ECs work strongly on projects increasing positive externalities of agriculture (e.g. encouraging farmers taking care of the landscape, animal biodiversity). This contrast is a general difference between the U.S. and the EU (detailed in Chapter 1). Emphasizing the benefits and the positive potential of agriculture on the environment leads probably to higher motivations of farmers in integrating conservation practices and landscape management, as compared to restoring the environment and preventing further pollution. Further, the results of positive efforts are usually visible quicker than in the case of actions aimed at restoration or recovery, and, consequently, are probably more encouraging for farmers.

Conclusion - Identification of Relevant Variables as Part of the U.S. Setting Distinction of Specific U.S. Elements

The above review aimed at establishing the U.S. context for this study. Understanding existing U.S. forms of cooperation between farmers and other stakeholders, and the incentives and programs with environmental orientations, leads to distinguishing certain elements which could favor/enable the implementation of a system of ECs in the U.S. They are as follows.

Collaborations among different environmental organizations and between environmental organizations and various community's actors. Rather than the creation of partnerships towards the protection of the environment coming from environmental organizations, the question is whether it would be more efficient if these partnerships were initiated by the farmers themselves. The environmental organizations would then be collaborators under the mission of advising, providing expertise, diffusing information, etc. The elaboration of contracts with these organizations would then come from the willingness of farmers considering their interests and desires. Thus, complying with environmental regulations would not be about applying a certain rule, but about responding to a collective agreement.

Resource quality trading systems. This system helps at putting value on a beneficial activity carried out by farmers on their natural environment, although it mostly focuses on decreasing negative externalities. The weakness of this system is the generation of high transaction costs, because of the need for intermediaries to build partnerships and analyze farmers' situations and potential. If this system were organized into a single agency, in other words, if this system would involve actors who are staff from the same unit, all with the same status (such as an EC), and it would facilitate negotiation as well as the evaluation of a farmer's potential for a specific project.

In addition, there is resistance to environmental trading programs because of the fear of strong monitoring by the government. An EC would likely compensate this by focusing more intensively on mutual monitoring among farmers and on the trust between each other. The institutional framework of the EC stipulates additionally greater

flexibility from the government, which may reduce or eliminate any feelings of governmental control.

Presence of a very intensive farming system. The impact of the Illinois farming sector on the Illinois and U.S. agriculture economy is huge. Therefore a willingness to maintain this agricultural system can be assumed, to make it sustainable over the time and maybe to adapt it to new consumers demands and global challenges. The question is whether the EC could be an appropriate mechanism for maintaining sustainability and encouraging adaptability.

Presence of important environmental issues. There are several important environmental issues in Illinois which require a system of conservation practices suitable for the stakeholders in food production in this area, and can effectively deal with environmental damages associated with the high level of intensification of agriculture.

Co-operative actions and initiatives dealing with natural resources issues and environment. Watershed collaborative groups are an example of support and financial aid from authorities which encourage local organizations to design their own strategies in tackling a natural resource problem. From the perspective of the authorities and its methods of dealing with environmental regulations, this kind of action and collaboration suggests that the structure of EC could be accepted by the authorities, especially concerning the criteria of self-governance.

Conclusion

There are organizations and collective initiatives in the U.S. and in Illinois specifically that reflect values similar to the ones represented by the ECs in the Netherlands. The data collected for this study therefore aimed at gathering information on how these values are represented in a U.S. setting according to general farms'

characteristics such as the type of farming and the size of the farm. Current U.S. environmental cooperative efforts, initiatives and programs involve Commodity Stewardship Program, food cooperatives, Community Supporting Agriculture, and watershed collaboratives. In particular, this study tries to identify the variables (based on literature about ECs in the Netherlands) which could be responsible for the development (or not) of ECs in Illinois from the farmers who are part of these initiatives. For instance, the willingness to connect the farming system in an area closer to the consumers is represented via CSAs.

In addition, there are other important components and components' combinations present in the ECs which are not represented by these organizations or forms of cooperation. The Dutch structure would then constitute a novelty in a U.S. setting because of its special association of stakeholders, purposes, and activities. The U.S. investigation aims therefore at observing how these components could be represented in a different way among Illinois' farmers.

From this summary of the U.S. setting, the questions remain about the applicability of the structure of EC in the U.S. In particular, we question the existence of a possibility which emphasizes the willingness and collaboration of the farmers towards environmental strategies integrated within the farming system and less tied to the authorities and general regulations, and whether this would be beneficial for the sustainability of the agricultural production system, conservation of the environment, and the development of the local rural area.

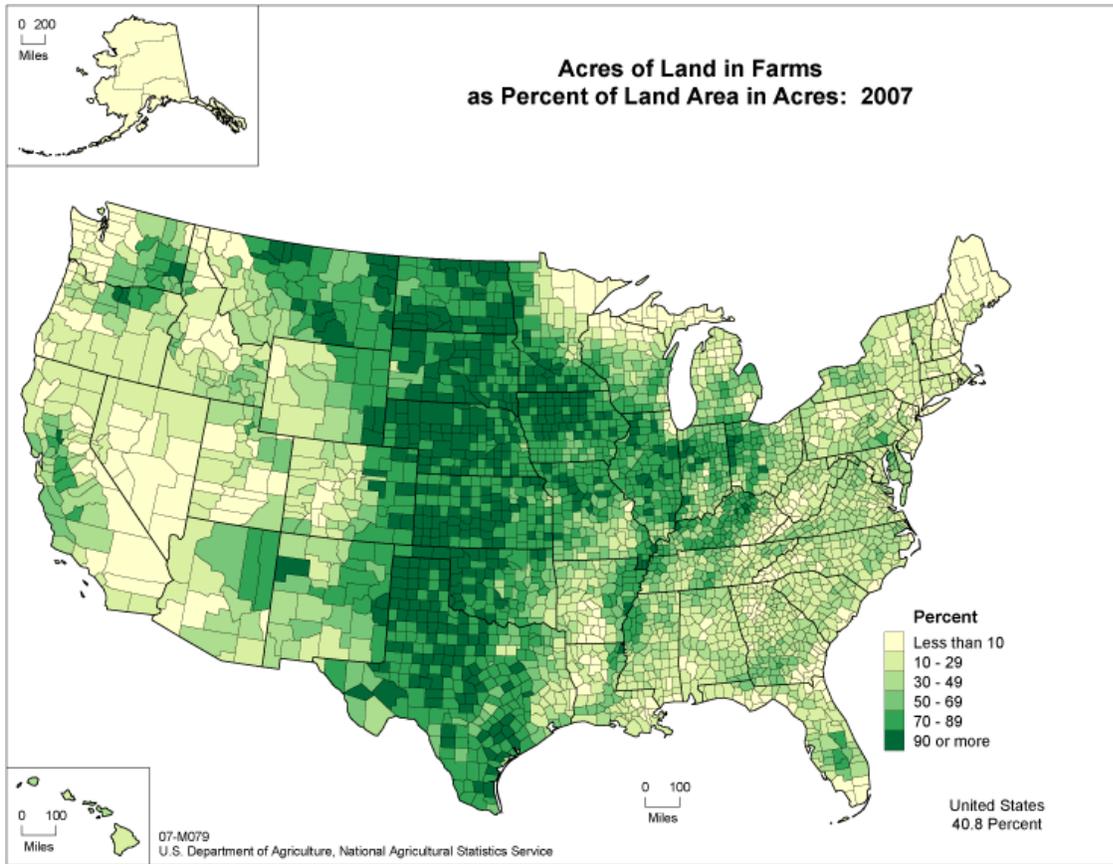


Figure 3-1. Acres of Land in farms as percent of Land Area in acres (USDA, 2007)

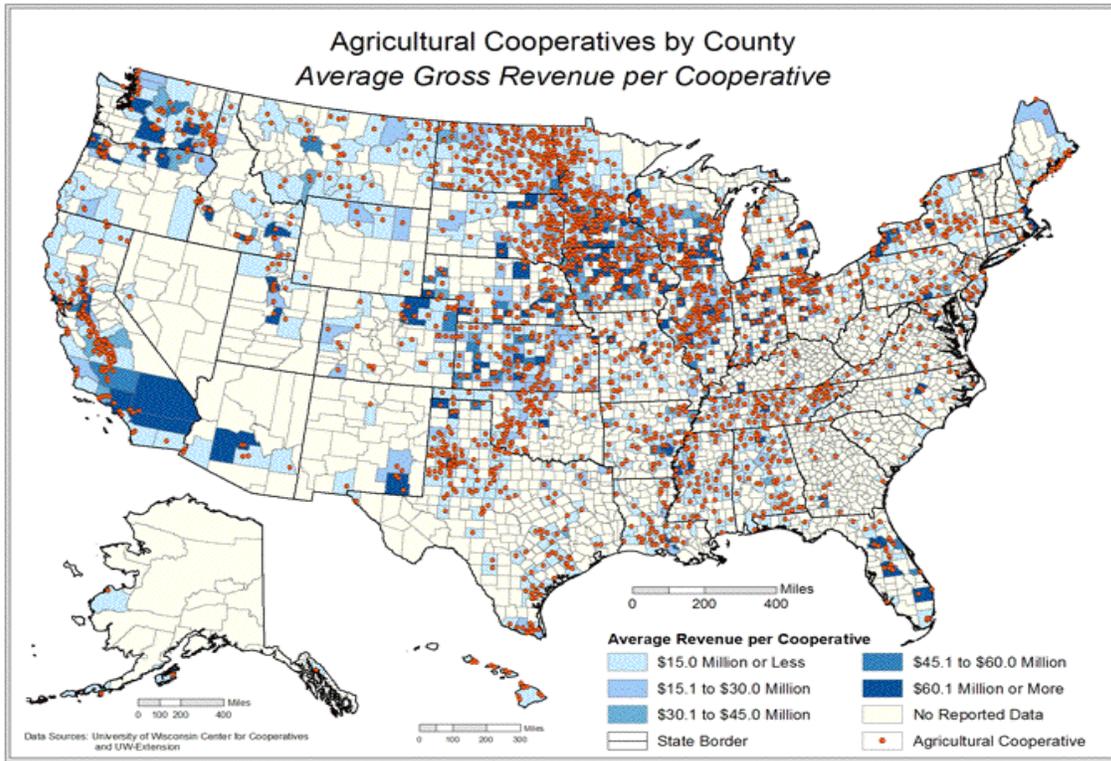


Figure 3-2. Agricultural Cooperatives by County: average gross revenue per cooperative (USDA, 2007)

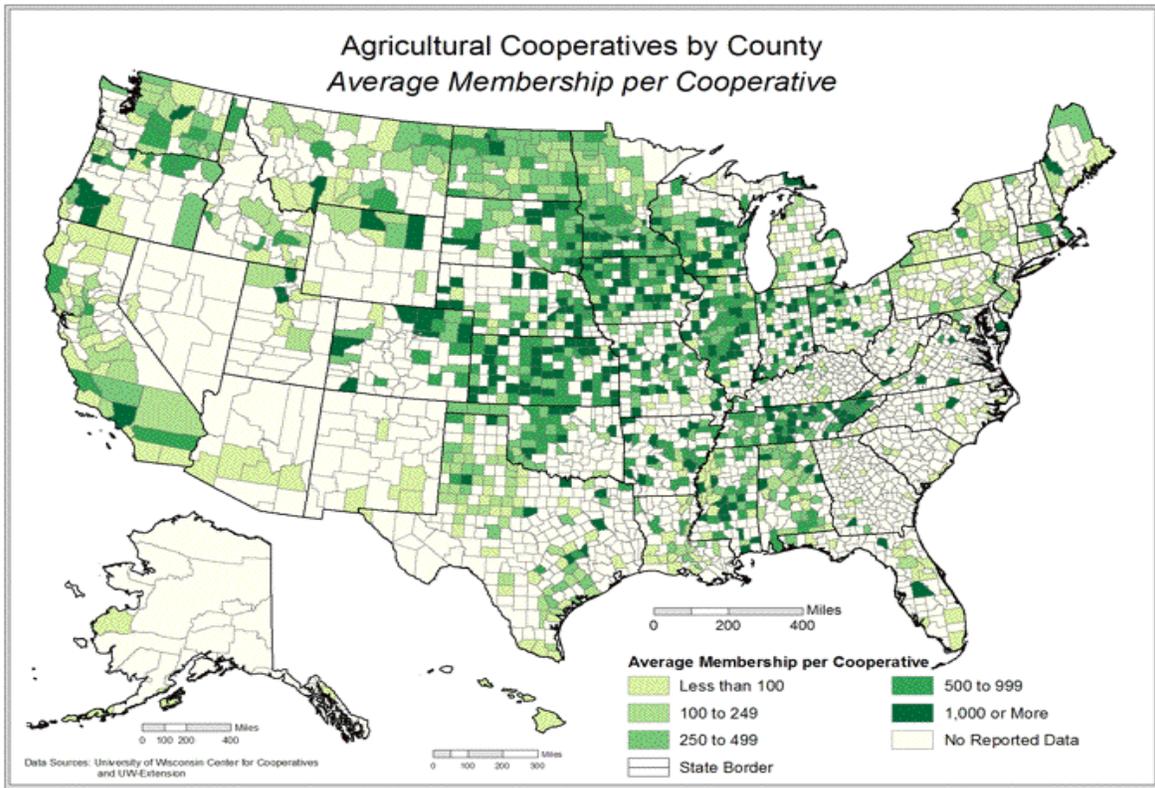


Figure 3-3. Agricultural cooperatives by County: Average membership (USDA, 2007)

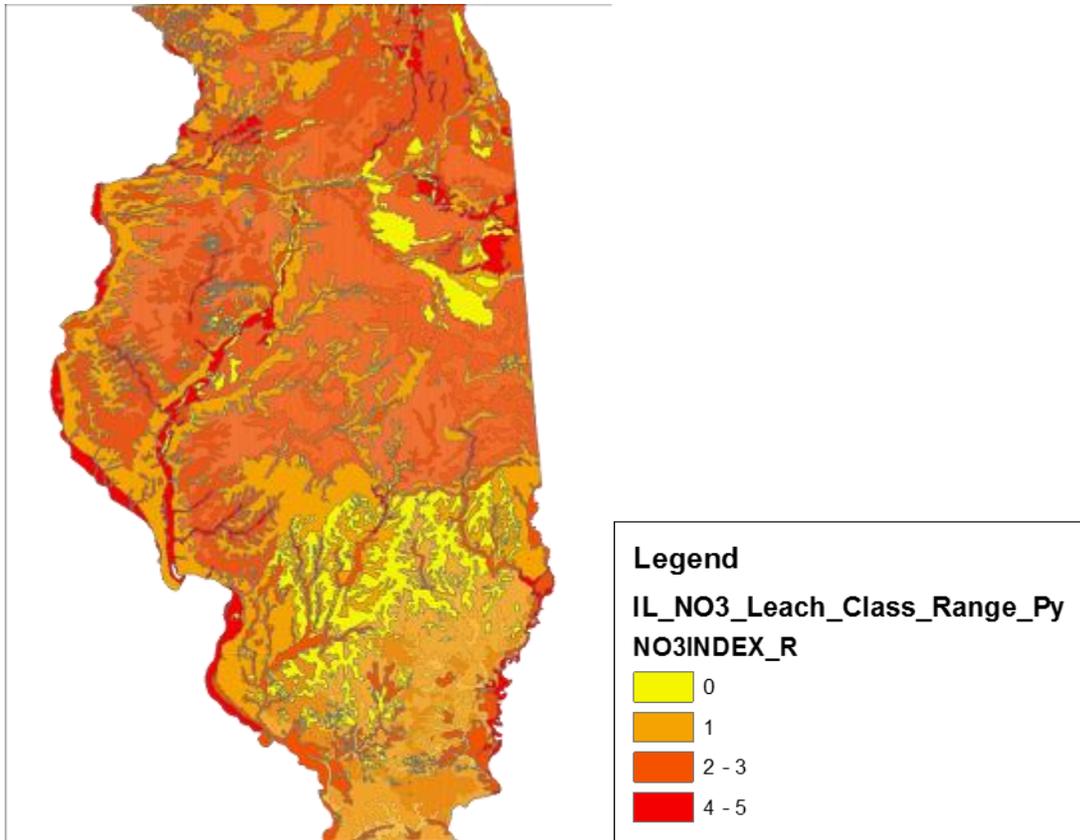


Figure 3-4. Level of nitrate leaching in Illinois (source: ISGS Illinois)

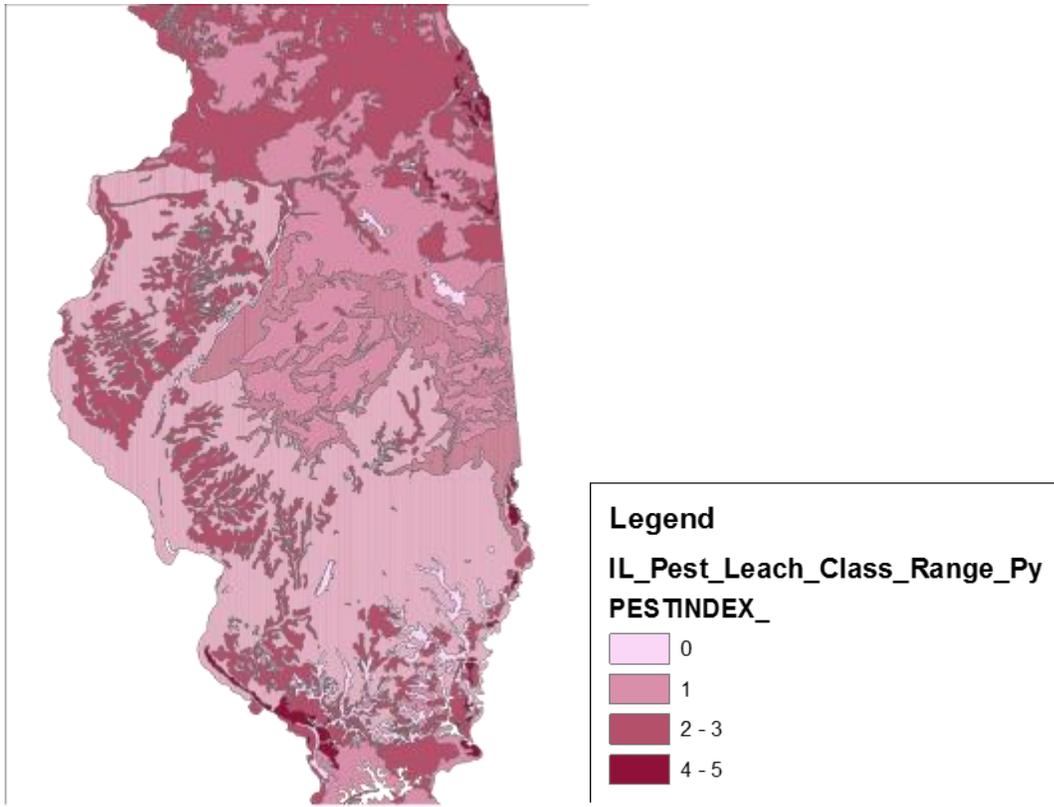


Figure 3-5. Pesticide leaching class in Illinois (source: ISGS Illinois)

Farms with less than \$ 10.000 sales revenue in Illinois,
in percentage, per county

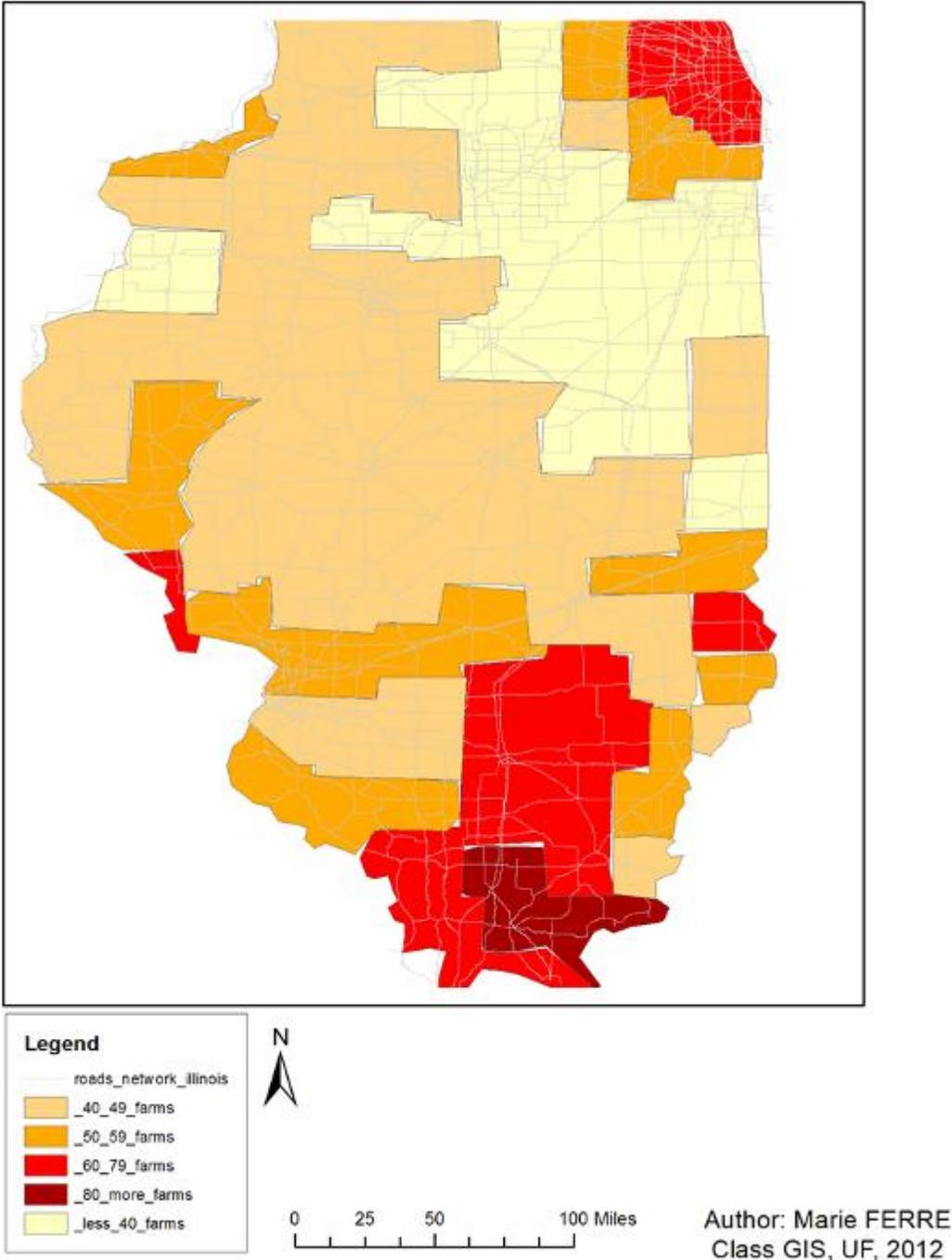


Figure 3-6. Farm with less than \$ 10.000 sales revenue in Illinois, in percentage, per county

Size of the farms - levels of pesticides and nitrates leaching Correlation, in Illinois

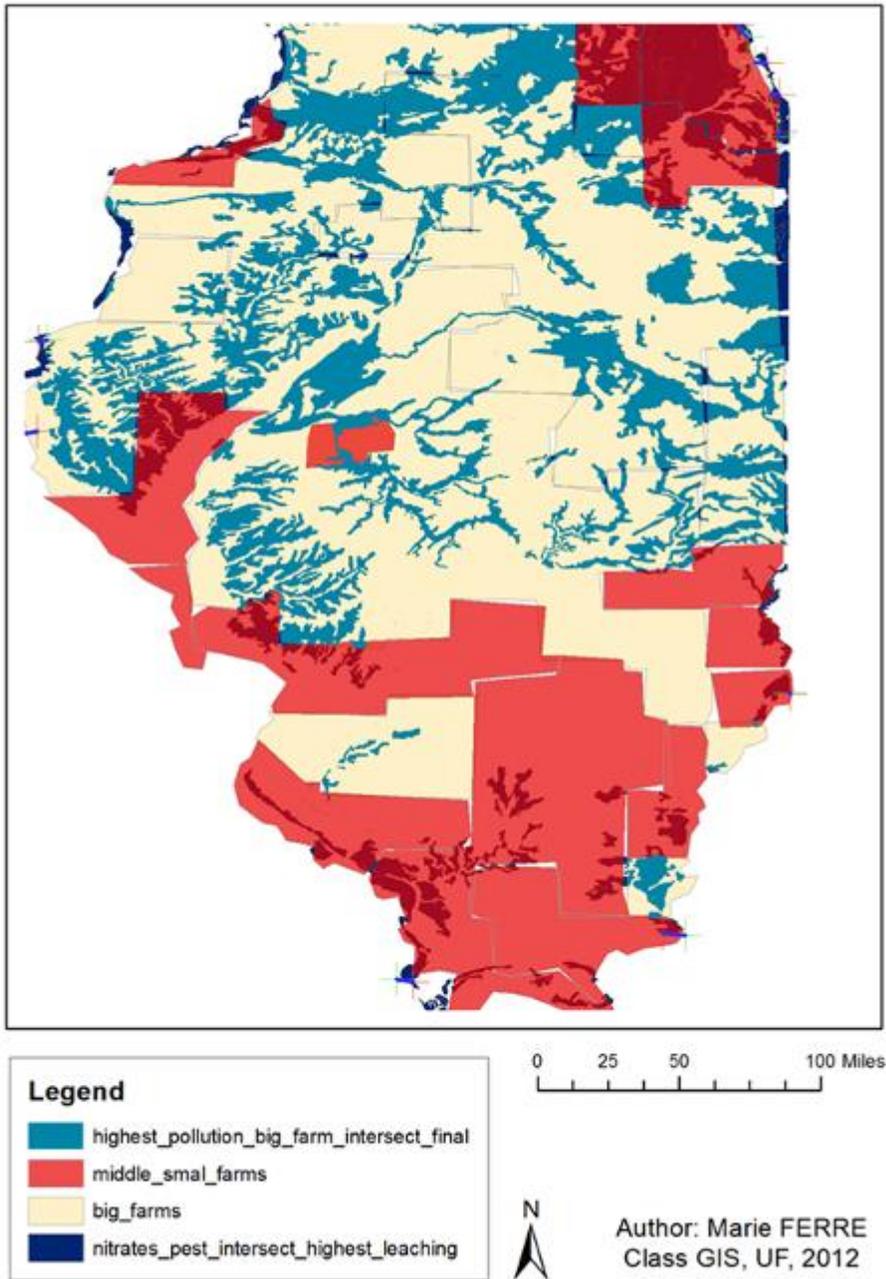


Figure 3-7. Illinois - Size of the farms – levels of pesticides and nitrates leaching correlation



Figure 3-8. Location of the Community Supported agriculture in Illinois. (Source: Western Illinois University <http://www.value-added.org/communityCoop/csa.asp> accessed on 07.11.2013)

CHAPTER 4
INVESTIGATIONS IN THE U.S.: RESEARCH DESIGN, METHODOLOGY, AND
RESULTS

Research Design

Information Needed and Material Design

The information needed for this study can be categorized into different phases as described below and correspond to the two first phases of the specific objective number vii (cf. Chapter 1).

Variables related to phase 1

The general characteristics of the U.S. farms such as the type of production, the type of markets the farms sell to, farm size, and the demographic characteristics were obtained from secondary sources. A questionnaire was used to obtain specific information about variables related to the:

- Added-value of farmers' extra-farming activities: number, nature, purpose, level of benefits (extra-revenue), etc., in order to assess the degree of diversification of the farm and its potential in terms of multi-functionality
- Attachment of the farmer to his territory or community (notion of regional/community identity)
- Farmer's perceptions of existing conservation programs and regulations: how these programs and regulations match with a specific agricultural system (e.g. soil structure), farmers' feelings of constraint, degree of awareness of the need for adoption of new orientations in farming practices, and feelings about stricter environmental policies
- Current degree of cooperation and collaboration among farmers and with external actors: degree of knowledge sharing with other farmers, degree of involvement in voluntary organizations, farmers' evaluation of the level of cooperation of members of existing cooperatives, perceptions of the economic benefits of being part of a cooperative, feelings about constraints and regulation from the authorities, and thoughts about cooperative self-governance
- Degree of importance/value that farmers place on the farming profession, perceptions of farmers' public image, the decision-making process the farmer employs (either based on economic outcomes or on environmental

characteristics), the way farmers perceive their jobs, the degree to which they seek compatibility between their farming practices and their specific environment, and their thoughts about the growing consumer demand for a more sustainable agriculture and healthier products.

Table 4-1 gathers the complete list of variables related to general characteristics of the farm and the farmer, gathered from the questionnaire.

Variables related to phase 2

Information about the current orientation in terms of support from the authorities, the cooperation capacities of farmers, the degree of ease or difficulty to combine the environmental practices into the agricultural system, and the degree of possible effectiveness of new policy approaches compared to current approaches. Data were obtained from public sources and a questionnaire via the identification of the following variables related to the:

- Effectiveness of the authorities: i.e., whether current incentives by the government or the states toward environmental markets work, what flexibility is provided by the authorities to farmers in implementing conservation practices, to what degree are regional-specific characteristics considered in regulations, and how transparent are regulations
- Interactions between various stakeholders of the territory: how frequent are interactions between farmers and other stakeholders of the territory, and how frequent are interactions with external actors
- Perception of future results of environmental cooperation for the farmers in terms of market opportunities, to assess their perceptions of cooperation as in terms of its contribution to marketability.

Specific Variables from the Dutch Environmental Cooperatives – Analysis in a U.S. Setting

The aim of this study was to discover if there are already-existing variables in the U.S. that can promote EC development, and to identify those that are lacking (vis-à-vis the situation in the Netherlands). In other words, what would be necessary in order to

successfully establish ECs in a U.S. setting? From the review of Dutch ECs and the previous analysis of the U.S. setting, the study summarizes below the variables which have been identified as “relevant variables” and which constituted the basis for the U.S. (Illinois) investigation and the design of the questionnaire.

The “relevant variables” belong to the following categories (cf. table 4-2 for the complete list of “relevant variables”):

- Trust with other farmers
- Specific regional environmental issues
- Willingness to collaborate with other farmers and with non-farmers
- Vision of the current conservation programs: adaptation, effectiveness, suitability
- Link between the farmer and his region or territory (e.g. identity)
- Extra farm activities
- Perception of the local resources as linked to the farming system
- Importance of the local/traditional farming practices
- Sharing knowledge of the profession
- Farmers’ desires regarding methods of conservation practices and nature and landscape management
- Image of the farm and the farming system
- Link with the consumers

Materials and Methods

Primary data were collected in the State of Illinois.

Sample Design

Sample characteristics

The sample of farmers that participated in this study was selected at random from among Illinois’ farms population, although it depended first on the willingness and type of intermediary for the diffusion of the questionnaire, and then on the willingness of the farmer. There had been no previous studies about the involvement of U.S. farmers in ECs.

The review of the Dutch setting showed that involvement of farmers in voluntary organizations and environmental organizations was not correlated to their decision to be part of an EC. Studies observed a significant number of dairy farmers (the largest proportion of the environmental cooperative membership) who are members of Dutch ECs; the dairy sector is important in the Netherlands. However, this does not mean participation in dairy farming leads to membership in an EC. Criteria are certainly different in the U.S. It was the aim of this study to highlight and identify the relevant factors in the case of the U.S. The State of Illinois – as a whole – was selected as the area of study for reasons that will be discussed below.

Target population

The target population for data collection was farmers. According to the literature review on ECs in the Netherlands, farmers are the fundamental actors for the design and functioning of an EC. They are indeed the ones who initiated this form of cooperation in the Netherlands and who are leading its management and viability.

Sample selection procedure

The sample selection procedure for the U.S. study was based on an a priori judgment about how the target population matches with the intent of the research. The sample set from the target population was then selected at random. From the already published studies of the ECs in the Netherlands, characteristics of the various actors who might be involved in the establishment of an EC were identified.

Research design method

The study employed a descriptive research method which was carried out through a cross-sectional design targeting a sample of U.S. agricultural actors in Illinois at one point in time. The main objective was to analyze the perceptions and willingness

of the farmers to establish an EC; it was a perception/behavioral approach. The second stage of the study concerned inferring hypothetical impacts of the implementation of an EC system in the U.S.

Limitations of the research study

The value and accuracy of the data in this study relied on participants' willingness to divulge business and personal information. The information reported by the respondents was assumed to be reasonably accurate, but the possibility that some respondents either would not have accurate information about their cooperatives or farms, or would not wish to provide accurate information is acknowledged. This possibility has been overcome by providing for instance, as part of the questionnaire, written assurance that participants' identities would not be revealed. This was especially the case for questions considered as "sensitive," which a participant would more easily skip or try to fake an answer with the aim of conforming to some social norm. Other limitations to the accuracy of the data were data interpolations and subjectivity of the investigator (especially visible in the case of open-ended questions for which an interpretation was necessary for it to be coded). Very few open-ended questions were used in this questionnaire, and the answers to the open-ended were treated as qualitative data.

Data Collection

Material

Questionnaire content. The collection of primary data in the U.S. was carried out by use of a questionnaire that targeted Illinois' farmers. The questionnaire was a semi-structured type - including both closed and open questions. The responses for the closed questions, were either in the nominal (e.g. yes or not) or ordinal (ranks and

intervals) form. These questions applied a Likert-type scale method of measurement and had 6 – levels of measurement because their link to the farmer’s perception was very subjective. The questions therefore did not propose neutral answers; the participant had to take a position and choose the right or left side of the scale (either a negative or positive answer to the questions). Since this study used a behavioral approach, this methodological choice was appropriate to facilitate drawing of conclusions, as there is always the temptation by the respondent to choose the “middle” answer, e.g., level 4 on a 7 point Likert scale. Questions were designed with inclusion of explanations of the meanings of the lowest and highest levels on the scale. Nevertheless, the questionnaire included other questions which offered neutral choices as answers.

Based on the variables identified earlier on, the questionnaire (cf. Annex 1) was divided into several parts as follows:

- General characteristics about the farm and its manager
- The farm and its geographical and community identities
- Extra-farming activities
- Community environmental issues
- Perceptions of conservation programs
- Collaboration and cooperation between farmers
- Perceptions of the farming profession

The first set of questions was related to the general characteristics of the farm and the farmer, and aimed at learning the nature of the farmer’s interest (or not) in ECs, and the type of farming system for this particular farmer. This information was necessary to create eventual associations and correlations between the general farm characteristics and farmers’ behaviors, perceptions, and values vis-à-vis an eventual EC initiative. For instance, the Dutch literature demonstrated that criteria such as the

presence of a successor to the farm and the size of the farm were determinant factors for the adoption of agri-environmental schemes and involvement in ECs. This was linked to the long-term perspectives on projects related to environmental conservation.

The size of the farm and the type of farming seemed important criteria. While the size of the farms which form an integral part of ECs in the Netherlands is relatively small (although it is very heterogeneous among the cooperatives), the U.S. farms are on average much bigger. However the study needed to look at this criterion as part of a whole group of U.S. criteria. The system had to be analyzed as a whole in the American setting, and more specifically, the Illinois context. The fact that the size of the farms was generally bigger in the U.S. because of greater availability of lands' surface area did not imply a non-applicability of structures such as ECs. There were indeed in the U.S. other variables which could make it feasible. According to previous Dutch studies, a large farm size could see ECs as advantageous due to the higher investment potential, innovation management in the long term, and low financial risk.

Questionnaire purposes. The questionnaire aimed at analyzing and evaluating the behavior and values of Illinois' farmers, based on the factors identified in the literature on Dutch ECs. The aim was to define the extent to which Illinois' farmers would be willing and ready to take part in an EC structure. To do so, the questionnaire aimed at getting the perception of Illinois' farmers concerning their possible participation in an EC in their territory. For the farmers involved in an agricultural cooperative, this entailed finding out whether farmers were satisfied with the services offered by the cooperative, and whether they would be willing or open to a reorientation of the cooperative towards a higher incorporation/integration of conservation practices.

The motivating factors towards the creation of an EC by farmers varies; one of the primary reasons for joining a Dutch EC (as environmental stewardship schemes) is the economic benefit a farmer gets as a member (CROSS AND FRANKS, 2007). For a new farmer to be integrated as a member, he/she is required to be convinced and to strongly convince the EC governing committee that the rules and practices of the EC are consistent with his/her farming objectives and values. Believing in the principles of the EC and accepting them as a future guideline for conduct is a determining criterion and a factor of success for the cooperative in the long term. As it is the case in the Netherlands, U.S. farmers are obviously also interested in earning extra revenue. This study also looked at the economic motivations and tried to assess the willingness aspects of the U.S. farmers regarding environmental initiatives in these terms.

Survey realization

Initial preparation. In addition to choosing Illinois as the general study area, other geographic characteristics, characteristics of natural resources, proximity to urban areas, and presence of farmers' organizations such as CSAs, were used to form different sample-areas, which created sufficient variations among the samples of farmers throughout the State of Illinois. The study assumed that these criteria were part of external factors which did not influence directly the behavior of the farmers but which constituted the environment in which the farmer is living and where his choices are made. Through the combination of data related to the criteria mentioned above, the following five study areas were therefore identified (shown in Figure 4-1). The map resulted from an association of different database/layers associated with the criteria mentioned, and using ArcGIS software.

Distribution – attribution method. Because of the limited access to U.S. farmers' contact data, the contact with the target population and the diffusion of the questionnaire were carried out through intermediaries. These intermediaries were farmers' organizations and environmental associations: SWCDs, Illinois Farm Bureau (IFB), farmers' associations and networks (Simple, good and tasty; Local Harvest), farmers' cooperatives, University of Illinois Cooperative Extension Service, and National Agency Statistical Service (NASS). An email was sent to the representatives or board/committee's members of these organizations (contact information was extracted from the organization's directory). These organizations were invited to diffuse the questionnaire to their farmers-members either by forwarding the link to an online survey through emails (the survey had been made available on the research server of the University of Florida – Qualtrics), through a weekly newsletter "Rural Partners – Illinois" in which a short article of this study was published and included the online link of the questionnaire and was diffused to farmers and other rural stakeholders. Hardcopy U.S. Postal Service mail that included the link and hardcopies of the questionnaire itself were diffused to farmers through their representatives. The study assumed that the use of different ways to distribute the questionnaires, and thus different situations surrounding the completion of the questionnaires by farmers, did not significantly affect the results of the survey. This is based on the fact that the survey aimed at gathering information which was very general and which did not relate to something which needed to be evaluated or estimated for particular conditions. Only the organizations (and their members) located in the areas identified in Figure 4-1 were contacted in the first stage of the study.

Challenges. The willingness of collaboration from these organizations was very low: only about 3% of the organizations' representatives who had been contacted (more than 650 people in total) answered positively. However, about 1% supported effectively the study by diffusing the questionnaire. As a consequence, the primary target areas in Illinois that had been selected previously were not adequate and therefore, the study extended to the whole of the Illinois State. The participants of the survey were then distributed all over the State of Illinois. However, since the general location (county and town) was one of the questions in the questionnaire, the data analysis focused on categorizing farmers based on their location in Illinois.

Survey - outcomes

Participants' outcomes - sample size. In total, more than 900 farmers were contacted, but only 55 questionnaires were fully useable. This number was sufficient to ensure the recommended statistical representation of the sample (30 sample units is generally considered as the minimum to the statistical representation), although very low considering the scale and variability of the study-area. Many U.S. farmers fear any connection of a survey with anything even remotely connected to the federal administration, which they feel which could disadvantage them later on (this was also clearly described by a couple of Illinois organizations' representatives contacted). This is one of the primary explanations for the relatively low participation rate, although, to counter this fear, points to the contrary were clearly stated in the invitation.

Implications. From the clearly low representativeness of the sample obtained from the survey, the data analysis of the study changed to consideration of the qualitative data which was obtained through both the literature review and the data collection. The relatively high number of questions and the presence of open-ended

questions in the questionnaire indeed enabled farmers to bring further information and thus provide a more precise idea of their perceptions and characteristics.

Data Analysis

Data Preparation

Data preparation included the checking, editing and coding of the questionnaires. It also included the cleaning of data, identifying errors and the hypothetical reasons for them. The questionnaires which were not considered for the final sample were mainly ones in which the relevant questions to the research study had not been answered; these questionnaires could not help solve our research questions.

Methodology of Analysis

Process of the data analysis

Data analysis consisted of processing of the data obtained from the questionnaire using statistical models. The outcomes of the process were then analyzed and interpreted. The relevance and accuracy of their interpretations was optimized by crossing and combining the results and also comparing the results with the literature review. In the framework of this study, the results obtained and the correlations of variables were interpreted from a local perspective. Indeed, the results of this study could not be extrapolated to represent the state of Illinois due to the small sample size. However, the combination of qualitative data (e.g. about specific perceptions and characteristics of the participants) and the quantitative data constituted a good basis for providing answers to the research questions.

Statistical models – nature and purposes

From the first and second phases of the study, descriptive statistics of the sample were obtained. The study then conducted further analysis using the models

explained below. To ensure the validity and accuracy of the results, one statistical model constituted the basis for data analysis: the Ordered Logit Model (OLM). Principal Component Analysis (PCA) was used on a smaller number of variables to refine some of the outputs. Data processing was carried out through the R statistical software, including the packages R studio for the OLM, R interface for the PCA, and R Commander (Rcmdr).

Ordered logit model (OLM). The Ordered Logit Model was set up to include more than two independent variables. This model enabled us to draw associations between, on one hand, Illinois farm's characteristics and farmers' perceptions about certain issues and territorial approaches (the "relevant variables" based on the variables extracted from the Dutch literature). On the other hand, the model allowed drawing associations among these latter "relevant variables" in order to evaluate whether some of them (e.g. farmers' thoughts, desires, behaviors) could influence or affect other "relevant variables" (e.g. farmers' willingness, interests). The study then employed the OLM in two steps. Quantification of the effects of the independent variables on a given dependent variable could be realized through the measure of the marginal effects, although, as the sample was relatively small, the use of the p-values was sufficient: that is, we could determine the significance or not of an effect. No accurate or strong interpretation of the marginal effects could have been expressed in this study.

Principal component analysis (PCA). This method of data analysis was used between selected relevant variables and aimed at refining the results obtained from the Ordered Logit Model. Its purpose was to determine groups of "relevant variables" correlated to other groups of "relevant variables". Especially in the case of the second

set of variables analyzed through the OLM, the PCA would likely confirm or infirm the results and interpretations.

Model – predictions. Running the models presented above was fundamental to determine the factors required to optimize the integration of conservation practices as part of the farming system in a U.S. setting, and to maximize the correlation between conservation practices and cooperation. Based on the results on how variables identified in the Dutch setting are present in Illinois, and the analysis of the U.S. economic, legal and social setting based on the primary qualitative data collected and the literature review, the study therefore focused on drawing general predictions related to the future of an EC in Illinois. Recommendations about further analysis and predictions are presented in the last part of this study.

Extraction of the results – method

From the outcomes of the statistical analysis, the study extracted the variables for which the effect of the respective estimators was stated as significant at a 95% level of confidence (estimators associated to a p-value inferior to 0.05 imply rejection of the null hypothesis ($\beta_0 = 0$ for instance)). This level of confidence interval was chosen to optimize the accuracy of the results and their interpretations. After observing the p-value, and in case of a hypothetical significant effect of the independent variable concerned on the dependent variable Y, the sign of the estimator was then observed to determine whether the independent variable influenced the dependent variable negatively or positively.

Data Processing

Ordered logit model (OLM)

As explained previously, the Ordered Logit Model was applied in two stages.

Theory. The Ordered Logit Model can be presented as below. y_i^* is an index of the farmer's willingness/feeling/perception. It is therefore a measure of the farmer's level of feeling concerning a given issue (e.g. perception of the success of U.S. and Illinois conservation programs). y_i includes the values (1,2,3,4,5,6), as the questionnaire applied 6 Likert-scale questions for the quantifiable questions. An interval decision rule is then set, considering the indicators u_i :

$$y_i=1 \quad \text{if} \quad y_i^* \leq u_1$$

$$y_i=2 \quad \text{if} \quad u_1 < y_i^* \leq u_2$$

$$y_i=3 \quad \text{if} \quad u_2 < y_i^* \leq u_3$$

$$y_i=4 \quad \text{if} \quad u_3 < y_i^* \leq u_4$$

$$y_i=5 \quad \text{if} \quad y_i^* > u_4$$

The threshold values (u_1, u_2, u_3, u_4) are unknown. In theory, they are different for each farmer. The model can then be written as following:

$$y_i^* = \beta_0 + x_{1i} \beta_1 + x_{2i} \beta_2 \dots x_{ki} \beta_k + \epsilon_i$$

$$y_i^* = x_i' \beta + \epsilon_i, \text{ with } \epsilon_i \text{ the disturbance term}$$

The x_i are the independent variables for $i = 1, \dots, k$. The statistical package estimates the β 's (estimators).

Variables of the OLM – step 1. The independent variables considered in step 1 of the OLM analysis were the “general quantitative variables”, meaning, the quantitative variables related to general characteristics of the farm and the farmer. (See table 4-1). The dependent variables were the “relevant quantitative variables that is, those variables which relate to perceptions/desires/behaviors of the farmer vis-à-vis the issues and criteria considered in the Dutch EC. (See table 4-2).

Variables of the OLM – step 2. The independent variables considered in step 2 of the analysis are the “relevant quantitative variables”. The dependent variables are the same “relevant quantitative variables” taken individually. Nevertheless, four of these “relevant variables” have been specially selected because they reflect the real potential of these Illinois farmers to be interested in, to accept, and/or to take part in an EC.

Principal Component analysis

From the Ordered Logit Model, the Principal Component Analysis aimed at identifying how certain variables influence other variables in the Illinois context, and thus enabled the prediction of farmer’s behaviors/attitudes from certain variables concerning ECs.

Theory. A Principal Component Analysis has two main purposes. On one hand, it deals with observing profiles/variability of responses among farmers regarding the “relevant variables” and therefore visualizing similarities and differences between profiles of responses. On the other hand, it deals with observing connections and relationship between variables and designing variable-indicators which could synthesize these correlations. In the framework of this study, it was difficult, even unfeasible, to study any resulting “graph of the individuals”. The axis of the outcome graph of variables represents dimensions of maximum variability. The first principal component has therefore the largest possible variance. Each succeeding component has the highest variance possible under the constraint that it is not correlated with the preceding components. The components are designed through calculations of the correlation coefficient between the variables, via the correlation matrix.

Variables. The PCA processed the “relevant variables” as independent variables. Four of these “relevant variables” had been selected and constituted the

dependent variables. They had specifically been selected because they refer to the way the farmer would see himself as part of an EC. They could be qualified as direct indicators of the implementation of an EC which the sample's farmers would be taking part in. They included: the farmer's willingness to participate in efforts to enhance the identity of the territory, the farmer's willingness to do more in terms of multi-functionality of agriculture, the farmer's perception of working with neighboring farmers in environmentally-oriented projects, and the farmer's perception of working with non-farmers in environmentally-oriented projects.

Purpose. Through the PCA, the study was able to determine groups of variables respectively correlated to these four specific variables. Out of this model, the study was then able to answer the questions: how do the feelings/perceptions/wishes of farmers concerning issues related to the environment, to co-operation, and to the authorities, influence their interest and potential in complying with the attributes defining an EC? Can the farmers' potential of adopting the characteristics of an EC be predicted from this set of "relevant" variables for the Illinois' setting?

Data General Results

This section presents general results of the data collection which characterize the sample and highlight the representation of certain Dutch variables within the Illinois sample population. The results presented as a certain average level/degree observed in the sample's farmers refer to a 6-Likert-scale type.

Sample characteristics

Location of the sample's units. Figure 4-2 shows the locations of the sample's farmers. The background of this map is the Illinois land cover. The different landscapes and the diversity of agriculture can be distinguished. The red points indicate the location

of the sample's units, although incomplete because five of the farmers had not given indication of their location in Illinois (these latter were grain producers with large acreages in production). The "code" associated to each of them corresponds to the participant' identity (the anonymity of the questionnaires was guaranteed to the participants as part of the invitation and distribution process).

Farmers' characteristics. Most of the farmers were over 55 years old – which corresponds to the average age of U.S. and Illinois farmers - and 70% achieved an academic level equal to or higher than college/university completion (17% have a level equal or lower than secondary school). On average, they reported to be "enjoying farming" at a rate of 5.5 - close to the maximum point on the questionnaire's scale. This parameter is important because it defines the extent to which the farmer is willing to engage in his job and therefore is a determinant of the farm's future development pattern. That is, if the farmer is passionate about his/her job, he will not mind putting in efforts towards improving the landscape in his daily practices, and working on the combination of the landscape and nature management in the production system. In case the farmer is not enthusiastic about his job, there is a possibility that it would be difficult to convince him to engage in extra functions such as improving the landscape. This is despite the fact that the integration of activities linked to landscape management and environmental conservation could give another dimension to his job that he had not considered previously. The farmer might then change his/her negative perception regarding his job. Similarly, care about the public image of the farm was high (over 5). Furthermore, all farmers mentioned a relatively high feeling of civic responsibility (4.8 on

average). This parameter was important because it is linked to the intensity of the involvement of the farmer in his territory and with other actors.

The level of risk the farmer is ready or able to take as part of the management of his farm was ascertained via a question about the frequency of new farming practices/technologies undertaken by the farmer. Evaluating the attitudes of the farmer concerning risk-taking (e.g. innovations) was fundamental in this study considering the “novelty” of the EC. Among the sample, 70% of the farmers reported trying one or more than one new practice/technology per year, which reflected some risk-taking as compared to the farmers who try one or less than one new practice/technology every few years. The latter, interestingly, were mostly over 55 years old).

A priority in the EC is the consideration of the environment, from which the projects emerge and the strategies are elaborated. Therefore, farmers’ decision-making process is important. Of the sample, 62% of the farmers affirmed having a farm management decision-making process strictly based on expected revenues. Of the total, 14% of the farmers reported basing their decisions on local and natural characteristics of the environment. The remaining 24% either combined both types or mentioned another type of decision-making process such as the idea of “adding value to life.”

The way a farmer perceives his farm as part of the food production system as a whole gives indications of the degree of possible interactions of the farmer within the system and with other actors in it. Over the sample, 37% of the farmers (all of whom were grain producers) viewed the production system as “a fragmented chain containing the link “farming/agriculture” with minimum collaboration among the various actors,”

while the rest perceived it as “an integral system requiring collaboration among the various actors within the chain and the different levels of authorities” -- implying collaboration both horizontally and vertically. One of the farmers gave his opinion about the position of the farmers in general on this issue: “95% of the system is the top one (fragmentation) and 5% is the bottom one (integral system with collaboration)”.

Production characteristics. Grain producers were the most represented in the sample (86%). 35% were livestock producers with from 4 to 10,000 head of hog, beef, cattle, calf, or horses. Some of them combined both grain and livestock production. The remaining few were either fruit and vegetable producers (highlighted in green in figure 4-2) or dairy farmers. The acreage managed by the farmers varied from 10 to 15,000 acres (4 to 6 ha), with an average of 1700 acres (688 ha). It was observed that 39% of farmers had average sales above \$1 Million per year (€0,74 million) (categorized as very large farms by the USDA). They are represented by the points highlighted in yellow in figure 4-2, and are mostly grain producers. These farms are mainly located in the upper-east part of Illinois and along the Illinois River – the Illinois surface covered by the most intensive and uniform cultured fields (soybean and corn). Most of them evaluated their production to be greater than the Illinois average level of production. In addition, 17% of the sample reported average sales lower than \$100.000 per year (about €74.000 per year) (USDA small farms).

The way a farmer plans for the future of his farm is a determinant factor regarding the characteristics the projects which lead to involvement in an environmental cooperative. For instance, farmers who do not know whether somebody will take the farm over would be reluctant to start and/or invest in an environmental cooperative. In

this study, 50% of farmers affirmed that their farm enterprise would remain relatively stable over the next 10 years, while 35% thought that it would expand significantly in the same time period. The object was to find out whether the enterprises with expected longevity would, based on other criteria, be willing to join an environmental cooperative. While Illinois includes one of the most intensified systems of production and important agrarian areas relatively to the total U.S. agricultural economy, Illinois' big farming enterprises still plan to expand their business, although there was no indication from the farmers about the specific field of expansion (e.g. technology, acreage, market).

Farmers were asked to state the level of impact of certain factors on their production levels. The study would then distinguish the results according to the type of production. The impact of the level of inputs (e.g. fertilizers, genetics, and labor) on the grain production systems was on average 4.7, and about 4.1 on the livestock production systems. The factor "efficiency of the use of the natural resources (e.g. through application of precision agricultural technologies)" had an impact factor of 4.3 on grain production systems and 3.3 on livestock production systems. It was observed that crop production demanded a higher supply of external inputs and higher focus on the efficiency of the use of natural resources as compared to livestock.

Variables' representations - general highlight

Farmer and territory. The questionnaire aimed at assessing the degree of territorial identity/image perceived by the farmer, which is, determining whether he feels part of a larger system to which he is contributing and which shapes his territory and values. The willingness to identify with a region, to be proud of it, and to promote it are important factors in the development of an EC. The identity of a territory is characterized by the sharing of social values, the existence of networks, the strength of social

coherence, and the sense of belonging to the same community (some of these factors explain the existence of the Dutch ECs). Most of the farmers affirmed that they contribute to the identity of their territory (mean of 3.8, varying from 1 to 6). They reported giving their contribution through “specific products”, “mechanization of farming activities”, “attraction of many u-pick customers”, “sustainable agriculture education”, “organic production”, “willingness to try new technology”, “rotational grazing”, “performance tested bulls”, “raising of non-HMO corn high quality cattle”, “use of precision farming practices”, “use of cell grazing”, “sale of heifers for top price to other breeders”, “trying to foster a good impression of farming to city friends and other people”, and “growing regulated soybeans for major seed companies”. One farmer commented about this question as follows: “Socialism/communism has failed. Wake up before your ideology kills/starves millions more!” It appeared that the notion of contributing to the identity of the territory is interpreted by the farmers mostly in terms of agricultural practices.

A significant number of the sample’s farmers (37%) reported producing a specific product that they would like to expand and market, but for which they are not able to do so. Most of them thought that higher cooperation with other farmers of the area would not enable them to successfully expand and market this specific product mainly because of the constraints it would lead to (e.g. less freedom, increase in competition). The rest (part of them fruit and vegetable, and organic producers) thought that they could - through cooperation – be markedly stronger in the market.

Organic farmers perceive cooperation very positively, according to a representative of an Illinois organic farming cooperative. Besides, the part of Illinois

farmers who would like to develop specific products but are not able to do so as part of the current farming system constitutes a real potential regarding the purposes of the EC. These farmers probably lack the means and incentives for the development of markets for alternative products.

Multi-functionality. As part of this study, the aspect of farm multi-functionality was a fundamental criterion to be analyzed. From the perspective of the farmer, working towards multi-functionality implies the development of specific strategies related to natural resources to make it compatible with the existing farming system. In this study, 64% of the farmers carried out at least one of the activities associated with the definition of multi-functionality, either consciously or unconsciously (only 47% have heard about the concept of multi-functionality). The activities related to farm multi-functionality are categorized into several dimensions defined by the second pillar of the European Common Agricultural Policy: landscape management, wildlife habitat creation, biodiversity maintenance; improvement of nutrient recycling and carbon sequestration; water management, improvement of water quality; renewable energy (wind, solar, biomass); contribution to rural cohesion, historical heritage, agro-tourism activities; contribution to local food security and food safety. The first three categories were the most prominent in our sample; each of them representing 40% to 50% of the farmers studied. It was also observed that 50% of the farmers reported focusing on at least two of these categories; these farmers were mainly grain, fruits and vegetable producers. The focus on multi-functionality therefore seems to apply more in the case of crop production systems as compared to livestock production systems. Among the farmers, 70% defined their profession as a resources protector. The investment by the farmer in

activities towards farm multi-functionality reflects the willingness to focus on non-commercial benefits of the farming practices, on the surrounding natural environment, and on the management of the natural resources and landscape. It is closely related to the importance of the resource protection as part of the profession. In particular, these farmers could be interested in a structure such as an EC as they would get the opportunity to be rewarded for their actions.

Farmer and extra-farm activities. The study looked at both farm multi-functionality and diversification. The study focused on the one hand how the farmer thinks about multi-functionality of agriculture, which is defined by increasing the positive externalities resulted from agricultural practices, for example, nature and landscape management (VAN HUYLENBROECK, 2007). On the other hand, we looked at how the farmer diversifies his farm and engages in off-farm and non-farms activities. Evaluating the importance of extra-farm activities aimed at assessing the degree of diversification of the farm and its potential for multi-functionality. The identification of both the extent to which farmers are performing activities other than pure farming in their day-to-day lives and the value these activities add to the farm, was useful to assess the degree of feasibility of integration of additional or different conservation practices into the farming system. An EC would probably be more suitable to a farm which is diversified rather than to one only focusing on the production aspect. However the latter could also be interested and motivated in taking part in an EC because of opportunity to gain extra revenue and to benefit from advantages and contracts they had not been previously offered. These approaches were analyzed in more details in the statistical models and the identification of correlations.

In this study, 36% of farmers carried out at least one non-farm activity (e.g. environmental and landscape management, on-farm sales, agro tourism) and 70% were involved in off-farm activities (e.g. farmers' organizations, other associations, political involvement). Off-farm activities are of great importance to Illinois farmer's day-to-day lives. Compared to Europe, the U.S. is known for the high level of people's involvement in voluntary organizations. Among the farmers who specified the reasons of their extra-farm activities, almost 50% of them mentioned their desire to improve the image of the agricultural sector. This explanation which was mentioned most was followed by the "willingness to enhance social contacts", and "pleasure." "Spreading the risk of extra farm income" was only mentioned once. The study can therefore assume that farmers involved in extra farm activities (either on-farm or off-farm) do so partially in the perspective of contributing to the identity of the region. Those activities were generally not implemented by default (e.g. to compensate for bad times for the farming products). The other reasons which were freely mentioned by the farmers were: "ethical", "promote conservation", "protection of the resources", "further understanding of agri-business as well as financial experience for large business", and "a sense of social responsibility". For the farmers who rely on extra-farming activities for extra revenue, the revenues generated from these activities varied from 50% to 90% of the total revenue (production system in second place in terms of total household income. For the other farmers, extra-farm activities generate from 0.5 to 10% of their revenues.

Farmer and environment. The place of the environment from the perspective of the farmer was a fundamental factor in the framework of this research. In this study, 77% of the farmers affirmed the importance that farmers play (as determinant actors) in

solving environmental issues, and similarly 79% felt that they play a key role in the management of regional landscapes. These significantly high rates were accompanied by 92% of farmers who reported implementing conservation practices as personal initiatives, and 75% reported implementing nature and landscape management because of personal incentive. Although some farmers did not accept partial responsibility of agriculture for the environmental damages (“how a farmer cares for his land is his prerogative; If others would like to care for land in a different manner they have as much right as anyone else to buy a farm and treat it as they feel necessary”, “farmers know how to correct or fix the problem”), 85% reported they have made changes in their farming system to stop or prevent further environmental degradation. Those who commented mentioned “cover crops”, “prairie restoration”, “leaving grass waterways whenever erosion patterns occur”, “working a longer fallow period into the rotation to allow the natural soil environment to recover”, “reducing or eliminating tillage”, “capturing feedlot runoff to minimize erosion”, “drainage improvements”, “vegetation to hold soil and preserve bee’s habitat”, “cell grazing to reduce erosion”, “organic certification”, “240 acres permanent pasture”, “long rotations to enhance fertility”, “soil sample every acre to determine what fertilizers to apply, in order to avoid over applying or under applying”, “more wildlife areas”, and “more soil friendly fertilizers”. On the other hand, other farmers were not concerned by the question: “What degradation? Don’t agree”, “Are we degrading now? I manage to keep the environment and my crops healthy”, “farming gets blamed for a lot of problems caused by urban areas”.

Almost half of the farmers perceived the increasing demand for more sustainable agricultural production and more environmentally-sound products as an opportunity, and

25% as a potential for adaptation. Fifteen percent of the farmers perceived it as a constraint on change or a threat. A few comments of the farmers about this question were interesting; some reported that a more sustainable agricultural production and more environmentally-sound products are “the only path to a future for the planet and humankind”, while other said; “If we weren't already sustainable, we wouldn't be here, who is demanding more sustainable agriculture?”, it is “marketing”, and “driven by misinformation”. The EC has proven to be an alternative and opportunity for more sustainable agriculture. The study assumed that the farmers approaching this increasing demand as an opportunity would be more likely to participate in the functioning of an EC. Nevertheless, some farmers have an opposite approach. One of them stated for instance that “farmers need added protection from left wing groups like Sierra Club, PETA, HSUS (Human Society of the U.S.). Groups like these pose the greatest threat to farmers and consumers paying a higher cost for food. We have the cheapest and most abundant supply of food in the world. By the year 2050 we will need to double world food production and 75% of this will come from technology increases. Groups like these do nothing but hinder production and increase regulations and costs to farmers that is not needed”.

In this study, only one farmer mentioned previous enrollment in the Chicago Carbon Exchange Market. Carbon sequestration markets were criticized vehemently by some farmers, especially regarding their usefulness, costs and consequences for consumers: “it's a joke! And anti-business. They might as well just raise taxes on Americans because the public is ultimately going to pay through higher costs due to regulation”.

Although Illinois is characterized by an intensive farming system, most of the farmers are (or say they are) open to change in their practices towards a greater focus on the environment.

Farmer and conservation programs. The questions related to the conservation programs aimed at assessing the degree of farmers' satisfaction with U.S. conservation programs. This criterion was the main reason for the development of EC in the Netherlands. This study specifically attempted to assess the degree of match of the programs with the characteristics of the territory and the way farmers feel about them.

It was observed that 67% of the sample's farmers were enrolled in conservation programs and 33% were not. The given conservation programs were the CRP, WRP, EQIP, WHIP, CSP, cover crops, filter strips, Hill Prairie Restoration, windbreaks, nutrient management, controlled drainage, CREP, and minimum tillage. There were no specific farm' or farmers' characteristics that differentiated the farmers who were enrolled from those who were not. However, application of the statistical models gave more indications about this. Most of the farmers (58%) explained they enrolled in conservation programs due to their "conviction of its importance in environment and natural resources preservation". Other secondary reasons reported by farmers include "extra farm income" and "improving the image of agriculture (social pressure)". Only 8% of the farmers reported enrolling in conservation programs as a requirement to receive commodity payments. These few farmers were relatively young (around 30), grain producers, with an average acreage of about 900. One of the farmers reported to have already implemented practices related to conservation and thus "signing up was easy" for conservation programs.

The questionnaire also looked for the barriers in the application and enrollment in conservation programs. Most of the farmers who are already enrolled also reacted to this question. It was observed that 52% of the farmers mentioned “heavy administration burden” as a barrier, followed by “lack of knowledge” and “high requirements”. Farmers who reported “lack of knowledge” as a barrier in joining conservation programs were over 55 years old. Other barriers reported by farmers included “limited program funding”, “possible achievement of what the programs espouse at less cost and without hassle”, “lack of programs”, and “lack of government jobs to do it”. The conservation programs’ application processes are not accessible and easy for all farmers. Indeed, the government’s approach in dealing with the environment and conservation programs was particularly criticized as adaptation to the programs is difficult. Farmers judged the transaction costs associated with the conservation programs (bureaucracy, administrative procedure, time, pre-evaluation etc.) relatively high (4 on the Likert-6-scale). However, they put their investments costs, operational costs and time spent on conservation practices at a relatively low level (3.3). A significant percentage of farmers (25%) declined to enroll in conservation programs because of the investment costs involved. One farmer reported his failure to enroll in conservation programs was not related to monetary costs: rather it was “resulting from intrusive regulatory agencies”. Twenty percent of the farmers said that they had already adopted an environmental practice against their will. The farmers said that conservation programs apply/fit to their particular farming practices at a level of 3.6 on average. The farmers who reported the lowest level of suitability of the conservation programs to their farming practices were mainly small farms. Twenty five percent of farmers (considering both the ones who

enrolled into CPs and the ones who did not) claimed that they wished for more advice from authorities or external advisors regarding the application of conservation practices. There was a relatively neutral position among the farmer about the way conservation programs possibly constrain the management of the farm. An important finding is that 60% of the farmers clearly wished for more freedom in the choice of conservation practices to accomplish given environmental objectives, 23% were neutral on this point, while 17% did not so wish. There was a clear disagreement among farmers about stricter environmental policies. Farmers' opinions about more targeted environmental policies were either similar or more positive. With an average score of 3.2, farmers judged that conservation programs have been relatively unsuccessful in fulfilling their objective to restore and preserve the environment and landscape.

Basically, Illinois farmers want more freedom in the implementation of conservation practices and fewer requirements/less monitoring from the authorities. For instance, one of the participants strongly stated his disagreement with the way environmental policies are implemented by the authorities and the specialized environmental organizations or agencies: "In most cases farmers are continually improving their farming practices to become more efficient and conscious of the environment. Government policy is the worst kind of regulation because it is usually a one size fit for all situations that doesn't really work for everyone because it is neither understood and usually does not include farmers' input. Environmental groups are the enemy of farming as well because of their lack of understanding of farmers as well as their inability to understand budgets and management". To the farmers, stricter

environmental policies did not seem a solution to the environmental issues. However, more targeted environmental policies seemed welcomed.

In this study, significant part of the farmers showed disappointment with if not negative opinions about the conservation programs offered by the government and their process of implementation. The application of the Ordered Logit Model aimed at specifying this assumption, and analyzing the causes and consequences. Beyond the conservation programs, certain farmers claimed their high dissatisfaction with all governmental regulations: “farmers do not choose their occupation to be constantly told how to run their operation. They work hard to do what is right most of the time and having a government as corrupt and useless as ours telling us how to run our business doesn't make much sense. Farmers working together to establish guidelines not regulations that then give them an opportunity to earn money for their land will be the best opportunity. The problem is that it is highly unlikely to establish a conservation program that pages like traipsing crops on the land”.

Farmer and cooperation. In this study, 55% of the farmers were part of a farmers' cooperative (on average, most the U.S. farmers are part of an agricultural cooperative, including any type of cooperative). The types of cooperative of which the farmers were part of include credit, supply, marketing, finance, and input buying cooperatives, but also rural electric cooperative. The study aimed at analyzing differences of perception of an EC from both the perspective of farmers who are members of farmers' cooperatives and those who are not. The member-farmers reported “cheaper prices of inputs” “better market opportunities”, and “better access to the information”, as the main benefits of being part of a cooperative. The benefits of

“easier to follow administrative and governmental requirements” and a “learning system” were rarely mentioned. Other benefits reported by some farmers include “insurance discount” and “good service and location”. In contrast, some farmers stated that they did not get any of these kinds of benefits through the cooperative, but it was only the way they could conduct their business (the cooperative was the only way to maintain an economic advantage). Other benefits from the cooperative might be present but could not be captured by the questionnaire. Further, the members of cooperatives felt relatively not tied to the goals and guidance of the cooperative (on average 2.1). It was observed that 86 % of the members reported being satisfied by the services and options offered by the cooperative (they correspond with their expectations), but 35% affirmed that there were some options missing on the part of the cooperative. Interestingly, 27% wished for greater independence from the cooperative, in relation to the authorities.

In this study, farmers’ cooperatives seem very important for the farm from an economic perspective. However, Illinois farmers’ cooperatives did not appear as vectors of knowledge and skill-sharing, or a learning system, which was reflected by another result related to the level cooperation among the cooperative’s members experienced by the farmer - rated at 3 on average. The farmers concerned were mainly grain producers with a high level of acreage in production.

Data Results - Ordered Logit Model – step 1

The results of the Ordered Logit Model are presented based on the various issues this research study was concerned with, based on the perspective of the Dutch EC. From the observations, interpretations were formulated. Relevant statistics extracted from the data collection, as well as relevant qualitative data, were also incorporated. The variables whose values are affected by general characteristics of the

farmers or by other relevant variables (ref. step 2) were the ones which this study focused on.

Interaction of the farmer with the environment, landscape and natural resources

Concern of the farmer about the degradation of the environment and landscape, and the exhaustion of some of the natural resources (e.g. biodiversity, bees, water quality). All p-values associated to the estimators of the independent variables (cf. table 4-1 for the list of independent variables) were above 0.05. There was no significant effect of any of the independent variables on the degree of this concern by farmers. Besides, this question had an ethical dimension, therefore any significant effect would have needed to be taken with precaution because it was very tempting for the farmer to manifest his concern about this issue in such a questionnaire in order to conform with society expectations, although 9.6% of the sample's farmers clearly affirmed that they were not concerned at all by this issue.

Perception of the farmer concerning the conservation programs

The opinion of the farmers about the appropriateness or suitability of the environmental conservation plans on the territorial or regional environmental issues was a main reason for the development of ECs in the Netherlands. The application of the OLM aimed at highlighting any correlation between general farms or farmer's characteristics and the feeling of the farmer concerning the conservation programs.

The OLM-step1 did not show any correlations between farm's general characteristics and the farmer's enrollment into conservation programs, not even the farm size. In Europe, some studies demonstrate the curious relationship which exists between the size of the farm and the implementation of conservation practices and landscape management. On the one hand, it is observed that mostly small and middle-

sized farms are involved in conservation practices. On the other hand, the big farms have more capacity in their business systems and budgets to implement conservation practices. It is more cost-effective in terms of investment because of their larger acreage. There is a paradox in that, as some Dutch studies have shown (GLASBERGEN, 2000, p.13), small-sized farms sometimes face difficulties being members of ECs because of the need to develop environmental strategies to meet some collective objectives, and to imagine and implement innovations in certain cases. Small farms can therefore be at risk of survival when undertaking environmental initiatives.

In the present study, most of the farmers who were not enrolled in conservation programs (65% of those not enrolled) are engaged in livestock production. It was the only qualitative data available from which a connection could be drawn. The conservation programs offered seem more designed for crop producers than for livestock producers.

Impression that appropriate conservation measures and environmental regulations are implemented to handle the existing environmental issues. The p-values results indicated that the higher the average sales of the farm, the more likely the farmer to think (or report) that appropriate measures have been implemented to address existing Illinois environmental issues. Farmers who were members of farmers' cooperative also more likely had the impression that environmental issues were properly addressed. However, only 32% of the farmers in this study reported having observed environmental degradation or environmental pollution in their neighborhoods (68% did not). The types of environmental degradation reported by farmers include: "soil erosion" (mentioned several times), "train wreck contamination", "chemical corn and

soybean farming which degrade the health of the soil, polluting the ground water and well water, destroying natural habitats, causing soil erosion, decreasing biodiversity of wildlife and domesticated livestock and crops”, “open dumping”, “spray drift”, “water quality issues”, “soil organic loss”, “wildlife habitat loss”, “lake contamination”, “too much tillage”, “too much use of fungicide, insecticide and herbicide”. A general comment about this issue was “farmers could be better stewards of the land”. The farmers who had observed environmental degradation were relatively spread over the State. From the map of the units’ locations, it seemed that they were mostly located next to forests, major streams, or near an urban area.

From the above results, it was observed that farmers running big farm businesses (relatively) do not seem connected with environmental issues or are not sensitive to them, perhaps because environmental issues do not appear as a limiting factor in the productivity of their farming system. Also, farmers’ cooperatives do not highlight and deal with territorial environmental issues as part of their strategies/planning (e.g. promotion of incentives towards environmental protection). The study therefore assumed that either the farmers have other goals and priorities than environmental preoccupations (e.g. output), or farmers believe that environmental issues are effectively well handled in the area where farmers are operating in.

Farmer’s thoughts about how well current and historical U.S. and Illinois conservation programs have fulfilled their objective to restore and preserve the environment and landscape. Figure 4-3 is the outcome of the application of the Ordered Logit Model on this specific variable. It was observed that the higher the average farm sales and level of multi-functionality of the farm (number of activities

associated with multi-functionality), the less likely farmers think that conservation programs have fulfilled their goals. Besides, the higher the efficiency of the use of resources (e.g. through application of precision agricultural technologies), the more likely farmers think that conservation programs have fulfilled their objectives.

From this result and the previous one, the study can then assume that the largest farm owners expect more outcomes from the conservation programs other than only dealing with environmental issues. These farmers probably perceive the conservation programs as capable of improving the farm productivity, for instance by improving soil fertility and water drainage. Farmers who focus mainly on the farm's productivity and performance (e.g., use sophisticated technology) are satisfied with the results of the conservation programs. Farmers who focus on multi-functionality within their farm probably do so to compensate a lack of effectiveness or adaptation of the environmental conservations plans and practices offered by the conservation programs.

Farmer's desires and interest of interaction with the other farmers and non-farmers

Feeling of trust with the other farmers - Extent to which farmers are open to work collaboratively and share information with the farmers in the area. A quarter of farmers in this study reported to fully trust their neighboring farmers in what would be termed as business collaboration (maximum level on the Likert scale). From the OLM outcome and the detection of the significant independent variables, the higher the level of pride for the territory, the more likely the farmer trusts his/her neighbor. Pride for the territory is indeed related to a certain level of well-being ("feeling good") of the given farmer about his/her territory and consequently with the rest of the farmers in the region. However, the higher the average sales and the importance of the level of inputs in the

farming system, the less likely the farmer is willing to work in collaboration and share information with other farmers. Equally, being a member of a farmers' cooperative and preferring a high level of external guidance negatively influenced the feeling of trust for other farmers.

Farmers with smaller farms were more likely to express a high feeling of trust for other farmers. Farmers who considered themselves independent from regulations regarding the farm management manifested a higher feeling of trust with the other farmers. The study can then assume that governmental authorities do not implement a framework encouraging confidence for farmers to work together, and therefore a climate of trust among farmers themselves and with governmental authorities. This was reflected in the fact that Illinois farmers, and probably U.S. farmers at large, were extremely reluctant to any investigations or surveys targeting them, even if it was only concerning an interest in their work and situation. To illustrate this point, one of the participants explained that: "As a group, I believe farmers are surveyed more than anyone I know. I get survey solicitations all the time, mostly via computer but in the past it was via phone calls at inopportune times. The vast majority of farmers are annoyed by this and rarely complete a survey. To get farmers to respond, survey companies pay ~\$25-50 (~€19-37) for a survey which takes 20-40 minutes to complete. Sometimes, perhaps twice per year, I get invited to a local hotel conference room for a focus group survey meeting where the payout is \$100-150 (~€74-110). I do a lot of surveys each year and usually make about \$500/year total (€370/year)".

Farmer's appreciation degree of working with neighboring farmers on environmentally-oriented projects. OLM indicated that farmers enrolled in

conservation program were more likely to work with their neighboring farmers to address environmental issues. The higher the contribution of a farmer to the identity of his/her territory and his/her frequency of trying new or innovative agriculture practices (risk-taker), the more likely the farmer is open to co-operate with neighboring farmers on environmentally-oriented projects.

Farmers who are members of a conservation programs were naturally more open to innovative forms of actions aiming at environmental conservation than the one who were not, which represented a high majority of the farmers in this study. The level of risk the farmer is willing to undertake in his farm management decision-making significantly affected the interest of the farmer concerning that particular issue; collaborating with other farmers in environmentally oriented projects could be associated with something uncommon requiring a certain level of risk-taking. The farmers viewed this type of collective action as a sort of contribution to the development of the identity of the territory.

Farmer's sharing of knowledge about his/her profession with other farmers. A significant percentage of the farmers (40%) chose the highest level of the Likert-scale (level 6) concerning their level of knowledge sharing, and 25% chose the level 5. According to the OLM, farmers who engaged in voluntary organizations appeared more likely to share knowledge about their profession with other farmers (65% of the farmers are members of at least one voluntary organization) than farmers who were non-members. The voluntary organizations mentioned by the farmers are the church, intentional community, farmers' market, Illinois Beef Association, Illinois Farm Bureau, Annie's Project-Education for Farm Women, Soil & water conservation district,

Land use council, Resource, Conservation & Development, peer groups, University of Illinois Cooperative Extension Board, Cattlemen's Association, Illinois Stewardship Alliance, American Herbataurus Society, community theater group, community jazz band, Volunteer Firemen, Ogle county Prairie Preservation Society, and local Corn Growers Association.

Farmer's sharing of professional skills with external stakeholders (non-farmers). It was observed that the higher the level of income generated from off farm activities, contribution of the farmer to the identity of the region, and his desire for compatibility between farming practices and surrounding environment and natural resources, the more likely the farmer shares professional skills with external stakeholders (non-farmers). Also, the higher the importance of the efficiency of the use of the natural resources, the less likely the farmer shares professional skills.

The farmer's involvement outside the farming profession, his contribution to the identity of the region and his consideration of the surrounding environment positively influenced whether he shared his skills with non-farmers. In order to get the best out of the external stakeholders and thus to improve his farm as well as considering the regional identity and the environment, the farmer is probably required to expose his situation and farming interests. A hypothesis for the negative effect may be that a high focus of the farmer on the efficiency of the use of the natural resources requires efforts and maybe leads to a feeling of competition with other farmers in order to remain in a better position than others.

Farmer's use of external assistance and/or technical advice to improve the management of the farm. External assistance is mainly characterized by the

intervention of specialized organizations or agencies bringing expertise or suggestions related to a certain issue in the farming system, (e.g. production techniques, accounting practices, investment strategies). On one hand, it reflects the openness of the farmer. On the other hand, a high level of use of external expertise can reflect uncertainty and lack of confidence concerning the farm management. It all depends on the intervention purpose and the farmer's interest.

Farmers who have livestock, are enrolled in conservation programs, and/or seek compatibility with the surrounding environment tended to use external assistance in relation to the management of their farm. The higher the number of non-farm activities carried out by the farmer, the less likely the farmer uses external assistance.

The desire for suitability and optimal compatibility of the farming practices with the natural environment often requires integrating different fields of knowledge to evaluate the most optimal method. This, then, frequently leads to the need to access external expertise. Some conservation programs cannot be implemented by the farmer alone. Farmers often need the help and support of external agencies to implement their conservation plans. This may involve extra costs to be considered when applying for membership in conservation programs, and sometimes these costs are not predictable. Livestock production appears seems to require more "attention" and technical evaluation (at least in the Illinois context), hence the increased need for external advice for livestock.

Interests and desires of the farmer related to the management of the farm and to the food production system at large

Interest of the farmer in doing more towards the multi-functionality of the farm. The OLM results indicated the higher the variety of activities related to multi-

functionality, and the higher the average sales and the revenue generated from extra-farm activities, the more likely farmers show interest in the multi-functionality of the farm. Further, the higher the level of a farmer's risk-taking and his pride in the region, the more likely the farmer is interested in enhancing or focusing on farm multi-functionality. In addition, farmers involved in cooperatives and voluntary organizations, and those enrolled in conservation programs, were also more likely to be interested in this issue. In contrast, the higher the acreage, and the farmer's giving importance to civic responsibility, the less likely the farmer is interested in multi-functionality.

Thus, with respect to this variable, farmers who already carry out activities related to the concept of multi-functionality are more likely to increase the efforts in this direction. This is probably due to the fact that the analysis of the strategies and their suitability with the farm system - most difficult part of the process - is already established. Enhancing the process is then easier. In addition, the activities linked to multi-functionality seemed perceived as costly by the farmers, because the higher the average farm sales, the higher is the interest in multi-functionality. Therefore, more likely the highest revenue can facilitate firm development of farm multi-functionality. The EC could face this aspect due to the strength of the collective action which implies that it is no longer solely at the individual level where farmers have to deal with this issue. However, farmers who own very large production acreages might not be aware of how to exploit such strategies by implementing them on large scale. Smaller farms feel more concerned or affected by this aspect. The higher the focus of the farmer on external inputs, the less likely he considers the natural environment, and therefore the less likely he is interested in farm multi-functionality. Cooperation with other farmers and non-

farmers may then be seen as a positive, as they develop strategies related for multi-functionality which in the long term positively affects farmers as well as the territory and community as a whole.

There is an existing willingness among Illinois farmers (as far as this study sample is concerned) to engage themselves in their territory by not only focusing on the production aspects of the farming system, but also on environmental conservation and resource protection. No correlation with general characteristics (e.g. age) has been observed through the statistical model relative to the level of pride felt by the farmer for the territory.

Farmer's feeling of disconnection between the food production system and consumers. The higher the importance of the identity of the region for the farmer, the level of multi-functionality and the average sales of the farmer, the more likely the farmer feels a disconnection between the food production system and local consumers. Also, the higher the level of off-farm activities carried out by the farmer, less likely the farmer feels the disconnection.

Focusing on farm multi-functionality and thus on aspects other than food production reflects a willingness towards re-connecting with consumers. Large scale farmers appear conscious of the distance between farming and the consumers. Only 8% of farmers in this study participate in local food systems such as the Red Cross, CSA, u-pick farms, farm stands, and farmers' markets. This proportion of farmers is similar to the proportion of these farmers in the overall Illinois farmer population. The main benefits from the short food supply chain initiatives reported by these farmers include "better price" and "know the customers". In the framework of this study, a higher

representation of the category of farmers who are members of local food systems could have given a more clear indication of the potential of those farmers who would adopt the structure EC. Finally, as could be expected, farmers involved in off-farm activities collaborate with stakeholders from other professions.

Interactions between the farmer and the authorities

Farmer's feeling of not being given any or enough say from the authorities in the environmental policies that affect him/her. The higher the number of non-farm activities carried out by the farmer, the more likely he feels deprived of any or enough say by the authorities.

There may be shortage of incentives, efforts and structure towards the support and help for the farmer in developing extra farm activities on farm. Farmers did not feel encouraged and listened to regarding their willingness to develop new source of revenues within their farm which could contribute to economic development of the area in the long term. Regarding this issue, the EC could enhance the ability of farmers to negotiate with authorities and enhance their opportunities to be listened to.

Conclusion

From the first application of the OLM, a few of the relevant variables which had been identified as part of the Dutch environmental cooperative were observed in the Illinois setting. More detailed conclusion and interpretation about their representation will be given in the discussion section of this report. However, some general features of the Illinois farms can be underlined from these results. In this study it was observed that there was relatively a high level of sharing of knowledge among farmers, and between farmers and non-farmers, a relative openness to innovative forms of environmental conservation, a certain level of dissatisfaction with the conservation programs, and pride

of farmers for their territory. The specific farming types or farmer features which need to particularly be underlined were mainly the livestock producers, the small scale farms, farmers engaged in multi-functionality, and the farmers engaged into off-farm activities. These criteria could indeed contribute to potential for acceptance of and eventually integration into an environmental cooperative. More explanation will be given in Chapter 5.

The other variables processed in the OLM – step 1 have not been significantly affected by any of the independent variables (general characteristics of the farmer and farm). These variables are: the “care about the public image of the farm”, the “perception of cooperation between farmers to combat environmental issues”, the “interest in participating in efforts to enhance the identity of the territory”, the “importance of the role of the farmer in nature and landscape management”, the “importance of the role of farmers in solving environmental issues”, the “feeling of responsibility to implement conservation practices”, the “implementation of conservation practices under personal initiatives”, the “implementation of nature and landscape management under personal initiative”, the “feeling about increasing farmer’s involvement in conservation practices”, the “feeling that more cooperation in nature and landscape management would bring to better environmental results”, the “effect of more financial support on the involvement of farmers in landscape and nature management”, and finally the “perception of farmers of working with non-farmers on environmental projects”. The present sample did not reflect any significant effect of the farmer’s general characteristics on those dependent variables, through the OLM. However, this does not mean that they are nonexistent, especially if the whole of Illinois was to be

considered. Step 2 of the OLM will bring further indications about the role of these variables and their connections.

Data results - Ordered Logit Model – step 2

The second application of the OLM concerned the “relevant variables”. Each of them was analyzed as a dependent variable relatively to the other “relevant variables” (independent variables). A higher focus was put on four specific variables mentioned previously: the farmer’s willingness to participate in efforts to enhance the identity of the territory, the farmer’s willingness to do more in terms of multi-functionality of the agriculture, the farmer’s perception of working with neighboring farmers in environmentally-oriented projects, and the farmer’s perception of working with non-farmers in environmentally-oriented projects. The model aimed at designing correlations between these four specific variables – reflecting the potential for the implementation of an EC.

Farmer’s willingness to participate in efforts to enhance the identity of the territory and to promote other unique characteristics of the region (V1)

Logically, the higher the interest of the farmer in increasing his contribution to the territory, the more likely variable V1 is high. The higher the farmer’s feeling of responsibility to implement conservation practices and his trust for other farmers, the more likely V1 is high. There were no specific criteria distinguishing the farmers who felt a high responsibility to implement conservation practices from those who did not, except that all of those possessed the highest level of education on the Linkert-6-type scale. Contribution to the identity of the territory was slightly associated with taking care of and preserving the environment, and according to the way the farmer interacts with other farmers (his/her well-being as a member of farmers’ community). Surprisingly, the more

a farmer shares his professional skills with external stakeholders, the less likely is variable V1 to be high, perhaps because the choice to contribute to the identity of the territory is very personal. Also concerning the identity of the territory, the model showed that the higher the farmer's impression to be influenced by his neighboring farmers and his feeling that appropriate measures are implemented to deal with the environmental issues, the more likely the farmer is interested in increasing his contribution to the identity of the territory. Pride in the territory was a relevant criteria in the frame of this research study because it determined the extent to which the farmer was ready to get involved and to contribute to the development of his rural area. The application of the OLM on the dependent variable "farmer's pride of the territory" led to: the higher the interest of the farmer in contributing to his/her territory, his feeling of responsibility to implement conservation practices, and his/her level of confidence working collaboratively with other farmers, the more likely the farmer is proud of his/her territory.

The influence of other farmers was significant in Illinois and affects the way farmers are involved in their territory. Illinois farmers are (naturally) more likely to promote a territory with minimal environmental issues. The interest in promoting the territorial identity did not seem to be associated with working on actions towards the restoration and protection of the environment because the farmers who thought that appropriate environmental measures are implemented were mainly the one interested in developing the identity of the territory. However, when it concerns putting a lot of effort into preserving the identity of the territory, this was associated with the implementation of conservation practices. At the level of effective actions towards the development of the regional identity, there was a feeling from certain farmers of the need to deal with

the current environmental issues because they can more likely be a threat to the identity of the territory and Illinois as a whole. From this perspective, conservation practices are perceived as a way to improve and sustain the development and the image/identity of the territory.

A farmer's care about the public image of the farm implies that local people take into consideration the external appearance of the farm and its functioning, and pay attention to the effects of the farm on the territory. Also, this notion reflects an openness of the farmer outside his farm, for instance on the attractiveness of the surrounding farms. The more the farmer takes care of his farm's image, the more the farmer is interested in contributing to its identity and consequently the more the farmer contributes to the identity of the territory as a whole. The application of the OLM on the dependent variable "level of caring about the public image of the farm" showed that farmers who feel influenced by other farmers, who implement nature and landscape management because of personal initiative, who use external assistance and advise related to the management of their farm, who trust other farmers, enjoy farming, and feel a disconnection between the producers and the consumers were more likely to pay higher attention to taking care of their farm. When a farmer reported that he/she wished stricter environmental policies and would consider being involved more in nature and landscape management if there were more financial supports, the less likely that farmer sees importance in the public image of the farm.

The well-being of the farmer in his territory and with other actors determines the importance of the image of the farm to the farmer, and it is reinforced by the support of other farmers from the same area. Also, it is likely to be an incentive to get closer to

consumers and other citizens, by making the farm “accessible”. On the other hand, farmers who have a positive opinion about stricter environmental policies and financial supports in nature and landscape management could be relying on these external supports to take care of the image of the farm. The organizations in charge are then viewed as substitutes to the activities that the farmer could integrate into his/her day-to-day practices.

Farmers’ interest and willingness in working with neighboring farmers in environmental projects (V2)

The higher the farmer’s feeling of responsibility to implement conservation practices, the more likely variable V2 is higher.

The farmer’s perception that farmers’ cooperation would be beneficial to combat environmental issues is more likely to be higher if the farmers’ feeling of contributing to the identity of the territory, willingness to participate in efforts to enhance the identity of the territory, willingness to do more towards the enhancement of the agriculture multi-functionality, feeling that he is not given any or enough say from authorities in the environmental policies that affect him, his wish for stricter environmental policies, his feeling of confidence working with other farmers, and sharing of professional skills with external stakeholders are also higher. As previously discussed, the importance and contribution towards developing the identity of the farm and the territory is generally a personal rather than a collective idea. This explains why the higher the interest of the farmer in contributing to the identity of the territory, the less likely the farmer perceives the environmental cooperation between farmers as “a plus” to deal with environmental issues. The influence of the neighboring farmers also affected this variable (type of cooperation) negatively. There is therefore no emerging incentive among farmers

towards cooperation to deal with environmental issues. Besides, the higher the feeling that the involvement of the farmer towards conservation practices should be increased, the less likely the farmer considers cooperation as a “good alternative”. Nevertheless, it may be difficult for the farmer to say whether the cooperation among farmers concerning the environment would be a strength or not (some farmers mentioned in the questionnaire that it was not possible for them to comment and thus failed to answer the question). Furthermore, the higher the feeling of the farmer enjoying farming, the less likely the farmer thinks about cooperation as an advantage concerning environmental matter.

Farmers’ cooperation as an advantage in dealing with environmental issues is suitable for farmers who are willing to act and put efforts for development of regional identity and towards farm multi-functionality, who are looking for an alternative besides the governmental environmental policies which they feel are inappropriate, and those who feel obviously confident working with other farmers and sharing their skills with external stakeholders. In general, Illinois farmers, as far as this sample is concerned, are relatively independent and do not imagine cooperation with others as a beneficial alternative. Another result supporting this idea is the higher the concern of the farmer about the degradation of the environment and the depletion of natural resources, the less likely the farmer perceives cooperation as a way to face these environmental issues.

Co-operation with other farmers implies the sharing of knowledge and information. The application of the OLM on the dependent variable “Sharing of knowledge of the profession with other farmers” demonstrated that the higher the

feeling of the farmer to be influenced by other farmers and to trust them, the more likely the farmer shares knowledge and information about his/her profession with the other farmers. However, the higher the pride of the farmer for his region, the less likely the farmer shares about his/her profession. As previously stated, it seems that independence is a characteristic highly present among Illinois farmers, which is again associated with the pride in the region. Besides, the feeling of trust among farmers is more likely to be higher when the feeling of responsibility to implement conservation practices is also higher. It seems that the feeling of confidence is reinforced by the farmer's proximity and concern about the surrounding environment.

Farmer's interest in doing more towards farm multi-functionality (V3)

From the first application of the OLM, the higher the feeling of disconnection of the farmer from the consumers, the more likely variable V3 (farmer's interest in doing more towards farm multi-functionality) is higher. Investing in the aspect of multi-functionality of the farm requires personal initiative from the farmer and the elaboration of specific strategies. The farmer's plans to focus on other and non-marketable benefits of farming than the farm product, especially concerns on the impact of farming to the environment reflect efforts of the farmer to pay attention to his surrounding natural environment and natural resources. A similar approach is needed in order to be able to implement conservation practices within the farming system. That is why this latter dependent variable's outcome is incorporated in this section. It helps in explaining variable V3. This feeling of responsibility, as a farmer, towards the implementation of conservation practices, was more likely to be higher with a high farmer's assessment of his role in solving environmental issues and in landscape and nature management, a high impression of being denied any or enough say by the authorities, and a high feeling

that there is a need for more financial support to increase farmers' involvement in conservation practices implementation. As evidenced earlier, the higher the perception of the farmer that he is responsible to implement conservation practices and that there is a disconnection from the consumers, the more likely the farmer thinks that more financial support would increase the farmers' involvement in conservation practices. From the side of multi-functionality as contributing to the management and shaping of nature and landscape, the degree of the farmer' feeling to play a role, is more likely to be higher with a high feeling that environmental issues are appropriately handled by conservation programs.

Illinois farmers feel highly responsible to implement conservation practices, but do not seem satisfied with the conservation programs which are offered to them. Illinois farmers would highly welcome extra financial support from the government to facilitate in connecting producers to consumers and to implement environmental conservation practices as part of the farmer's responsibilities.

Farmer's interest and willingness in working with non-farmers in environmental projects (V4)

The higher the farmer's feeling of disconnection from consumers, the more likely the farmer is willing to work with non-farmers in environmental projects. The higher the farmer's perception of the importance of his role in solving environmental issues, the less likely the farmer feels willing to work with non-farmers. The last significant independent variable on V4 is the farmer's perception that there is a need for more finance in order to increase farmers' involvement in conservation practices, affecting V4 negatively.

Illinois farmers demonstrate once again in this study that they prefer to be relatively independent in terms of actions linked to the environment in the case they feel it is their role to deal with it. Finally, higher external support reaching the farmers is contrary to the idea of working with non-farmers in environmental projects. Illinois farmers in this study seem more open to receiving extra financial support than to cooperate with other farmers for the sake of environmental practices.

Representatives of authorities are also part of the membership of an EC. The way Illinois farmers perceive the authorities (non-members too) and their intervention is therefore important. The higher the farmer's interest in contributing to the identity of the region, his being influenced by other farmers, his use of external assistance and advice, his openness to work with neighboring farmers around environmental projects, his enjoyment of farming, and his feeling of disconnection from consumers, the more likely the farmer thinks often that he is not given any or enough say by the authorities.

It appeared that the more the farmer was involved in his territory and with relating to external stakeholders, the more he did not feel encouraged by the authorities.

The use of external assistance and advice from external stakeholders demonstrates sharing between the farmer and experts in certain fields, and therefore show a higher potential to also work with these actors in environmental projects. The application of the OLM on this variable showed that the more the farmer is willing to participate in efforts to enhance the identity of the region, to increase the farm multi-functionality, the more he feels that he is not given any or enough say from authorities, and wishes stricter environmental policies, the more likely the farmer uses external assistance and advice. On the other hand, the more the farmer shares about his/her

profession with other farmers, shows his openness to work with neighboring farmers in environmental projects, and has positive opinions regarding cooperation to deal with environmental issues, the less likely the farmer uses external assistance. Also, the higher the farmer's feeling of responsibility to implement conservation practices, the more likely the farmer shares professional skills with external stakeholders.

External assistance appears to be a good support for farmers who want to focus on the concept of identity development and farm multi-functionality. Also, the use of external assistance could be also associated with being a substitute for the authorities. Farmers who do not feel listened to by the authorities or do not find in the Federal programs what they aim at achieving, seem more likely to proceed by themselves, with the help of external expertise and stakeholders. However, working with other farmers, external assistance or advice is not preferred. Concerning the Federal regulations and related agencies, a participant affirmed that "Authoritarian advice" is the single largest threat to agriculture". Therefore, in the context of Illinois, using external assistance and advice could reflect a need for external guidance, at terms detrimental, according to this farmer.

Farmers and conservation programs

From the application of the OLM – step 2, some results concerning the farmers' perceptions about existing U.S. and Illinois conservation programs can be extracted. This aspect is fundamental in the frame of this study as it determines the extent to which farmers would welcome another approach of conservation practices and institutional framework. The higher the feeling of trust among farmers, and the more they share professional skills with external stakeholders, the more likely the farmer feels that appropriate environmental measures are used to handle the environmental issues.

Also, the higher the farmer's interest in contributing to the identity of the territory and his concern about the degradation of the environment and depletion of natural resources, the less likely the farmer thinks that appropriate environmental measures are applied.

Therefore, the higher the proximity of the farmer with his environment, landscape and the image of his region, the higher the concern of the farmer about the effectiveness and adaptation of the conservation programs and other environmental regulations regarding territorial environmental issues. However, the higher the feeling of well-being by the farmer in his/her territory and with other actors, the less likely the farmer sees and feels affected and concerned by the existing environmental issues.

The higher the farmer's feeling of responsibility for the implementation of conservation practices, the more likely the farmer welcomes financial support as a right way to improve his involvement towards conservation practices. This observation supports a previous assumption. Cooperation among farmers in environmental issues, should be associated with extra financial supports from external agencies or the government. Farmers who use external assistance and advice, who are open to work with neighboring farmers in environmental projects, who enjoy farming, and who feel disconnected from the consumers, are more likely to desire stricter environmental policies. Furthermore, the wish for more targeted environmental policies was more likely to occur with a wish for stricter environmental policies and with a high concern about the degradation of the environment and the depletion of natural resources. Stricter environmental policies could be mainly related to more targeted environmental policies.

Conclusion

From the application of the OLM – step 2, some main correlations among the relevant variables analyzed could effectively be drawn. The PCA model, for which the results are presented below, will give further indications on these correlations.

Data Results - Principal Component Analysis

The present study proceeded to the application of a PCA on the “relevant variables”, respectively focusing on the four specific variables selected earlier as dependent variables. The results are presented according to these variables, as follows. The PCA was complementary to the OLM -- step 2 in the sense that it aimed at confirming that the four specific variables are really determinant variables which can serve as predictors for farmers’ interest in and willingness to take part in an EC. The PCA also gave indications about whether or not these specific variables could be predicted by a few of the other relevant variables.

Farmer’s willingness to participate in efforts to enhance the identity of the territory and to promote other unique characteristics of the region (V1)

From the PCA outcomes for this dependent variable V1 (farmer’s willingness to participate in efforts to enhance the identity of the territory and to promote other unique characteristics of the region), the first dimension could effectively be associated with the variable “willingness to participate in efforts to enhance the identity of the territory” (Dimension 1 aggregates 21.4% of the variability, Dimension 2 = 13.8%). The other variables which were also highly correlated to axis 1 are the feeling of contributing to the identity of the region, the pride of the territory, and the care about the public image of the farm. The study can then observe a real willingness from the sample’s farmers towards the promotion and the conservation of the characteristics and farming practices

of the territory, associated with the other variables. Furthermore, as the first dimension was assumed to be associated with variable V1, the three other variables could be named predictors. In other words, from the extent of the farmer's feeling of contributing to the identity of the territory, the level of pride of the farmer for his region, and the extent to which the farmer care for the public image of his farm (all of those three combined), the value of V1 can be estimated.

Farmers' interest and willingness in working with neighboring farmers in environmental projects (V2)

The axis 1 was correlated at most with variable V2 as was done above, so V2 could be associated with the dimension 1 (Dimension 1 = 20%, Dimension 2 = 14%). From Figure 4-4, the study observed that the variables which could serve as predictors of V2 are: the feeling of contribution to the identity of the territory, the pride of the region, the influence of neighboring farmers, the openness to work collaboratively with other farmers, and the care about the public image of the farm.

Farmer's willingness in doing more towards farm multi-functionality (V3)

From the outcome of the PCA for this variable, V3 aggregated a low variability, therefore it could not be associated with one of the dimensions. It was not a synthetic variable which could be explained by other variables (regarding this sample of farmers).

Farmer's interest and willingness in working with non-farmers in environmental projects (V4)

The PCA concluded that V4 could be associated with the first dimension. The variables which could predict the value of this variable are the importance of the identity of the region, the pride of the region, the influence of the neighboring farmers, the feeling of responsibility to implement conservation practices, the wish for more targeted environmental policies, and the care about the public image of the farm.

PCA – conclusion

The three of the four variables studied above which work as synthetic variables, could really predict the potential of farmer's interest and willingness regarding a participation in an EC. And they can be predicted through other variables more specific to the farm and farmer.

General Outcome of the Analyses

From the general results of the variables' correlations, including general characteristics and relevant variables, to the design of predictions of certain variables, the study made observations of the perceptions, interests, possibilities and potential of the study-sample and the sample's units regarding features and principles corresponding with the structure of an EC. From these results and observations, further interpretations and discussions are constructed as part of Chapter 5 - last chapter of the research.

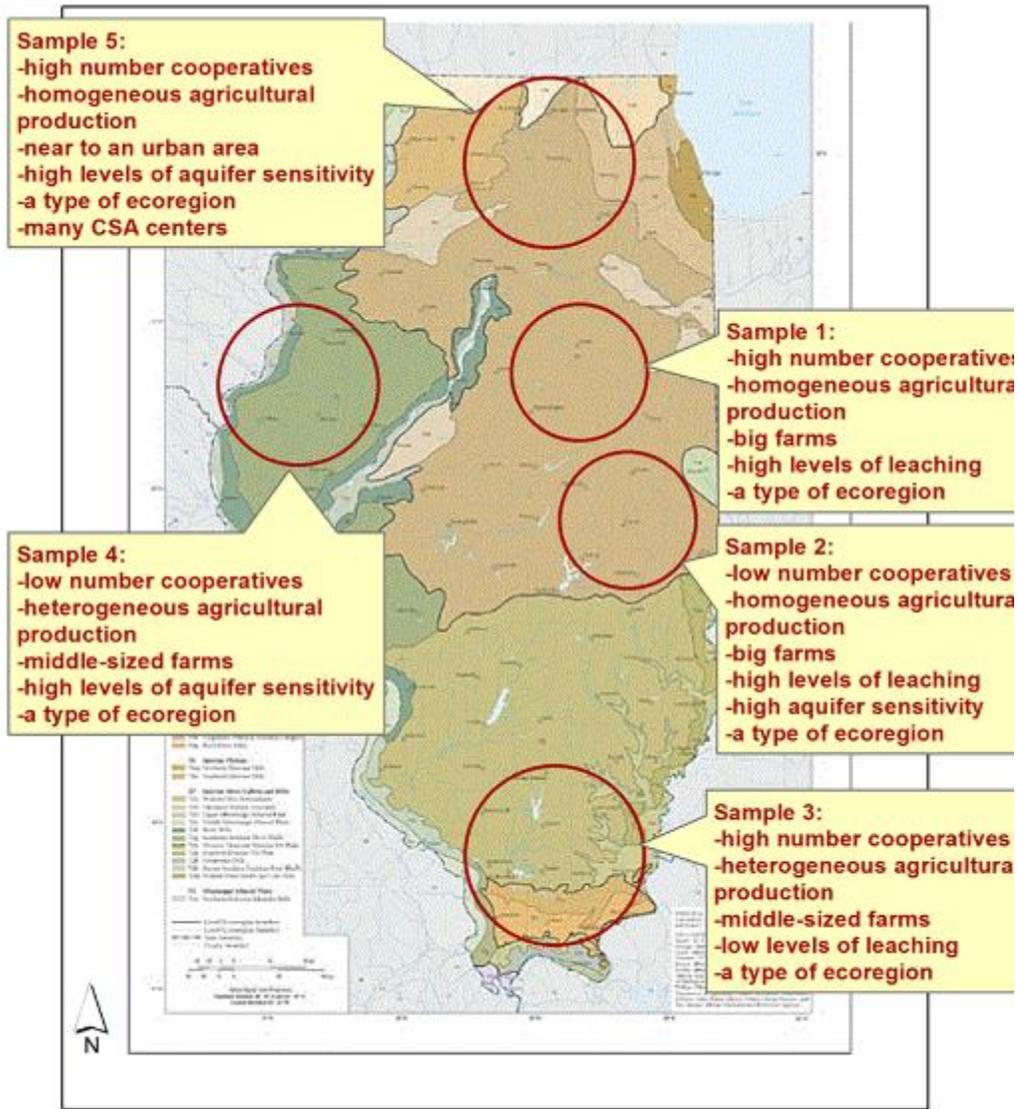


Figure 4-1. Representation of the 5 selected research study areas. (Eco-regions in Illinois correspond to areas of general similarity in ecosystems, type, quality, and quantity of environmental resources. The delimitation of these regions was considered useful for establishing ecosystem management strategies (U.S. EPA))

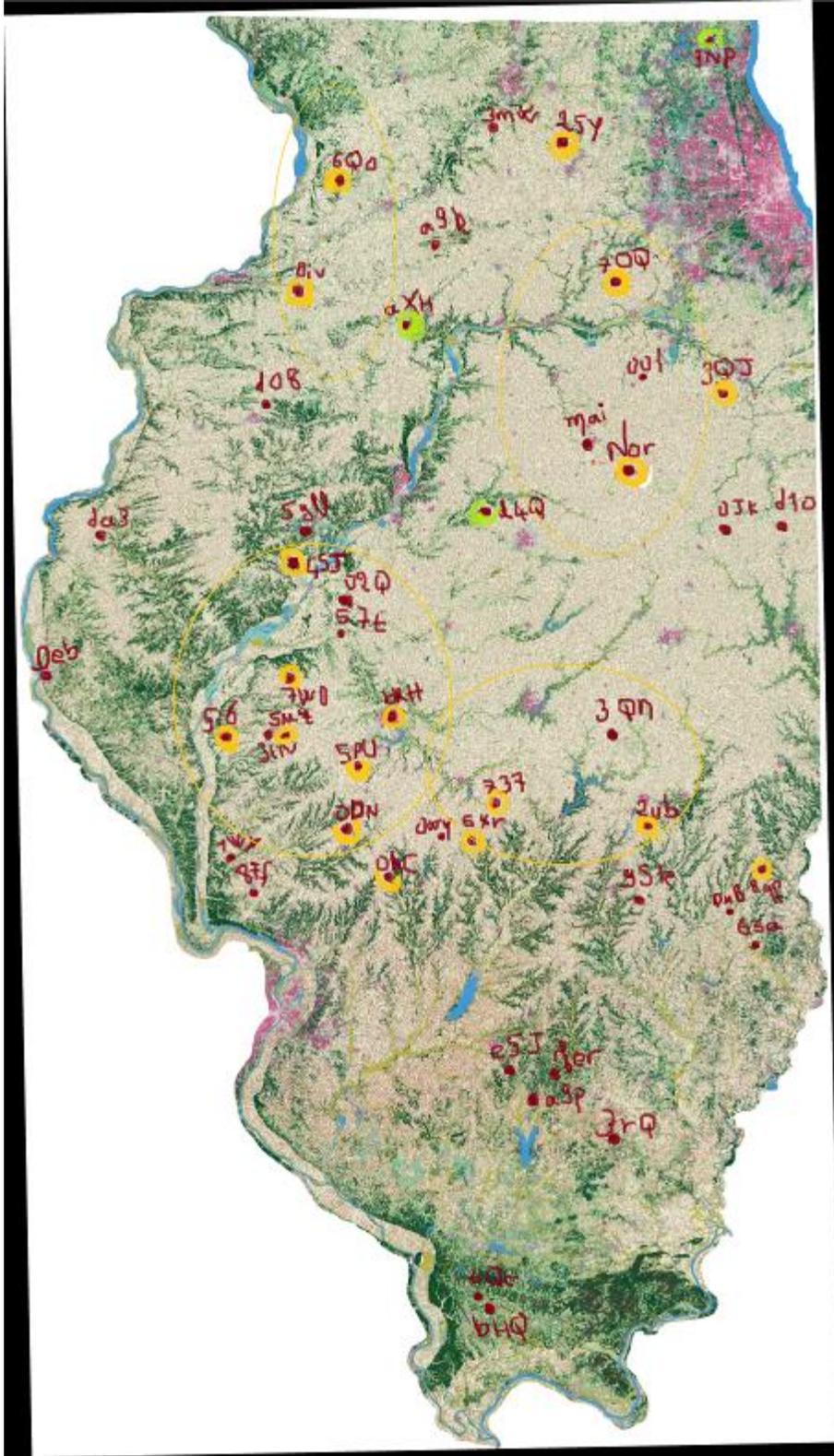


Figure 4-2. The sample's units in Illinois (U.S.)

```

> summary(Y)
USIlconspgmsfulfilledgoals
Min. :1.000
1st Qu.:2.000
Median :3.500
Mean :3.269
3rd Qu.:4.000
Max. :6.000
> table(Y)
 1  2  3  4  5  6
 7  7 12 18  7  1
> table(Y)/sum(table(Y))
 1  2  3  4  5  6
0.13462 0.134615 0.230769 0.346154 0.134615 0.01923

```

Logistic Regression Model

```

lrm(formula = Y ~ X, data = G.USIlconspgmsfulfilledgoals2)

```

Frequencies of Responses

```

 1  2  3  4  5
 2  3  4 12  5

```

		Model Likelihood		Discrimination		Rank Discrim.	
		Ratio Test		Indexes		Indexes	
Obs	26	LR chi2	20.84	R2	0.586	C	0.887
max deriv	0.04	d.f.	21	g	3.113	Dxy	0.774
		Pr(> chi2)	0.4690	gr	22.485	gamma	0.781
				gp	0.264	tau-a	0.569
				Brier	0.027		

	Coef	S.E.	Wald Z	Pr(> Z)
y>=2	-2.5964	7.6304	-0.34	0.7337
y>=3	-4.5013	7.8462	-0.57	0.5662
y>=4	-6.1333	8.0044	-0.77	0.4435
y>=5	-9.5846	8.1712	-1.17	0.2408
cropsacr	0.0022	0.0017	1.23	0.2186
livestoc	0.0193	0.0159	1.21	0.2263
avsales	-2.6628	1.2449	-2.14	0.0324
implevir	-1.0966	1.2338	-0.89	0.3741
impeffus	2.3926	1.2043	1.99	0.047
civicres	1.9201	1.3882	1.38	0.1666
trynewpr	-0.4153	1.0228	-0.41	0.6847
nonfarm	1.8524	2.1474	0.86	0.3883
offfarm	0.9912	1.2328	0.8	0.4214
incomeex	-0.0118	0.0304	-0.39	0.6978
multifur	-1.9013	0.8424	-2.26	0.024
enrollec	2.4049	2.6614	0.9	0.3662
partfarm	0.6176	1.5911	0.39	0.6979
partvolu	0.7508	1.8689	0.4	0.6879
identrec	-0.9021	1.0213	-0.88	0.3771
contribi	0.4787	1.0417	0.46	0.6458
proudpar	0.4205	1.1617	0.36	0.7174
leveldep	-1.5622	0.8001	-1.95	0.0509
seekcomp	-1.138	0.831	-1.37	0.1709
changesf	7.1203	4.164	1.71	0.0873
specproc	0.8481	2.7303	0.31	0.7561

Figure 4-3. Outcome of the ordered Logit Model processing, Y = USIlconspgmsfulfilledgoals2

Variables	Dim.1	ctr	cos2	Dim.2	ctr	cos2
workingneighfarmersenvproje	0.774	10.029	0.599	-0.285	2.044	0.081
prodlevelsilav	0.005	0	0	0.584	8.572	0.342
implevinputs	0.436	3.183	0.19	0.635	10.13	0.404
impeffuser	0.434	3.146	0.188	0.394	3.888	0.155
civicresp	0.519	4.513	0.27	-0.149	0.56	0.022
identreg	0.523	4.572	0.273	0.519	6.764	0.27
contribidentreg	0.711	8.461	0.506	0.365	3.342	0.133
proudpartreg	0.68	7.739	0.462	0.42	4.434	0.177
inflneighb	0.66	7.287	0.435	0.295	2.177	0.087
Howwellenvissueshandled	-0.102	0.176	0.01	0.496	6.166	0.246
incrfarmerinvolvconspact	0.487	3.969	0.237	-0.467	5.473	0.218
investopecostsconspgms	0.027	0.013	0.001	0.223	1.248	0.05
feelgivensayfromauthorities	-0.142	0.337	0.02	0.41	4.212	0.168
feelresponsibimplementconsp	0.596	5.938	0.355	-0.299	2.246	0.09
stricterenvpol	0.372	2.315	0.138	-0.666	11.116	0.443
moretargetenvpol	0.565	5.339	0.319	-0.494	6.128	0.244
morenatlandsmngmtifmorefin	0.387	2.505	0.15	-0.144	0.521	0.021
USIlconspgmsfulfilledgoals	0.335	1.878	0.112	-0.127	0.405	0.016
shareknowledgeprofotherfarm	0.4	2.674	0.16	0.291	2.13	0.085
useextassistadvisemngmtfarm	0.014	0.003	0	-0.15	0.565	0.023
shareprofskillsextstak	0.379	2.406	0.144	-0.271	1.837	0.073
openworkcollfarmers	0.629	6.616	0.395	-0.068	0.116	0.005
enjoyfarming	0.253	1.072	0.064	0.299	2.251	0.09
carepubimagefarm	0.705	8.316	0.497	0.415	4.327	0.172
leveldependprefered	0.078	0.102	0.006	-0.186	0.866	0.035
disconnectconsumersfarmstak	-0.296	1.465	0.088	0.042	0.045	0.002
seekcompatfarmpractsurrenv	0.434	3.148	0.188	-0.346	3.005	0.12
degenvdepletnatR	0.409	2.8	0.167	-0.465	5.431	0.216

Figure 4-4. Outcome of the application of the PCA on the variable V2 (farmers' interest and willingness in working with neighboring farmers in environmental projects)

Table 4-1. Study's general variables (related to farms' and farmers' characteristics) – codes and meanings

Variable's code	Meaning
age	Farmer's age
future.farm	Expectations about what will happen to the farm in the next 10 years
education	Highest level of education
prod.type	Type(s) of farm production
crops.acreage	Acreage
livestock	Annual total livestock
av.sales	Average farming sales/year
prod.levels.il.av	Production levels compared to the Illinois' averages
imp.lev.inputs	Impact of the level of inputs (capital, labor, natural resources) on production levels
imp.eff.useR	Impact of the efficiency of the use of the resources on production levels
farm.mngmt.status	Status of the farm management
civic.resp	Farmer's importance of civic responsibility to you
try.new.farm.pract	Frequency of trying new farming practices or technologies
non.farm.act	Engagement (or not) in non-farm activities
off.farm.act	Engagement (or not) in off-farm activities
income.extra.farm.act	Percentage of the annual farm income derived from extra-farm activities
multi.funct.farm	Level of activities related to farm multi-functionality implemented within the farming system
enrolled.cons.pgm	Enrollment in conservation programs
part.farm.coop	Member (or not) of a farmers' cooperative
part.volunt.orga	Involvement (or not) in voluntary organization(s)
ident.reg	Importance of the identity of the geographical area

Table 4-2. Study's relevant variables – codes and meanings

Variable's code	Meaning
contribidentreg	Feeling of contributing to the regional identity
interestcontributid	Interest in increasing the contribution to the identity of the region
proudpartreg	Pride to be part of the region
parteffortsenhanceident	Interest in participating in efforts to enhance the identity of the region and to promote other unique characteristics of the region
inflneighb	Influenced by neighboring farmers' or community's activities
doingmoreincrmultifunct	Willingness to increase multi-functionality in the production system
Howwellenvissueshandled	Thought about how existing environmental issues are being handled
coopbtwfarmerscombatenvissues	Thought about collaboration between farmers in the management of projects related to combatting environmental pollution can lead to more efficient and effective results
farmersimprolesolvingenvissues	Opinion about the importance of the role of farmers in solving these environmental issues
incrfarmerinvolvconspract	Thought about increasing farmers' involvement in conservation practices
feelgivensayfromauthorities	Feeling about whether (not) given any or enough say (e.g. from Federal and State authorities) in the environmental policies that affect the farmer
feelresponsibimplementconspractices	As a farmer, feeling the need or the duty to adopt and implement environmental conservation and landscape management practices
stricterenvpol	Thought about stricter environmental policies from authorities
moretargetenvpo	Thought about more targeted environmental policies (in terms of community characteristics and environmental issues specific to the area)
implemnatlandsmngmtpersini	Voluntarily implementation of nature and landscape management practices as part of daily farming operations?
morenatlandsmngmtifmorefinanc	More of nature and landscape management if it was to be rewarded?

Table 4-2. Continued

Variable's code	Meaning
conspgmsfulfilledgoals	Thought about how well current and historical U.S. and Illinois conservation programs have fulfilled their objective to restore and preserve the environment and landscape
shareknowledgeprofototherfarmers	Sharing level of knowledge about faring profession with other farmers
useextassistadvisemngmtfarm	Use of external assistance/technical advice oriented to the farm management
shareprofskillsextstak	Sharing of professional skills with external stakeholders (non-farmers)
openworkcollfarmers	Open to work collaboratively with other farmers - Trust with other farmers
workingneighfarmersenvprojects	Feeling about working with neighboring farmers in environmentally-oriented projects
morecoopnatlandsbetterresults	Thought about whether cooperation between farmers in nature and landscape management would help to achieve better results regarding environmental conservation
workingnonfarmersenvprojects	Feeling about working with non-farmers within the territory in environmentally-oriented conservation projects
enjoyfarming	Enjoy farming
carepubimagefarm	Extent to which care about the farm's public image
disconnectconsumersfarmst	Feeling about how the existing farming system is disconnected from the local community/consumers
degenvdepletnatR	Feeling about the degradation of the environment and landscape, and the exhaustion of some of the natural resources
farmerrolemanngmnt	Farmer's role in the management of regional landscapes and natural resources

CHAPTER 5 CONCLUSIONS

Results Interpretations

From the results obtained in the Chapter 4, this section presents interpretations and possible answers to the hypothesis formulated at the beginning of the study. This is realized by considering the Illinois setting as a whole and with the support of the research objectives set in the general introduction.

Answer to the Research Objectives

Extent of representation of the environmental cooperative's variables in the U.S.

As explained earlier, the present study focused on qualitative data as complementary to the quantitative data extracted from the sample. Both types of data were important in order to study the presentation, in the Illinois setting, of the variables seen in the Dutch setting. The presentation of these variables helped conceptualize farmers' environmental attitudes regarding an innovative form of environmental conservation. As Reimer stated in his study, in this study in the U.S., we sought to identify "relevant and measurable aspects of farmers' conservation attitudes that influence stewardship behavior". In this framework, qualitative data were then crucial to refine farmers' descriptions, characteristics and interests. Furthermore they can likely improve quantitative measures. (REIMER et al., 2011)

The predominant variables extracted from the Dutch literature were analyzed in two phases: on the one hand we looked at the variables responsible of the creation of the structure of EC, and on the other hand we analyzed the variables defined as factors of success of the development and functioning of the environmental cooperative in the

Netherlands. This section of the study will focus on the variables whose presentation in Illinois is of significance and relevance to the present study.

Representation of the factors affecting the decision of Dutch farmers in deciding to create the environmental cooperative, in Illinois. The perception of and opinion about the governmental conservation programs and their impact on both farming practices and natural environment were the main reasons for Dutch farmers to initiate an EC. In Illinois, there was also a visible dissatisfaction concerning conservation programs offered by the government. This dissatisfaction was mainly linked to the heavy administration burden of the programs and their strict requirements, both of which both prevented some of the farmers from applying for them. This could be one of the main reasons why Illinois farmers might be interested in the model of EC. Additionally, Illinois farmers mentioned high transaction costs involved in the conservation programs (higher than the operational costs) and some farmers considered that it is not up to the government to take care of environmental regulations. The latter observation was very interesting because it reflected farmers' willingness to be empowered in the design of strategies aimed at environmental conservation. Finally, there was similarity to the case in the Netherlands (although lower), in a certain lack of adaptation of governmental environmental programs and regulations to the farming system, and therefore a wish for more targeted environmental policies (in the case where changes in environmental policies are welcomed or requested). Moreover, many of the Illinois farmers perceived a gap between their desires/wishes and those of the authorities; they did not feel listened to by the authorities. In the Netherlands, farmers created the EC to form an entity and institutional framework which could be recognized by the government, but through

which they could express their desires in terms of combination of conservation practices to the agriculture practices.

There are similar environmental issues in Illinois as in the Netherlands, and some of them resulting from the agriculture practices. These environmental issues raise concern among the farmers. The main issues include soil erosion, prairie, biodiversity, and water quality degradation. The main agricultural factors enhancing this phenomenon are high levels of inputs, tillage practices, and non-rotation of the crops.

Through the launch of and participation in ECs, Dutch farmers wanted to benefit from opportunities that they were not previously able to. Similarly, the study observed that there are farmers in Illinois who produce specific products that they would like to expand and market but are not able to do so in the current context. There is therefore a potential in this population to develop a structure such an EC, which would give them further opportunities and possibly allow them to fulfill their goals.

Secondary factors extracted from the Dutch context can also be mentioned. Most of the farmers place importance on the identity and image of their territory. This is mainly reflected in this sample through doing something which is different from the other farmers, and something which can then contribute to the building of a territorial identity. The way the farmer is interested in a larger scale than his farm, in giving it an image, and even in participating to its contribution could also be a reason for Illinois farmers to be interested in ECs. Furthermore, the Dutch farmers who originated ECs were risk-takers because of the unknowns associated with their project and the high uncertainty of its success and future. The Illinois farmers contacted in this survey are largely risk-takers, and thus open to innovations in farming profession. Another positive attribute to

a launch an EC could be the certainty of the future of the farm because of the long term perspectives of the cooperative's projects. The very largest part of the Illinois sample's farms will either remain stable or expand significantly in the future decade, hence, there is a match of the ECs use of long-term plans with Illinois farmers' expectations.

Beside the variables which had been extracted from the Dutch setting, the research study revealed other factors more specific to the Illinois setting which could also push farmers to create or integrate an EC. Half of the farmers who practiced extra farm activities mentioned their willingness to improve the image of the agricultural sector, followed by the willingness to enhance social contacts. There could be an interest and motivation to change their current pattern of farming and the way farming is perceived from outside, and especially by consumers. Also, the very largest part of the farmers affirmed that they had made changes in their farming system to stop or prevent further environmental degradation. These initiatives could be enhanced or pushed forward as part of an EC. Besides, most of the farmers in this study implemented either conservation practices or landscape and nature management under personal initiatives. Being part of an EC would enable them to be rewarded for it and to enhance their personal projects/ambitions. Those are factors which could raise farmers' interests in ECs. However, more than half of the farmers said they did not observe any environmental degradation/pollution in their territory. This point seemed negatively correlated with the interest of farmers in an EC. Nevertheless, it does not mean that farmers would not be interested in increasing the positive externalities from agriculture through the use of an EC.

Representation of the factor of success for the functioning and development of environmental cooperative in Illinois. First of all, Illinois' farmers are interested in investing in their region beyond the production function of their farm. They seemed willing to put efforts beyond the farm, towards the valorization and promotion of their territory. Therefore, they would certainly be willing to invest in long term projects, and be likely to show perseverance and patience based on the visibility of the results. These features are indeed required for projects dealing with natural resources and landscape management.

Secondly, the farmers' motivation and impression of their duty and responsibility to implement conservation practices and nature and landscape management, especially because of how they perceive their profession, are positive factors which could help lead to the creation of an EC. Indeed, farmers would thus feel at the right position and doing the right thing by taking part in the EC's activities. Most of the farmers in this study who were already enrolled in conservation programs reported having done it due to their concern for the environment (extra revenue came in second place). Although the responses could be a bit biased due to the ethical character of the question, there seemed a real engagement by farmers in resource conservation and protection. This conviction has proved to be necessary to the successful functioning of an EC.

As part of the functioning of the cooperative and like other businesses, the structure relies on monitoring, sanctioning and means of conflict resolution. However, the structure of EC is distinct from the other forms of business due to the importance of mutual trust between farmers, which helps significantly reduce transaction costs, facilitates cooperation, prevents opportunism, and secures communication and dialogue

(ESHUIS & VAN WOERKUM, 2003). Trust is an important component of the EC, and it is beneficial for the members. However, trust cannot be the only basis element of functioning of the organization. The three levels of supervision (monitoring, sanctioning and conflict resolution's means) are necessary. Moreover, monitoring has been reported has playing an important role in the building of trust, even in the case of initial distrust between the different parties. It is due to the fact that parties agree on the monitoring because they view it as an important tool to realize mutual goals (ESHUIS & VAN WOERKUM, 2003). The present study looked at the notion of trust in persons, but there also exists dimensions of trust in organizations and trust in institutions. These other dimensions of trust could be further analyzed by involving the authorities to participate in the study.

A significant percentage of farmers is open to work collaboratively and to share information with other farmers (e.g. professional skills), and in particular with the farmers in the area. This feeling of confidence and non-resistance to a situation which involved working with other farmers would be a determinant element to the successful functioning of an EC. Besides, more than half of the farmers put sharing knowledge about their profession at a high level of importance. It is a positive component to the constitution of a learning system as part of the EC. Sharing experiences, knowledge, and skills with the other members (farmers and non-farmers) proved to be in the short or long run very beneficial for both parties involved.

Beside the variables for factors of success which had been extracted from the Dutch setting, the study revealed other variables, specific to the Illinois setting and likely to be also factors of success of an eventual Illinois EC. U.S. farmers are very much

involved into off-farm activities through associations and other social involvement. To compare with the European case, it is important to note that the share of off-farm income for EU agricultural households is lower than for the U.S. because the European definition of an agricultural household excludes many households where off-farm income is significant, whereas the U.S. definition includes all farms including the very smallest operations. The official U.S. farm definition requires indeed only \$1,000 of sales to be qualified as a farm, and over half of U.S. farm households operate farms with sales less than \$10,000. In the U.S., the share of household income from farming tends to be related to the economic size of the farm. By being part of voluntary organizations, these farmers are certainly “used to” being in contact with other stakeholders, participating in meetings, making decisions, and giving recommendations. Therefore they are very likely to be skilled in sharing information, suggesting strategies, convincing other people, and discussing. Furthermore, the high participation into off-farm activities give these farmers more opportunities to take leadership positions within a group. This point which was highlighted as sometimes difficult in the Dutch case may not be qualified as such in the U.S. This could really facilitate the functioning of an eventual EC.

Conclusion – important variables’ presence in the U.S. Most of the factors which had been extracted from the Dutch literature are presented in the Illinois sample, although differently and clearly in a different extent. Moreover, other factors, specific to the U.S. context, have been discovered and are also potential factors for the development of an EC. The next section deals with refining the representation of these factors through their connections with farms’ and farmers’ characteristics.

Identification of farmer's typologies and variables' correlations

From the results of the model, the study aimed at determining Illinois farmer's typologies characterized by associations of specific variables. The associations were drawn depending on the typologies which seemed the most favorable to the implementation of an EC in the U.S. and especially in Illinois, and the typologies or correlations of variables/characteristics which seemed less favorable. Secondly, the farmers' typologies were designed according to a certain type of potential in respect to interest or integration in EC. They are as follow:

Typology 1 – conviction about importance of the environment. The farmer's perception of the environment as an entire element of the functioning of the farming system, and as an element that require protection and conservation, is fundamental to ensure sustainability of the farmer's willingness and motivation to be part of an EC. This typology refers to farmers who are most likely to have a strong conviction about the importance of the environment. The current study showed that this typology is characterized by a high level of education (farmers who feel highly responsible to implement conservation practices), and is grain producers (farmers strictly saying that their decision – making process starts from the local and natural characteristics of the environment rather than from the future expected outcomes). The focus, interest and efforts on both multi-functionality and protection of the resources as part of the farming responsibility are also related to this type. Theses motivations are very likely to increase the farmer's interest in an EC and facilitate his integration. They are also characterized by grains, but also fruits and vegetables producers, high average sales, high revenue from extra-farm activities, high level of risk-taking, high pride for the region, and a voluntary organizations enrollment. Grain producers were additionally the producers

who presented the highest rate of enrollment into the conservation programs compared to other categories of producers. From the results, multi-functionality by Illinois farmers would mainly deal with activities and strategies related to landscape management, wildlife habitat creation, biodiversity maintenance; improvement of nutrient recycling and carbon sequestration; and water management, and improvement of water quality.

This typology or group of farmers could be interested in EC, in particular because of the desire to be rewarded for their conviction about the importance and action towards the environment and landscape.

Typology 2 – engagement in the identity of the territory. The farmers who are not afraid and interested in getting involved in the building of an identity of the territory are characterized by having higher than average sales, a high level of farm multi-functionality, and high importance given to the territorial identity. The notion of territory is defined by the combination of the physical dimension of geometrical space to the social dimension of relational space. The space is then not only the scenario but the representation of human action condensing the values of the culture produced in it. The territory corresponds to a delimited geographical space reflecting a given community and representing the community's individual and collective actions. The notion of territory comes thus from “the process of interaction between this community and the environment”. From this the concept of identity emerges originating from the local community and the act of territorialization - “result of a competition between different values and expectations that live in the same social space” (POLLICE, 2006). Territorial identity holds an orientating function in the development of local-scale endogenous processes and leads “the territorial system in its evolutionary process”. A strong

territorial identity is an impulsion to the design of objectives strategies and contributes to the development and the implementation of local-scale innovation processes.

Furthermore, Pollice explains that territorial innovation is successful when it is the result of “choices shared by the local community and the authorities that govern the territory”.

The implementation of the change resulting from territorial identity “requires the participation of culturally different individuals driven by contrasting interests”. The value of the sense of belonging (social expression of territorial identity) can be very decided in this phase and can contribute to “investing individuals with responsibility and stimulate their proactive behavior”. (POLLICE, 2006)

An engagement into territorial identity can therefore be a determinant to the building of innovative community projects, such as the development of an EC.

Typology 3 – dissatisfaction conservation programs. Farmers who mentioned the “lack of knowledge” as a reason not to take part to conservation programs were over 55 years old. These farmers would benefit from a better knowledge and information provision as part of an EC because they would be closer to the dynamic membership. The farmers of this typology are also characterized by having small farms (mentioned the lowest level of suitability of the conservation programs with their farming practices), higher than average sales, and high number of activities related to multi-functionality (the less likely to think that conservation programs have fulfilled their goals).

Typology 4 – ambitions, wish for better opportunities. The farmers who share ambitions matching with the concept of EC are characterized by the production of a specific farm product, and were especially fruit and vegetable growers or organic

producers (they have a positive opinion about cooperation regarding this ambition). These types of producers may be working on a share of the market which can offer more doors towards Marketing Niche Development. Also, given the fact that they represent a small part of the territorial production in Illinois, they could be more open to innovative forms of cooperation. Cooperation would allow them to be markedly stronger and have more weight concerning the development of a specific product or marketing innovation (e.g. label, quality or traditional aggregation). Fruits and vegetables productions have indeed a strong economic potential in the Illinois market, regarding both the increasing demand for locally grown products in Illinois and the fact that Illinois wholesale buyers cannot currently meet their demand for fruits and vegetables from in-state production. Fruit, vegetable, and organic producers are also characterized by engaging in a high number of non-farm activities, usually carried out because they do not feel listened or encouraged by the authorities. They could find through the EC better offers than the ones given by the government, in which they could participate in their design. The wish of the farmers belonging to this typology is also to be more independent, and maybe to be able to design their own plans and strategies. This explains why farmers carrying out non-farms activities need less help from specialized organizations (lower use of external assistance) than the other ones. It is probably due to the opportunities they have to get advises through their contact and entrepreneurship (e.g. out of other people's experiences).

Typology 5 - Interest in and willingness for collaborating and working together with other stakeholders. From Chapter 4, the study concluded that these farmers are characterized by the pride they feel or experience for their territory, the high

level of income from off farm activities, the high contribution to the regional identity, the high search for compatibility between farming practices and surrounding environment and natural resources, by their being livestock producers, and having high enrollment in conservation programs. Combined to these latter characteristics, farmer - manager of relative small farms, preferring independence from the general regulations, and risk-taker are furthermore open to co-operate with neighboring farmers on environmentally-oriented projects.

Typology 6 – common projects with the Dutch model. There is a very few number of dairy farms in Illinois, therefore an EC in this territory could be run with another type of farming, more so than in the Netherlands. Most of the projects implemented by the Dutch EC imply projects focusing on the efficiency of the cycle and recycle of the natural resources and farm products within the farming system, meaning limiting the supply of external inputs. The study assumes that Illinois farmers who limit these external inputs in their farming system could be a positive element. They are mainly livestock producers.

Typology 7 – no primary conviction on conservation practices. They are mainly characterized by being young in age, grain producers, and medium or high crop acreage (relative to the sample's units); they are enrolled in conservation programs strictly as a way to receive commodity payments. These could be farmers just taking over a farm, and so are more interested in running first the business and recover the eventual start up difficulties, than on focusing on environmental conservation aspects. This typology brings also farms in which the impact of inputs is high.

Typology 8 – no cooperation. High average sales, high importance of inputs, and farmers' cooperative membership are the main significant characteristics of farmers not willing to work collaboratively with other farmers. Second, grains producers with high level of crop production and who are part of farmers' cooperative are the one who experience, the most, low levels of cooperation with the other members of their cooperative. It refers then to farmers' characteristics for which a reorientation of the cooperative they are part of would be difficult because of the main focus on the economic purpose, rather than on cooperation.

Conclusion – farmers' typologies. Each of these typologies designed above is a potential combination of farmers and farm's characteristics towards the development of an EC or not. Each typology has been designed according to a certain dimension either favorable (for the first 6 typologies) or not (for typologies 7 and 8) to the development of an EC. From the results, combinations of some characteristics have effectively been determined and were associated with a specific typology.

Results Interpretations, Concept by Concept

From the literature review, the models' results and the above analysis and interpretations, the general concepts which fundamentally characterize the EC were approached from a more general perspective. The purpose was to study the logic and appropriateness of these concepts in a U.S. - Illinois setting.

Self-governance

Individual freedom and an individualistic culture are at the core of the American society (cf. the "American dream") and are reflected in U.S. legislation. This explains why there is a relative high interest from farmers towards the attributes of self-governance and self-regulation of the EC. It is especially true concerning their desires to

be freer in what concerns the choice and implementation of conservation strategies. A study on the possible position of the U.S. authorities on the EC would facilitate refining how a self-governance structure could be conceivable and supported in an Illinois context. It appeared from the research study that self-governance would be very well accepted by the Illinois farmers.

Self-governance and self-regulation in terms of environmental measures are monitored and conditioned by the interaction of the EC and its members with the authorities. Therefore the ways farmers perceive and interact with the authorities, especially the government is important. On one hand, very few of the farmers claimed that they wished for more advice from authorities or external advisors regarding the application of conservation practices. In the case of any desire of change in the application of the environmental policies, it is mainly about more targeted ones, and not stricter ones. On the other hand, most of the farmers in this study showed a real desire for low intervention of the government in the implementation of environmental conservation strategies. They wished for a higher level of flexibility and freedom from the authorities.

In the U.S. there are more levels of government authority than there are in the Netherlands, certainly in part because of the larger size of the U.S. This higher number of authorities likely enables a larger number of programs and strategies for farmers, as well as a greater range of institutional frameworks for them to relate to. There might be potential for different kinds of support for innovative institutional frameworks, for example with a stronger focus on local levels in the implementation of conservation strategies. The support of the authorities is determinant for the development of an EC,

in particular during the starting-up phase. The initiative could come from the local level, with identified issues and projects manageable by the members. According to Frantz & Gloin (2007), this is how the sustainability and success of such projects can be ensured. Governmental financial support has only a role of autonomy maintenance. In the long term, the credibility and image of such initiatives is maintained if the EC starts and continues “as a “community of interests” rather than as financial opportunists” (FRANKS & GLOIN, 2007).

Cooperation with non-farmers and other farmers

In the U.S., a main obstacle to the implementation of EC could be the reluctance in sharing with external stakeholders on matters concerning the farm and farming system. In general, high resistance from these Illinois farmers has been observed in sharing information. This is probably due to the fear for the government and other authorities, which is in the U.S. greater than in the European context. Regarding this point, the results of this study need to be looked at with caution because some of the responses might be biased in order to conform to society standards. In general, farmers want to be independent, however the influence of the other farmers seems significantly determinant of the way they handle their farm activities.

The main conclusion on the cooperation dimension is that the higher the involvement of the farmer in his territory and the farmer’s proximity and consideration of the surrounding environment and natural resources, the more likely the farmer shares and works with external stakeholders (non-farmers in particular). The farmers’ ambitions and desires make farming dynamic, requiring the farmer to mobilize other resources other than the ones related to just the farming profession. Besides, the high caution of farmers concerning the government, governmental policies and governmental

intervention could turn to be an advantage towards the creation of ECs by inducing the willingness to be more independent, the desire to elaborate own strategies and to be empowered by the government. This would be conceivable in the frame of an EC.

As the study showed, farmers who are member of cooperatives are in general satisfied about the functioning and the services of the cooperative they are members of, and these farmers' cooperatives do not seem to enhance co-operation and sharing among members. Therefore, the study predicts that it would be difficult to reorient an existing agricultural cooperative towards the principles of an EC.

New approach on the environment, and its integration into the farming system

A certain portion of Illinois farmers (whom the characteristics have been described in the previous sections) focus on the integration of the environment into the farming system in a perspective of conservation and management. They are doing so through activities related to multi-functionality, focusing on the efficiency of the use of the natural resources, and the implementation of environmental conservation practices and nature and landscape management under personal initiatives. This research study concluded that farmers would especially be open to such initiative depending on the opportunities they would be offered in terms of financial rewards as a result of caring for the environment. The material and financial benefits they could get in exchange of positive actions towards the landscape and environment seem very important from the perspective of farmers in Illinois. It could be an element to convince them to launch an environmental conservation project.

Discussions

General Outcomes

Answer to research questions

The study had two main objectives. On the one hand, the study sought to provide an analysis of the potential for initiatives related to nature, landscape and environment in the U.S. On the other hand, the study tried to provide the analysis of the potential of cooperation between farmers and others actors at large to deal with this issue. These targets had been associated with three research questions as part of the U.S. The study can at this point bring forth elements of answer to these research questions. It is very important to emphasize on the fact that the study did not aim at generalizing the results which have been found from this sample. The data collected resulting from a small sample of Illinois farmers - for which randomized selection could be discussed, the results are therefore not representative and the interpretations and conclusions formulated from these results have a low value.

The predominant variables which enabled the creation of environmental cooperatives in the Netherlands exist in the U.S., in the study area of Illinois. In particular, Illinois farmers often request for more freedom and independence in the conservation practices they have been proposed to. It could match well with the principles of an EC which imply and require a certain level of autonomy from farmers in the elaboration and implementation of environmental strategies matching with their farming practices and surrounding environment.

The model of EC is applicable in an U.S. setting considering the different typologies which have been designed above. However, those typologies reflect only a positive principle or possible element of functioning towards an EC. Extra factors would

need to be associated with, or further investigations on these specific groups of farmers would be needed to help analyze their potential concerning the EC.

As an alternative or complement to other agri-environmental policy instruments or conservation programs, cooperation among farmers and between farmers and other territorial stakeholders may also present advantages in a U.S. setting as far as the control of nonpoint source pollution and the focus on increasing the positive externalities of agriculture are concerned. Collective action may also be beneficial in the U.S. in reaching environmental objectives set at a regional level, because it is more cost-efficient. Although, to be a valuable option, the costs generated by collective action still need to be less than the benefits accruing to participants. However, this latter point cannot be answered in the framework of this study because of the long-term view it implies.

Regarding to the latter point, a survey on 321 members of marketing cooperatives specializing in fresh fruits and vegetables, in Spain, highlighted the importance of the price paid to farmers as determinant of their satisfaction with the co-operative and their intention to continue their membership. It also revealed that farmers perceived the transaction costs as high. The high transaction costs are generally due to the numerous and heterogeneous members which have, on top of this, diffuse goals, and invest large amounts of resources. The study concluded that, as compared with the price paid to farmers, transaction costs could play a more relevant role as it contributes to explaining both satisfaction and the desire to continue in the co-operative.

(HERNANDEZ – ESPALLARDO, 2011)

The structure of EC proved that it reduces the transaction costs for the farmer as far as the conservation practices are concerned. However, the level of reward the farmer will get from the EC in exchange of his/her actions on the landscape and the environment, and the nature and level of the transaction costs are fundamental criteria to the long-term partnership between the organization and the farmer.

A significant number of farmers do not see or imagine the environmental issues present in their territory. A suggestion could be an EC as a vector for information diffusion and consciousness-raising about the territorial environmental features and issues. It could mainly be focused on strategies towards improving the territory, shaping the nature and landscape management and increasing the regional attractiveness. There may be an instinctive feeling from farmers to hide environmental issues, as they want to portray the best image of their region, even in an anonymous questionnaire. An eventual feeling of shame due to environmental issues would lead the farmer to avoid mentioning them. From the nature of Illinois farmers (through the study sample), a form of EC from the perspective of promoting and valorizing the territory and its natural resources would be certainly welcomed and very much accepted.

Verification of the research study's hypothesis

Based on the hypothesis set in the general introduction, the research study can conclude that there are in the U.S. similar values and interests like the ones represented by the Dutch ECs. Second, some farmers (characterized by certain features) seem willing to implement this kind of structure as it responds to the current demands and contribute to environmental conservation issues. Third, an U.S. EC could indeed facilitate conservation practice implementation, which could likely reduce transaction costs and administration burden for the farmers. Finally, the obstacles and

constraints to the implementation of such cooperative in Illinois are indeed linked to the types of farms, farming practices, perception of the environment by the farmers, and current policies (currently there is a strong emphasis for solving environmental pollution and resource degradation rather than on the benefits from agriculture).

Predictions of the implementation of an environmental cooperative in Illinois

Predictions of implementation. The creation of a structure such an EC in a setting other than the initial one (e.g. Illinois – U.S.) requires analyzing the hypothetical process of implementation and its different issues which determine the impact of the cooperative on its surroundings and on the community. It was observed in this study that an EC in Illinois would hold different characteristics and criteria as compared to the ones found in the Dutch model, although they would share common features. A variation in some of the characteristics between the Dutch EC and the hypothetical Illinois environmental cooperative implies differences in the institutional framework and differences in the rules and governing methods, which would impact differently on the farmer-members and on the way they reflect on their community and territory. The consequences for consumers and on development of the area at large would then be different too.

The structure of EC implies a degree of professionalism in order for the farmer to be able to design and project his own model of the future. That is why member-farmers must have access to the knowledge and expertise they need to reorient themselves in the direction of this project (e.g. about the management of nature and landscape). The consultation with specialized organizations and experts enable them for instance to get updated information about new technologies and methods available. From the literature about the U.S. setting, it seems that the U.S. hold the means to disseminate knowledge

efficiently (e.g. information, innovations) over the farms and to the farmers. This is as a result of various organizations specialized in this field and to the presence of environmental organizations at the different levels (e.g. county, state, Federal Administration) and their network connections. Knowledge and skills diffusion is an important element of the successful development of an EC and it seems that this capacity exists in the U.S. However, after information provision, the attention focuses on helping and supporting the farmers who are interested in implementing changes to succeeding in that direction and consequently offering long-term means/assistance. It seems that this point is often realized at an individual level, but some farmers miss the continuation of advice and assistance from external entities. This could be more effectively realized as part of collective action and common projects between farmers under the umbrella of an EC. The effectiveness of the farm changes in farming practices/innovations/patterns could then be more effective in the long run.

Through the EC, farmers would benefit from the collective action and the sharing with other farmers around a same desire and interest. It is very beneficial in the sense that the farmer could therefore be a higher risk-taker and pioneer in the elaboration of new strategies and the adoption of innovations of which he has been informed. Indeed, alone, he probably does not dare launching such new and uncertain plans. As part of an EC, he would be supported by other farmers and the cooperative itself with which he would share the risks and costs involved.

Challenges. The questions and predictions about the extent to which an EC would be beneficial in the U.S. to the rural area and territory in the long term (in terms of economic rural development) might be delicate to answer. First of all, in the Netherlands

there is also a lack of answers and studies about the Dutch EC case. Moreover, it is important to note the difficulty of drawing conclusions and predictions from general dispositions observed on a certain population of individuals. The behavioral, attitude and perception observations and their analysis have a certain limit and are described as “poor predictors of behavior in specific situations” (AJZEN, 1991). The attitude concept might not be completely trustful and might lead to a reality which had not been expected from the results of the attitude analysis. (AJZEN, 1991)

The present research study implied a relative large set of questions during which the farmer-participant was put in various situations. The poor predictive validity of the farmers’ future attitudes could be overcome through the aggregation of specific behavior across occasions, situations, and action simulations which have been suggested through the questionnaire. Behind, there is the idea that any single behavior reflects the influence of a general disposition as well as “the influence of various other factors unique to the particular occasion, situation, and action being observed”. By aggregating the different behaviors, these other sources of influence tend to cancel each other, and the aggregate becomes more valid. More valid predictions can therefore be formulated.

Suggestions and Further Recommendations

First of all, a crucial point to increase the representativeness of the study would be to look for ways to enlarge the sample of farmers. One of the possibilities would be by increasing the number of known and reliable contacts on the field who could directly communicate with farmers.

Empirical study

In the field. An investigation on the field including meeting the potential actors of an EC, especially the farmers, from the results obtained from the questionnaire survey

and as a complement to it, would enable the collection of further information and qualitative data. It would refine the design of the model of the implementation of an environmental cooperative in a U.S. setting. The investigation of the field could be carried out in different places in Illinois and meet different types of production and farmers (e.g. different in terms of farm objectives, connection to the environment, and interactions with the other actors). It would enable the collection of information and data which are not expected or visible through the questionnaire, and certainly the collection of explanations to the results of the questionnaire.

Focus groups. In addition of meeting the actors face-to-face and individually, the organization of focus groups, bringing together several actors, either from a same profession (e.g. farmers) or from different professions would enable the extraction of a different kind of information. The situation put participants in direct contact and interaction with each other. The information is provided more quickly than in the case of individual interviews. Also the group dynamics can directly give the direction of relevant issues the actors are facing (as compared to a list of questions designed by the interviewer) which can speed up the process and generate new thinking about a topic, resulting in more in-depth discussions. The moderator of the discussion gets then relevant information quicker. Also, due to the dynamic environment the moderator can modify the topics previously prepared in order to make them more suitable for the purpose according to the types of participants present. The expression and attitudes of the participants is also to be taken into account.

Targeting other actors present in the functioning of the environmental cooperative

Beside the research study with the farmers as the target population, further precision about the potential of implementation of an EC in the U.S. could be studied through observing the potential of the other parties of EC's membership as part of the U.S. setting. It would deal with leading a similar investigation like the one involving the farmers, but on organizations specialized in environmental conservations and in nature management, on people from legislative bodies (authorities at the regional - State and county - and local level), networking actors (e.g. people helping in the process of connecting farmers and consumers, or in certain forms of farming education), consumers, and people from research institutes such as university.

The main problematic which could be studied as part of these complementary investigations should be as follows.

On the side of the authorities. Could the potential and incentives towards the creation of ECs be enhanced? What would be the main impediments? How would the State and local authorities take part on the functioning of the EC? An important element to be considered is the way the government could support the structure of EC. Some studies about the perception of the government for such innovative institutional framework reported that such entities and government often consider "deviation from generic rules at risky (loss of control) and as a blow to their authority". There is difficulty in acknowledging the benefits of methods developed by pioneers in that field, and even distrust in the effects that could confirm the results. (DE ROOIJ, 2006)

On the side of specialized organizations. Future studies can deal with on one hand specialized organization or agencies oriented towards the conservation of the

environment and landscape management, and on the other hand with specialized U.S. organizations which tend to own the same kind of structure/characteristics as the EC (e.g. self-governance). The research question would be stated as: Would these organizations be willing to design contracts with such cooperative and to share knowledge and work closely with the farmers and other actors?

On the side of the consumers/local population. Would consumers or local population be willing to welcome this structure? Would they have the desire to participate/contribute to its development? In reference to a precision from a Dutch study, the Dutch farmers are apparently not able to charge consumers environmental costs (cost linked to the environmental damages generated by the production process) because farmers are price takers and not price makers (distribution companies can easily import from other regions). Also, consumers would not be willing to pay extra for an ecologically sound food product (the case of the successful niche of organic products is special and represents only a low percentage of the consumption), therefore the investigations on consumers must not be focused on whether U.S. consumers would be willing to pay an extra amount for products from the EC. The response may very likely be negative.

Model design

With the suggested further analysis and with extra quantitative data in both areas Illinois and the Netherlands, it may be possible to construct a model which could predict the potential of implementation of an EC in a U.S. setting as well as its future. The design of a model would enable calculating certain predictions, which was not possible regarding as per the extent of the present research study (lack of resource availability). The potential effects of the EC on U.S. farmers and other actors, as compared to the

Netherlands case could be analyzed. By fitting the model to various variables important for a successful environmental cooperation, as extracted from the Dutch literature, it would give recommendations for the right and feasible U.S.' combination of parameters maximizing the possibility of successful ECs - optimal alternative to the marketing mechanisms for the farmers. Quantitative variables such as U.S. farmers' transaction costs in implanting the conservation practices guided by the conservation programs, current economic gains of conservation practices for U.S. farmers as part of their total revenue, and farmers' transaction costs reduction generated by the EC in the Netherlands would be for example needed to run the model and obtain figured prediction of the likely development of an EC in the U.S., and figured comparison of the effects of such structure on the community as a whole in the U.S. versus the Netherlands. The model would test the following hypothesis:

- Would the negative pitfalls on the local community be positive with the implementation of the environmental cooperative in the U.S.?
- Would the costs of the U.S. farmers be lower than in the current situation?
- Comparison of the predicted means with the ones of the Netherlands

Secondly, the model would give long term predictions of the cooperative, including the analysis of the following.

- The extent to which a reduction in operational and transaction costs for the farmers in the U.S. is possible
- The benefits of the environmental cooperative to the environment (considering the current environmental issues existing in the U.S.)
- The economic and social gains for U.S. farmers
- The benefits for the communities and the rural development of the area (e.g. attractiveness, tourism, marketing image)

APPENDIX QUESTIONNAIRE

Q1.1 Institute of Food and Agricultural Sciences College of Agricultural and Life Sciences Food and Resource Economics Dear Sir or Madam, The purpose of this research project is to compare the environmental conservation practices within the farming system between the Netherlands and the U.S., and the structures and functions of the agricultural cooperatives. This research project is being conducted by Marie Ferré, a graduate student at the University of Florida. The purpose is to determine whether Dutch "Environmental Cooperatives" which have as one of their goals the promotion of positive environmental side benefits from farming, might serve as a model for similar organizational structure in the U.S. Since there have been no such studies on U.S. farmers' perceptions vis-à-vis such structure in the past, I kindly welcome you to participate in order to understand this question and its implications. Your participation in this research study is voluntary, you may withdraw at any time, and your responses will be kept confidential and anonymous. The procedure involves filling a questionnaire that will take about 15 minutes. Your responses will be kept confidential and anonymous. The questions will refer to some general farm and geographical characteristics, extra-farm activities, perceptions of conservation programs, attitude toward collaboration and cooperation with other farmers, and perception of the farmer profession. The results of this study will be used for scholarly purposes only, and will be shared with you once the research is concluded, or upon your request. If you have any question about the research study, please contact the investigator Marie Ferré (mferre@ufl.edu). This research has been reviewed according to the University of Florida's Institutional Review Board of the procedure for research involving human subjects. Once you start the survey, you are able to edit it during the following week, it will then be automatically recorded after that period of time. As both a farmer and a citizen, please check the answer(s) which characterize(s) your farm and yourself. I have read the above information and accept it. On my own will, I choose to take part to the study.

- Yes (1)
- No (2)

Q2.1 Please check the box which includes your age:

- 20-30 (1)
- 30-40 (2)
- 40-50 (3)
- 50-60 (4)
- >60

Q2.2 What do you expect will happen to your farm in the next 10 years?

- Farm enterprises will remain relatively stable (1)
- Farm enterprises will expand significantly (2)
- Farm will be inherited by a family member or other relative (3)
- Farm will be sold/rented out for agricultural purposes (4)
- Farm will be sold for non-agricultural purposes (5)

Q2.3 What is your highest level of education?

- Primary (1)
- Secondary (2)
- Post-secondary (trade school, junior college) (3)
- University (4)

Other: (5) _____

Q2.4 Where is your center of operations in Illinois (county and city/town enough)?

Q2.5 Please check any of the following that fit your farming operation:

- Hog (1)
- Dairy (2)
- Grains (3)
- Fruits and Vegetables (4)
- Others: (5) _____

Q2.6 Please, describe your main farming enterprises: Crops (in acres)

Q2.7 Livestock (annual total)?

Q2.8 Average farming sales/year:

- < \$100,000 (1)
- \$100,000-\$249,999 (2)
- \$250,000-\$499,999 (3)
- \$500,000-\$1M (4)
- >\$1M (5)

Q2.9 How do your production levels compare to the Illinois averages?

- 2 = Much lower than average (1)
- 1 (2)
- 0 = close to average (3)
- + 1 (4)
- +2 = much higher than average (5)

Q2.10 How much impact do you think the following factors have on your production levels?

	1 = No impact (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 = High impact (6)
Level of inputs (e.g. fertilizers, genertic, labor) (1)	<input type="radio"/>					
Efficiency of the use of resources (e.g. through application of precision agriculture technologies) (2)	<input type="radio"/>					

Q2.11 What is the status of your farm management?

- Family proprietorship (1)
- Family corporation (2)
- Family partnership (3)
- Other: (4) _____

Q2.12 How important is civic responsibility to you?

- 1 = Not important (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very important (6)

Q2.13 How frequently do you try new farming practices or technologies?

- More than 1 new practice/technology per year (1)
- About 1 new practice/technology per year (2)
- 1 new practice/technology every few year (3)
- Less than 1 new practice/technology every 5 years (4)

Q3.1 How important is the identity of your region to you?

- 1 = Not important (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very important (6)

Q3.2 Do you feel you contribute to the identity of your region?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very significantly (6)

Q3.3 If yes, could you explain how? (e.g. specific local type of farming and management practices adopted, local market contribution with specific products):

Q3.4 Are you interested in increasing your contribution to the identity of your region?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very interested (6)

Q3.5 Are you proud of being part of your region?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very proud (6)

Q3.6 With the right opportunities and incentives, would you be interested in participating in efforts to enhance the identity of your region and to promote other unique characteristics of your region?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very interested(6)

Q3.7 Are you influenced by your neighboring farmers' (or community's) activities?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = A lot (6)

Q4.1 Are you engaged in any of the following extra-farming activities?

- None (1)
- Environmental and landscape management (2)
- On-farm selling products (3)
- Agro tourism (4)
- Farmers' organization(s)/association(s) (5)
- Political involvement (7)
- Other: (6) _____

Q4.2 Which are the main reasons for your extra-farming activities?

- Extra-revenue (1)
- Spreading the risk of farm income (2)
- New employment opportunities for the area (3)
- Pleasure (4)
- Extra employment on the farm (e.g. for your partner) (5)
- Enhancing social contacts (6)
- Improving the image of the agricultural sector (7)
- Other: (8) _____

Q4.3 What percentage of your annual farm income is derived from extra-farm activities (approximately)?

Q4.4 Have you ever heard about the concept of multi-functionality in agriculture (non-commercial benefits of agriculture)?

- Yes (1)
- No (2)
- Other: (3) _____

Q4.5 How are you increasing the multi-functionality of your farm?

- Landscape management, wildlife habitat creation, biodiversity maintenance (1)
- Improvement of nutrient recycling and carbon sequestration (2)
- Water management, improvement of water quality (3)
- Renewable energy (wind, solar, biomass...) (4)
- Contribution to rural cohesion, historical heritages, agro-tourism activities (e.g. hunting spaces) (5)
- Contribution to food security and food safety (6)
- Other: (7) _____
- Not focusing on multi-functionality on my farm (8)

Q4.6 Are you interested in doing more to increase the multi-functionality of your farm?

- 1 = Not interested (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very interested (6)

Q5.1 Have you observed environmental degradation/pollution in your community?

- Yes (1)
- No (2)
- Other: (3) _____

Q5.2 If yes, could you please briefly mention them:

Q5.3 How well do you think these environmental issues are being handled?

- 1 = Nothing is done for it (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Appropriate measures and plans have been implemented to address the issues (6)

Q5.4 Do you think that cooperation between farmers in the management of projects intended to combat environmental pollution can lead to more efficient and effective results?

- Yes (1)
- No (2)
- Other (3)

Q5.5 Do you think farmers should have an important role in solving the environmental issues in your community?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.1 Have you ever participated in carbon off-set program?

- Yes (1)
- No (2)
- Other (3) _____

Q6.2 What do you think about increasing farmer involvement in conservation practices (e.g. through market systems, financial rewards systems...etc.)?

- 1 = Strongly disagree / no need for it/it would even get worse (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Strongly agree / urgent need, more incentives needed (6)

Q6.3 Are you enrolled in any conservation programs?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.4 If yes, which ones?

Q6.5 What are the **main** reason(s) why you enrolled in these conservation programs?

- Extra farm income (1)
- Requirement to get commodities payments (2)
- Conviction of its necessity in order to preserve the environment and natural resources (3)
- Further possibility of extra-income through alternative activities (e.g. green tourism) (4)
- Improving the image of agriculture (social pressure) (5)
- Other: (6) _____

Q6.6 What are the main barriers to participation in conservation programs?

- Heavy administration burden (1)
- Lack of knowledge (2)
- Strong monitoring (3)
- Public perception (4)
- High requirements (5)
- Other: (6) _____

Q6.7 How would you characterize the transaction costs associated with enrolling in conservation programs (bureaucracy, administrative procedure, time, pre-evaluation etc.)?

- 1 = Very low (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very high (6)

Q6.8 How would you characterize your investment costs, operational costs and time spent on conservation practices?

- 1 = Very low (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very high (6)

Q6.9 Have you ever refused to enroll in a conservation program because of the investment costs involved?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.10 How well do conservation programs apply/fit to your particular farming practices?

- 1 = Badly / inconsistency / even threat (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very well / completely adapted (6)

Q6.11 Have you ever adopted an environmental practice that you didn't really want to?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.12 Do you ever feel that you are not given any or enough say (e.g. from Federal and State authorities) in the environmental policies that affect you?

- 1 = Never (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Often (6)

Q6.13 Have you ever wished for more advice from authorities or external advisors regarding the application of a specific conservation practice?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.14 How much do the conservation programs that you currently participate in constrain the management of your farm?

- 1 = Very constraining (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Not constraining at all (6)

Q6.15 Do you wish for more freedom in your choice of environmental practices to accomplish given environmental objectives?

- Yes (1)
- No (2)
- Neutral (3)

Q6.16 Do you feel a responsibility or duty to implement conservation management practices?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Yes, it is my duty (6)

Q6.17 What do you think about stricter environmental policies?

- 1 = No /strongly disagree (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Necessary (6)

Q6.18 What do you think about more targeted environmental policies (in terms of community characteristics and environmental issues specific to your area)?

- 1 = Not necessary (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very desirable (6)

Q6.19 Have you implemented conservation practices because of personal initiative rather than incentives?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.20 Have you implemented nature and landscape management because of personal initiative?

- Yes (1)
- No (2)
- Other: (3) _____

Q6.21 Would you implement more natural landscape management if there were more financial support?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Yes completely (6)

Q6.22 How well do you think current and historical U.S. and Illinois conservation programs have fulfilled their objective to restore and preserve the environment and landscape?

- 1 = Very badly (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very well (6)

Q7.1 Are you part of a farmers' cooperative?

- Yes (1)
- No (2)
- Other (3)

Q7.2 Which kind of cooperative?

Q7.3 What are your benefits for being part of the cooperative?

- Cheaper prices of inputs (1)
- Better market opportunities (2)
- Easier to follow administrative and governmental requirements (3)
- Learning system (4)
- Better access to the information (5)
- Other (6) _____

Q7.4 As a member of a cooperative, do you experience a real environment of cooperation among the farmer members?

- 1 = No / nothing else other than economic benefit from the cooperative (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6= Completely / sharing of knowledge and experiences (6)

Q7.5 In what extent do you feel tied to the goals and guidance of the cooperative?

- 1 = Low degree (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = High degree/constraining (6)

Q7.6 Do the services/options offered by the cooperative correspond to the expectations of your cooperative's members?

- Yes (1)
- No (2)
- Other (3) _____

Q7.7 Are there some services or options from the cooperative which you think are missing?

- Yes (1)
- No (2)
- Other: (3) _____

Q7.8 Do you wish for greater independence from the cooperative, in relation to the authorities (e.g. in the design of the cooperative's strategies)?

- Yes (1)
- No (2)
- Other: (3) _____

Q7.9 Note: From this point, the next questions are no longer related to any particular cooperative's membership. Do you share knowledge about your profession with other farmers?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = A lot (6)

Q7.10 Are you part of any other voluntary organizations?

- Yes (1)
- No (2)
- Other (3) _____

Q7.11 If yes, which ones?

Q7.12 Are you part of a local food system initiative (e.g. CSAs)?

- Yes (1)
- No (2)
- Other (3)

Q7.13 If yes, which one(s)?

Q7.14 Can you mention your main benefit(s) of being part of local food system initiatives (relatively to the case you would not)?

Q7.15 Are you using external assistance / technical advice to improve the management of your farm?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = A lot (6)

Q7.16 To what extent do you share your professional skills with external stakeholders (non-farmers)?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = A lot (6)

Q7.17 To what extent are you open to working collaboratively and sharing information with the farmers in your area?

- 1 = Not open at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very open (6)

Q7.18 Would you appreciate working **with neighboring farmers** on environmentally-oriented projects?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Yes, completely (6)

Q7.19 Do you think more cooperation between farmers in natural landscape management would help to achieve better results?

- 1 = Yes (1)
- No (2)
- Other (3)

Q7.20 Would you appreciate and feel comfortable working **with non-farmers** within your region on environmentally-oriented conservation projects (considering that these non-farmers may have certain skills)?

- 1 = Not at all / incompatible (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Completely / beneficial (6)

Q8.1 What is the main reason you are a farmer?

- Own choice / vocation (1)
- Economic opportunity (2)
- Family business (3)
- Other reason: (4) _____

Q8.2 Do you enjoy farming?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Passionate about it (6)

Q8.3 To what extent do you care about the public image of your farm?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Completely (6)

Q8.4 In the decision-making process of your daily farm management, do you make decisions starting:

- Either from the expected outcomes (i.e. revenue) (1)
- Or from the local and natural characteristics of the environment (2)
- Other: (3) _____

Q8.5 Which level of dependence / independence do you prefer while working?

- 1 = Working alone and according to my own evaluation (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Following guidance / external goals (6)

Q8.6 How do you perceive your profession?

- As a production job (1)
- As a provider of landscape and natural environment (2)
- As a user and manager of natural resources (3)
- As a protector of natural resources (4)
- Other: (5) _____

Q8.7 How do you qualify the current food production system?

- As a fragmented chain containing the link "farming/agriculture", with minimum collaboration among the various actors (1)
- As an integral system requiring collaboration between the various actors constituting it and the different levels of authorities (2)
- Other view: (3) _____

Q8.8 Do you feel that the existing farming system is disconnected from the local community/consumers?

- 1 = Not at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Yes, completely disconnected (6)

Q8.9 To what extent do you seek compatibility between your farming practices and the surrounding natural environment/natural resources?

- 1 = No search for compatibility (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = search for compatibility and synergy / a condition for higher yields and sustainable production (6)

Q8.10 How do you feel about the degradation of the environment and landscape, and the exhaustion of some of the natural resources (e.g. biodiversity, bees, water quality etc.)?

- 1 = No concerns at all (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)
- 6 = Very concerned/worried (6)

Q8.11 As a farmer do you feel you play a key role in the management of regional landscapes?

- Yes (1)
- No (2)
- Other: (3) _____

Q8.12 Regarding environmental degradation partially resulting from agricultural practices, have you made changes in your farming system to stop or prevent further degradation?

- Yes (1)
- No (2)
- Other: (3) _____

Q8.13 If yes, could you briefly describe what you did?

Q8.14 How do you perceive the increasing demand for more sustainable agricultural production and more environmentally-sound products?

- An opportunity (1)
- A constraint on change (2)
- A threat (3)
- A potential for adaptation (4)
- Other: (5) _____

Q8.15 Is there a specific product from your farm you would like to expand and market (e.g. a specific quality product) but you are not able to do so?

- Yes (1)
- No (2)
- Other: (3) _____

Q8.16 Do you think that a higher cooperation with other farmers in your area would enable you to successfully expand and market your product related to the question above?

- Markedly stronger when joined (more weight and more credible to negotiate) (1)
- Constraining (less freedom, increase of the competition...) (2)
- Other (3) _____

Q115 Do you have any additional comments / information / suggestion you would like to share?

LIST OF REFERENCES

- AGGERI, F. (1999): Environmental policies and innovation, knowledge-based perspective on cooperative approaches, *Research Policy* 28 _1999. 699–717
<http://xcsc.xoc.uam.mx/apymes/webftp/documentos/biblioteca/Environmental%20policies%20and%20innovation.pdf> accessed 12.27.2012.
- AGRAWAL, A., GIBSON, C.C. (1999): Enchantment and Disenchantment: The Role of Community in Natural Resource Conservation, *USA World Development Vol. 27, No. 4*, pp. 629-649, 1999.
- Agricultural Economic Report No 834
http://www.ers.usda.gov/media/522926/aer834fm_1_.pdf accessed 10.05.2012.
- AJZEN, I. (1991): The Theory of Planned Behavior, *Organizational behavior and human decision processes* 50, 179-211 (1991).
- AMBLARD, L. (2011): The potential of collective action for the control of nonpoint source pollution in European rural areas.
- Association of Illinois Soil and Water Conservation Districts (2011)
http://www.aiswcd.org/Programs/education_activities.htm accessed on 01.08.2012.
- AUSEN, S.A.K. (2013): Local food, is it best for our environment? *The Porsgrunn Times* 30.04.2013, <http://matogvanntilverden.elevavis.no/?artID=60&navB=1> accessed 07.11.2013.
- BAYLIS, K., PEPLow, S., RAUSSER, G., SIMON, L. (2007): Agri-environmental policies in the EU and United States: A comparison, *Ecological Economics* 65 (2008) 753-764.
- National Center of Lexical and Textual Resources (2012), Nature,
<http://www.cnrtl.fr/definition/nature> accessed on 01.03.2012.
- CLAASSEN, R. (2012): The Future of Environmental Compliance Incentives in U.S. Agriculture, ERS.
- Conservation Technology Information Center (2013) <http://www.ctic.purdue.edu/> accessed on 08.20.3013.
- Conservation Technology Information Center (2006): Getting Paid for environmental Stewardship, An agriculture Community, Water Quality Trading Guide
http://ctic.paqinteractive.com/media/users/lvollmer/pdf/GPfS_final%281%29.pdf accessed on 01.09.2012.

- COOK, M.L. (1995): The Future of U.S. Agricultural Cooperatives: A Neo-Institutional Approach, *Oxford Journals*; Source: *American Journal of Agricultural Economics*, Vol. 77, No. 5, Proceedings Issue (Dec.1995), pp. 1153-1159 Published by: Oxford University Press, Stable URL: <http://www.jstor.org/stable/1243338> accessed on 07/30/2012.
- COWAN, T. (2007): An overview of USDA rural development programs, updated, CRS (Congressional Research Service) Report for Congress. http://lugar.senate.gov/services/pdf_crs/ag/21.pdf accessed on 12.23.2012.
- CROSS, M., FRANKS, J. R. (2007): Farmers and advisors attitudes towards the environmental stewardship scheme, *IFMA 16 – Theme 4*.
- CTIC (2002): Economic benefits with environmental protection, no-tills and conservation buffers in the Midwest, <http://www.ctic.org/media/pdf/Economic%20Benefits.pdf> accessed on 01.11.2012.
- CTIC (2002): Economic benefits with environmental protection, no-tills and conservation buffers in the Midwest, <http://www.ctic.org/media/pdf/Economic%20Benefits.pdf> accessed on 01.11.2012.
- DANIEL, F- J. (2012): La recomposition des solidarités entre agriculteurs aux Pays-Bas : écologisation des pratiques ou transformations managériales?, *Revue d'Etudes en Agriculture et Environnement*, 93 (1), 31-47 <http://www.raestud.eu/pdf/REAE-93-1-Daniel.pdf> accessed on 12.27.2012.
- DE ROOIJ, S. (2006): Territorial cooperative networks: new social carriers for endogenous rural development.
- DEMUTH, S. (1993): Community Supported Agriculture (CSA): An Annotated Bibliography and Resource Guide, USDA, National Agricultural Library, <http://www.nal.usda.gov/afsic/pubs/csa/csadef.shtml> accessed on 07.11.2013.
- ESHUIS, J. (2007): Trust and Control in Farmer–Government Partnerships: A Dutch Case Study, published In L. Cheshire, V. Higgins and G. Lawrence (eds) (2007) *International Perspectives on Rural Governance: New Power Relations in Rural Economies and Societies*, Abingdon: Routledge, pp. 21-37.
- ESHUIS, J., VAN WOERKUM, C. (2003): Trust and Monitoring in Governance Processes: Lessons from Landscape Management by Farmers in a Dutch Municipality, *Journal of Environmental Policy & Planning*, Vol. 5, No. 4, December 2003, 379-396.
- FERRIS, J., SIIKAMÄKI, J. (2009): Conservation Reserve Program and Wetland - Primary Land Retirement Programs for Promoting Farmland Conservation Reserve

Program http://www.rff.org/RFF/Documents/RFF-BCK-ORRG_CRP_and_WRP.pdf accessed on 04.10.2012.

- FOLSOM, J. (2003): Measuring the economic impact of cooperatives in Minnesota, Rural Business-Cooperative Service (RBS), Research Report 200.
- FRANKS, J. (2008): A Blueprint for green co-operatives: organizations for coordinating environmental management across farms holdings, *Journal of International Farm Management Vol.4. No.3*, University of Newcastle, England.
- FRANKS, J. (2010): Boundary organizations for sustainable land management: The example of Dutch Environmental Co-operatives, *Ecological Economics*, Elsevier B.V.
- FRANKS, J. (2008): Environmental co-operatives and the Dutch Government, <http://www.relu.ac.uk/research/Environmental%20co-op.pdf> accessed on 08.20.2013, shorter version of FRANKS, J. R. & MC GLOIN, A. (2007) Joint submissions, Output Related Payments and Environmental Co-operatives: Can the Dutch Experience Innovate UK Agri- Environment Policy? *Journal of Environmental Planning and Management 50 (2)*: 233-256.
- FRANKS, J.R, MCGLOIN, A. (2007): Environmental co-operatives as instruments for delivering across-farm environmental and rural policy objectives: Lessons for the UK, *Journal of Rural Studies 23 (2007)* 472–489, University of Newcastle, UK.
- GLASBERGEN, P. (2000) The Environmental Cooperative: Self-Governance in Sustainable Rural Development, *Journal of Environment & Development* pp. 240-259, online version of this article can be found at: DOI: 10.1177/107049650000900303.
- GROOT, J.C.J., JELLEMA, A., ROSSING, W.A.H. (2010): Designing a hedgerow network in a multifunctional agricultural landscape: Balancing trade-offs among ecological quality, landscape character and implementation costs, *European Journal of Agronomy 32 (2010)* 112-119.
- HAGEDORN, K. (2002): Institutional Arrangements for Environmental Cooperatives: a Conceptual Framework, *Environmental Cooperation and Institutional Change: Theories and Policies for European Agriculture*. New Horizons in Environmental Economics. Cheltenham, UK, and Northampton, MA, USA: Edward Elgar, 2002.
- HANSEN, H.O. (2009): Agricultural cooperatives and globalization: A challenge in future? University of Copenhagen, Institute of Food and Resource Economics http://www.ifmaonline.org/pdf/congress/09_Hansen.pdf accessed on 01.22.2012.

- HARDEN, G.H. (2012): Conservation Reserve Program – Soil Rental Rates
<http://www.usda.gov/oig/webdocs/03601-0051-Te.pdf> accessed on 10.05.2012.
- HARRISON, K. (1999): Talking with the Donkey: Cooperative Approaches to Environmental Protection, *Journal of Industrial Ecology*, Vol. 2, Number 3.
- HERMANN, A.J. (2003): The Illinois agricultural cooperatives Act: The possibility of and procedure for denying the voting rights of Stakeholders, Vol. 2002, from p. 177.
- HERNANDEZ-ESPALLARDO, M., ARCAS-LARIO, N., MARCOS-MATAS, G. (2011): Farmers' satisfaction and intention to continue membership in agricultural marketing co-operatives: neoclassical versus transaction cost considerations, *European Review of Agricultural Economics* pp. 1–22 doi:10.1093/erae/jbs024, Oxford University Press.
- HILCHEY, D., GILLESPIE, G., HENEHAN, B. (2006): Cooperatives in the Northeast United States, A Study of Organizational Characteristics, Manager, Member and Director Attitudes, and the Potential for Improving Regional Inter-Cooperative Collaboration, United States Department of Agriculture Small-Scale Grower.
- HOUSE COMMITTEE ON AGRICULTURE (2004): Examine new generation cooperatives and strategies to maximize farm and ranch income, Serial No. 108–18.
- <http://www.epa.state.il.us/permits/index.html>: IEPA, Bureaus.
- Illinois' Department of Agriculture (2011): Illinois Soil and Water Conservation Districts Directory 2011 (Jennings, T.E.),
<http://www.agr.state.il.us/Environment/LandWater/swcddirectory.pdf> accessed on 01.08.2012.
- Illinois Local and Organic Food and Farm Task Force (2009): Local Food, Farms and Jobs: Growing the Illinois Economy (GOVERNOR QUINN, P.)
<http://www.agr.state.il.us/about/orgdirectory/090.html> accessed on 11.06.2012.
- Illinois State Geological Survey, <http://www.isgs.illinois.edu> accessed on December 2012.
- JENNINGS, T.: 2009 Annual report Illinois' Department of Agriculture.
- KENKEL, P., PARK, J. (2011): Critical issues for agricultural cooperatives, *Choices – the magazine of food, farm and resource issues*
http://www.choicesmagazine.org/magazine/pdf/cmsarticle_179.pdf accessed on 01.18.2012.
- KENKEL, P. (2010): Understanding cooperative equity, Bill Fitzwater Cooperative Chair, Oklahoma State University.

- KOSSOY, A., GUIGON, P., AND AL (2012): State and trends of the Carbon Market 2012
- MATHIJS, M. (2002): Social capital and farmers' willingness to adopt countryside and stewardship schemes, No 6981, Katholieke Universiteit Leuven, Belgium, <http://purl.umn.edu/6981> accessed on 01.05.2012.
- MCGARIGAL, K. (2000): What is a landscape, University of Massachusetts, http://www.umass.edu/landeco/teaching/landscape_ecology/schedule/chapter3_landscape.pdf accessed on 01.03.2012.
- NACD (National Association of Conservation Districts) (2007): Conservation Title Food, Conservation and Energy Act of 2008 <http://www.nacdnet.org/policy/agriculture/farmbill/2007/NACD%20Farm%20Bill%20Conservation%20Title%20Summary.pdf> accessed on 10.02.2012.
- National Council on Farmers' Cooperatives (2013), Year of the Farmer Co-op Celebration Launched at NCFC's 83rd Annual Meeting <http://www.ncfc.org/news/year-of-the-farmer-co-op> accessed on 08.01.2013.
- National Council of Farmers' cooperatives (2010): About Co-ops, <http://www.ncfc.org/about-ncfc/about-co-ops> accessed on 08.20.2013.
- NORMILE, M.A., LEETMAA, S.E. (2004): U.S. - EU Food and Agriculture comparisons, changing trends highlight similarities and differences between U.S. and EU Food and ag sectors, USDA.
- NRCS, USDA (March 2011): Wildlife Habitat Incentive Program http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1041995.pdf accessed on 10.04.2012
- OOSTINDIE, H.: An introduction to environmental cooperatives, Department of Social Sciences - Rural Sociology Group, Wageningen University (CLM 2009 data) http://diaplan.ku.dk/pdf/historien_om_de_hollandske_miljoe_og_omraade_cooperativer.pdf/ accessed 12.26.2012.
- PENN, J.E., EVERSULL, E.E. (2011): Cooperatives statistics 2010, USDA, Service Report 71.
- POLLICE, F. (2006): The role of territorial identity in local development process <http://www.openstarts.units.it/dspace/bitstream/10077/841/1/b3pollic.pdf> accessed 07.21.2013.
- POLMAN, N., PEERLINGS, J. (2002): The Role of Transaction Costs and Bargaining Power in Wildlife and Landscape Services Production: A Micro-Econometric

- Model for Dutch Dairy Farms, Congress 'Exploring Diversity in the European Agri-Food System', Zaragoza (Spain), 28-31 August 2002.
- POLMAN, N.B.P. (2002): Institutional economics analysis of Contractual arrangement, Managing wildlife and landscape on Dutch farms, Wageningen University.
- REIMER, A.P., THOMPSON, A.W., PROKOPY, L.S. (2011): The multi-dimensional nature of environmental attitudes among farmers in Indiana: implications for conservation adoption, *Agric Hum Values* (2012) 29:29–40, DOI 10.1007/s10460-011-9308-z.
- RENTING, H., MARSDEN, T.K., BANKS, J. (2003): Understanding alternative food networks: exploring the role of short food supply chains in rural development, *Environment and Planning A* 2003, Vol.35, pp. 393-411.
- ROEP, D., VAN DER PLOEG, J.D., WISKERKE, J.S.C. (2003): Managing technical-institutional design processes: some strategic lessons from environmental co-operatives in the Netherlands, pp. 195-217, Rural Sociology Group, Wageningen University, the Netherlands.
- ROHEIM, C.A., DURHAM, C., KING, R., JOHNSON, A., MCCLUSKEY, J., PARDOE, I., FLORES, J., ZHAO, H. (2007): Rhode Island Consumers' Preferences for Locally-Produced Food: Report on Results from a 2006 Survey
<http://cels.uri.edu/sustainableag/docs/URI%20local%20produce%20report.pdf>
accessed on 07.15.2013.
- ROMANO, D. (2003): Environmental economics and sustainable development, NAPC
- Soil and Water Conservation Society and Environmental Defense Fund (2008): Conservation reserve program (CRP) program Assessment,
http://www.swcs.org/documents/filelibrary/CRPassessmentreport_3BEFE868DA166.pdf accessed on 08.26.2013.
- STUIVER, M., VAN DER PLOEG, J.D., LEEUWIS, C. (2003): The VEL and VANIA environmental co-operatives as field laboratories, pp. 27-39, rural sociology group Wageningen University.
- SULLIVAN, P., HELLERSTEIN, D., HANSEN, L., JOHANSSON, R., KOENIG, S., LUBOWSKI, R., MCBRIDE, W., MCGRANAHAN, D., ROBERTS, M., VOGEL, S., BUCHOLTZ, S. (2004): The Conservation Reserve Program Economic Implications for Rural America.
- Illinois' Department of Agriculture and Bureau of Land and Water Resources (2010): Illinois conservation partnership annual report
<http://www.agr.state.il.us/pdf/2010conservationannualreport.pdf> accessed on 01.22.2012.

- THE NATIONAL COOPERATIVE MONTH PLANNING COMMITTEE (2005): Cooperative Businesses in the United States, a 2005 Snapshot.
- University of Illinois Extension, from the 2007 Census of Agriculture and 2011 Illinois Annual Bulletin.
- USDA - SNAP to health (2010), Farm Bill and USDA <http://www.snapttohealth.org/farm-bill-usda/u-s-farm-bill-faq/> accessed on 08.20.2013.
- USDA (2004): Financial Profile of the 100 Largest Agricultural Cooperatives, 2002, *Research report 204*.
- USDA (2012): Preserving Common Ground - Rural cooperatives http://www.rurdev.usda.gov/supportdocuments/RDCoopMag_NovDec12.pdf accessed on 01.19.2012.
- USDA (2010): FY 2010 Budget Summary and Annual Performance Plan, <http://www.obpa.usda.gov/budsum/FY10budsum.pdf> accessed on 08.26.2013.
- USDA Rural Development (2010): Cooperatives statistics 2010, *Service Report 71*.
- USDA, NASS, Illinois Field Office, 2011: *Illinois Agriculture*.
- VAN DER PLOEG, J.D., RENTING, H. (2001): Environmental co-operatives reconnect farming, ecology and society, *Reconnecting nature, farming and society: environmental cooperatives in the Netherlands as institutional arrangements for creating coherence*, chapter 7.2, pp. 222-227, Wageningen University, the Netherlands http://www.compasnet.org/blog/wp-content/uploads/2011/03/ARNS/arns_22.pdf accessed on 12.25.2012.
- VAN DER PLOEG, J.D., VERSCHUREN, P., VERHOEVEN, F., PEPELS, J. (2006): Dealing With Novelties: a Grassland Experiment Reconsidered, *Journal of Environmental Policy & Planning*, Vol. 8, No. 3, pp. 199–218, 1523-908X, Department of Rural Sociology, Wageningen University, the Netherlands.
- VAN DIJK, G. (1998): Sustainable agriculture and environmental cooperatives in the Netherlands, National Cooperative Council, the Netherlands <http://www.fao.org/WAIRDOCS/LEAD/X6142E/X6142E00.HTM> accessed on 12.24.2012.
- VAN HUYLENBROECK, G., VANDERMEULEN, V., METTEPENNINGEN, E., VERSPECHT, A. (2007): Multifunctionality of Agriculture: A Review of Definitions, Evidence and Instruments, *Living Rev. Landscape Res.*, 1, (2007), 3, ISSN 1863-7329.
- WALZER, N., MERRETT, C.D. (2002): Collaboration, new generation cooperatives and local development, *Journal of the community development society*, Vol. 33 N° 2.

WISKERKE, J.S.C., BOCK, B.B., STUIVER, M., RENTING, H. (2003): Environmental co-operatives as a new mode of rural governance, pp. 9-25, Wageningen University, the Netherlands.

WUERTHNER, G. (2008): The Problems with the Conservation Reserve Program, the counterpunch, Weekend Edition April 11-13, 2008, <http://www.counterpunch.org/2008/04/11/the-problems-with-the-conservation-reserve-program/> accessed on 01.29.2013.

BIOGRAPHICAL SKETCH

Marie Ferré has grown up in the city of Bar-sur-Aube in France. After high school, interested in biology, she decided to do a “preparatory class” in Paris, with biology, mathematic, chemistry and physics for dominants. Three years later, she was admitted to the national agronomic school “Agrocampus-Ouest” in Rennes - France. As part of this training, she pursued an international master in agriculture economic and rural development (2011-2013), including one semester course in Gent (Belgium), one semester course in Berlin (Germany), one month case study in Pisa (Italy) and finally one year at the University of Florida (U.S.) which included courses and the master’s thesis research. Her interest for the management of natural resources and environment, the different forms of cooperation between territorial stakeholders, and the study of different perspectives and approaches among countries led her to choose this master’s thesis research.